Table Of Contents

1. Welcome to the new module handbook of your study programme .......................................................... 11

2. About this handbook .................................................................................................................................. 12
   2.1. Notes and rules ....................................................................................................................................... 12
      2.1.1. Begin and completion of a module ............................................................................................... 12
      2.1.2. Module versions ............................................................................................................................ 12
      2.1.3. General and partial examinations .............................................................................................. 12
      2.1.4. Types of exams ............................................................................................................................ 12
      2.1.5. Repeating exams .......................................................................................................................... 12
      2.1.6. Examiners .................................................................................................................................... 13
      2.1.7. Additional accomplishments ...................................................................................................... 13
      2.1.8. Further information .................................................................................................................... 13
   2.2. Contact ................................................................................................................................................. 13

3. The Master’s degree program in Economics Engineering .......................................................................... 14
   3.1. Qualification objectives of the Master’s program in Economics Engineering .................................. 14
   3.2. Structure of the Master’s degree program in Economics Engineering (M.Sc) SPO 2015 ............ 14
   3.3. Key Skills ............................................................................................................................................ 15

4. Field of study structure.................................................................................................................................. 16
   4.1. Master Thesis ....................................................................................................................................... 16
   4.2. Economics .......................................................................................................................................... 16
   4.3. Business Administration .................................................................................................................... 17
   4.4. Informatics .......................................................................................................................................... 17
   4.5. Operations Research ........................................................................................................................... 18
   4.6. Compulsory Elective Modules 1 ......................................................................................................... 19
   4.7. Compulsory Elective Modules 2 ......................................................................................................... 22

5. Modules ...................................................................................................................................................... 25
   5.1. Advanced Module Logistics - M-MACH-104888 ................................................................. 25
   5.2. Advanced Topics in Public Finance - M-WIWI-101511 ..................................................... 26
   5.3. Advanced Topics in Strategy and Management - M-WIWI-103119 ..................................... 27
   5.4. Agglomeration and Innovation - M-WIWI-101497 ................................................................. 28
   5.5. Analytics and Statistics - M-WIWI-101637 .................................................................................. 29
   5.6. Applied Strategic Decisions - M-WIWI-101453 ................................................................. 30
   5.7. Automated Manufacturing Systems - M-MACH-101298 ....................................................... 31
   5.8. BioMEMS - M-MACH-101290 .............................................................................................. 32
   5.9. Business & Service Engineering - M-WIWI-101410 ................................................................. 34
   5.10. Collective Decision Making - M-WIWI-101504 ....................................................................... 35
   5.11. Combustion Engines I - M-MACH-101275 .............................................................................. 36
   5.12. Combustion Engines II - M-MACH-101303 .............................................................................. 37
   5.13. Control Engineering II - M-ETIT-101157 ................................................................................. 38
   5.15. Data Science for Finance - M-WIWI-105032 .......................................................................... 40
   5.16. Data Science: Advanced CRM - M-WIWI-101470 .......................................................... 41
   5.17. Data Science: Data-Driven Information Systems - M-WIWI-103117 ............................ 43
   5.18. Data Science: Evidence-based Marketing - M-WIWI-101647 .............................................. 45
   5.19. Designing Interactive Information Systems - M-WIWI-104080 ............................................. 46
   5.20. Digital Service Systems in Industry - M-WIWI-102808 .................................................... 47
   5.22. Econometrics and Statistics II - M-WIWI-101639 ............................................................... 49
   5.23. Economic Theory and its Application in Finance - M-WIWI-101502 ....................................... 50
   5.24. eEnergy: Markets, Services and Systems - M-WIWI-103720 ......................................... 51
   5.25. Electives in Informatics - M-WIWI-101630 .......................................................................... 52
   5.27. Emphasis in Informatics - M-WIWI-101628 ........................................................................... 56
   5.28. Energy and Process Technology I - M-MACH-101296 .......................................................... 58
   5.29. Energy and Process Technology II - M-MACH-101297 .......................................................... 59
   5.32. Entrepreneurship (EnTechnon) - M-WIWI-101488 ............................................................ 62
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Code</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.33. Environmental Economics - M-WIWI-101468</td>
<td></td>
<td>63</td>
</tr>
<tr>
<td>5.34. Experimental Economics - M-WIWI-101505</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>5.35. Extracurricular Module in Engineering - M-WIWI-101404</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>5.36. Finance 1 - M-WIWI-101482</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>5.37. Finance 2 - M-WIWI-101483</td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>5.38. Finance 3 - M-WIWI-101480</td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>5.39. FinTech Innovations - M-WIWI-105036</td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>5.40. Fundamentals of Transportation - M-BGU-101064</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>5.41. Generation and Transmission of Renewable Power - M-ETIT-101164</td>
<td></td>
<td>71</td>
</tr>
<tr>
<td>5.42. Global Production and Logistics - M-MACH-101282</td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>5.43. Governance, Risk &amp; Compliance - M-INFO-101242</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>5.44. Growth and Agglomeration - M-WIWI-101496</td>
<td></td>
<td>74</td>
</tr>
<tr>
<td>5.45. High-Voltage Technology - M-ETIT-101163</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>5.46. Industrial Production II - M-WIWI-101471</td>
<td></td>
<td>76</td>
</tr>
<tr>
<td>5.47. Industrial Production III - M-WIWI-101412</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>5.48. Informatics - M-WIWI-101472</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>5.49. Information Engineering - M-WIWI-101411</td>
<td></td>
<td>82</td>
</tr>
<tr>
<td>5.50. Information Systems in Organizations - M-WIWI-104068</td>
<td></td>
<td>83</td>
</tr>
<tr>
<td>5.51. Innovation and Growth - M-WIWI-101479</td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>5.52. Innovation Economics - M-WIWI-101514</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>5.53. Innovation Management - M-WIWI-101507</td>
<td></td>
<td>86</td>
</tr>
<tr>
<td>5.54. Integrated Production Planning - M-MACH-101272</td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>5.55. Intellectual Property Law - M-INFO-101215</td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>5.56. Lean Management in Construction - M-BGU-101884</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>5.57. Logistics in Value Chain Networks - M-MACH-101280</td>
<td></td>
<td>92</td>
</tr>
<tr>
<td>5.58. Machine Tools and Industrial Handling - M-MACH-101286</td>
<td></td>
<td>93</td>
</tr>
<tr>
<td>5.60. Management Accounting - M-WIWI-101498</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>5.61. Manufacturing Technology - M-MACH-101276</td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>5.62. Market Engineering - M-WIWI-101446</td>
<td></td>
<td>97</td>
</tr>
<tr>
<td>5.63. Marketing Management - M-WIWI-101490</td>
<td></td>
<td>98</td>
</tr>
<tr>
<td>5.64. Material Flow in Logistic Systems - M-MACH-101277</td>
<td></td>
<td>99</td>
</tr>
<tr>
<td>5.65. Material Flow in Networked Logistic Systems - M-MACH-101278</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>5.66. Mathematical Programming - M-WIWI-101473</td>
<td></td>
<td>101</td>
</tr>
<tr>
<td>5.67. Microeconomic Theory - M-WIWI-101300</td>
<td></td>
<td>103</td>
</tr>
<tr>
<td>5.68. Microfabrication - M-MACH-101291</td>
<td></td>
<td>104</td>
</tr>
<tr>
<td>5.69. Microoptics - M-MACH-101292</td>
<td></td>
<td>105</td>
</tr>
<tr>
<td>5.70. Microsystem Technology - M-MACH-101293</td>
<td></td>
<td>106</td>
</tr>
<tr>
<td>5.71. Module Masterarbeit - M-WIWI-101659</td>
<td></td>
<td>107</td>
</tr>
<tr>
<td>5.72. Nanotechnology - M-MACH-101294</td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>5.73. Natural Hazards and Risk Management - M-WIWI-104837</td>
<td></td>
<td>109</td>
</tr>
<tr>
<td>5.74. Network Economics - M-WIWI-101406</td>
<td></td>
<td>110</td>
</tr>
<tr>
<td>5.75. Operations Research in Supply Chain Management - M-WIWI-102832</td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>5.76. Optoelectronics and Optical Communication - M-MACH-101295</td>
<td></td>
<td>113</td>
</tr>
<tr>
<td>5.77. Principles of Food Process Engineering - M-CIWWT-101120</td>
<td></td>
<td>114</td>
</tr>
<tr>
<td>5.78. Private Business Law - M-INFO-101216</td>
<td></td>
<td>115</td>
</tr>
<tr>
<td>5.79. Process Engineering in Construction - M-BGU-101110</td>
<td></td>
<td>116</td>
</tr>
<tr>
<td>5.80. Project Management in Construction - M-BGU-101888</td>
<td></td>
<td>117</td>
</tr>
<tr>
<td>5.81. Public Business Law - M-INFO-101217</td>
<td></td>
<td>119</td>
</tr>
<tr>
<td>5.82. Rail System Technology - M-MACH-101274</td>
<td></td>
<td>120</td>
</tr>
<tr>
<td>5.83. Sales Management - M-WIWI-101487</td>
<td></td>
<td>122</td>
</tr>
<tr>
<td>5.84. Seminar Module - M-WIWI-101808</td>
<td></td>
<td>123</td>
</tr>
<tr>
<td>5.85. Service Analytics - M-WIWI-101506</td>
<td></td>
<td>125</td>
</tr>
<tr>
<td>5.86. Service Design Thinking - M-WIWI-101503</td>
<td></td>
<td>127</td>
</tr>
<tr>
<td>5.87. Service Economics and Management - M-WIWI-102754</td>
<td></td>
<td>129</td>
</tr>
<tr>
<td>5.88. Service Innovation, Design &amp; Engineering - M-WIWI-102806</td>
<td></td>
<td>130</td>
</tr>
<tr>
<td>5.89. Service Management - M-WIWI-101448</td>
<td></td>
<td>132</td>
</tr>
<tr>
<td>5.90. Service Operations - M-WIWI-102805</td>
<td></td>
<td>133</td>
</tr>
<tr>
<td>5.91. Sociology - M-GEISTSOZ-101169</td>
<td></td>
<td>135</td>
</tr>
<tr>
<td>5.92. Specialization in Food Process Engineering - M-CIWWT-101119</td>
<td></td>
<td>136</td>
</tr>
</tbody>
</table>
5.93. Specialization in Production Engineering - M-MACH-101284 .................................................................................................................. 137
5.94. Stochastic Optimization - M-WIWI-103289 ................................................................. 138
5.95. Student Innovation Lab (SIL) 1 - M-WIWI-105010 ............................................................... 140
5.96. Student Innovation Lab (SIL) 2 - M-WIWI-105011 .................................................................................................................. 143
5.97. Technical Logistics - M-MACH-101279 ............................................................................ 146
5.98. Transport Infrastructure Policy and Regional Development - M-WIWI-101485 .............................. 147
5.99. Transportation Modelling and Traffic Management - M-BGU-101065 ........................ 148
5.100. Virtual Engineering A - M-MACH-101283 ................................................................... 149
5.101. Virtual Engineering B - M-MACH-101281 ...................................................................... 150
5.102. Water Chemistry and Water Technology I - M-CIWT-101121 .................................................. 152
5.103. Water Chemistry and Water Technology II - M-CIWT-101122 ................................................................. 153

6. Courses.................................................................................................................................................................................. 154

6.2. Advanced Empirical Asset Pricing - T-WIWI-110513 ................................................................. 155
6.3. Advanced Game Theory - T-WIWI-102861 ............................................................................. 156
6.4. Advanced Information Systems - T-WIWI-110373 ........................................................................ 157
6.5. Advanced Lab Informatics (Master) - T-WIWI-110548 ................................................................. 159
6.6. Advanced Lab Security - T-WIWI-109786 .............................................................................. 160
6.8. Advanced Machine Learning - T-WIWI-109921 ........................................................................ 162
6.9. Advanced Management Accounting - T-WIWI-102885 ................................................................. 164
6.10. Advanced Management Accounting 2 - T-WIWI-110179 ............................................................. 165
6.11. Advanced Statistics - T-WIWI-103123 ................................................................................. 166
6.15. Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines - T-MACH-105173 ........................................................................ 171
6.18. Application of Social Science Methods (WiWi) - T-GEISTSOZ-109052 .................................................. 174
6.19. Applied Econometrics - T-WIWI-103125 .................................................................................. 175
6.22. Asset Pricing - T-WIWI-102647 ......................................................................................... 179
6.23. Auction Theory - T-WIWI-102613 ......................................................................................... 181
6.25. Automation of Discrete Event and Hybrid Systems - T-ETIT-100981 ............................................................. 185
6.26. Automotive Logistics - T-MACH-105165 ............................................................................. 186
6.27. Basics of German Company Tax Law and Tax Planning - T-WIWI-108711 ............................................................. 187
6.28. Basics of Technical Logistics I - T-MACH-109919 ........................................................................ 188
6.29. Basics of Technical Logistics II - T-MACH-109920 ................................................................. 189
6.30. BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I - T-MACH-100966 ............................................................. 190
6.31. BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II - T-MACH-100967 ........................................................................ 191
6.32. BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III - T-MACH-100968 ........................................................................ 193
6.33. Bionics for Engineers and Natural Scientists - T-MACH-102172 ............................................................. 194
6.34. Blockchains & Cryptofinance - T-WIWI-108880 ........................................................................ 196
6.35. Building Laws - T-BGU-103429 ......................................................................................... 197
6.36. Business Administration for Engineers and IT professionals - T-MACH-109933 ............................................................. 198
6.37. Business Administration in Information Engineering and Management - T-WIWI-102886 ........................................................................ 199
6.40. Business Dynamics - T-WIWI-102762 ..................................................................................... 205
6.41. Business Intelligence Systems - T-WIWI-105777 ........................................................................ 207
6.42. Business Models in the Internet: Planning and Implementation - T-WIWI-102639 ............................................................. 209
6.43. Business Planning - T-WIWI-102869 ..................................................................................... 211
6.44. Business Planning for Founders - EUCOR - T-WIWI-110389 ............................................................. 212
6.46. Business Strategies of Banks - T-WIWI-102626 ........................................................................ 214
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.104.</td>
<td>Information Management M.Sc.</td>
</tr>
<tr>
<td>6.98.</td>
<td>Emerging Trends in Digital Health - T-WIWI-110144</td>
</tr>
<tr>
<td>6.97.</td>
<td>Elements and Systems of Technical Logistics - T-MACH-102159</td>
</tr>
<tr>
<td>6.95.</td>
<td>Dynamic Macroeconomics - T-WIWI-109194</td>
</tr>
<tr>
<td>6.94.</td>
<td>Discrete-Event Simulation in Production and Logistics - T-WIWI-102718</td>
</tr>
<tr>
<td>6.91.</td>
<td>Digitalization of Products, Services &amp; Production - T-MACH-108491</td>
</tr>
<tr>
<td>6.90.</td>
<td>Disassembly Process Engineering - T-BGU-101850</td>
</tr>
<tr>
<td>6.91.</td>
<td>Dynamic Event Simulation in Production and Logistics - T-WIWI-102718</td>
</tr>
<tr>
<td>6.92.</td>
<td>Dynamic Macroeconomics - T-WIWI-109194</td>
</tr>
<tr>
<td>6.93.</td>
<td>Efficient Energy Systems and Electric Mobility - T-WIWI-102793</td>
</tr>
<tr>
<td>6.94.</td>
<td>eFinance: Information Systems for Securities Trading - T-WIWI-109941</td>
</tr>
<tr>
<td>6.95.</td>
<td>Elements and Systems of Technical Logistics - T-MACH-102159</td>
</tr>
<tr>
<td>6.96.</td>
<td>Emerging Trends in Digital Health - T-WIWI-110144</td>
</tr>
<tr>
<td>6.97.</td>
<td>Emerging Trends in Internet Technologies - T-WIWI-110143</td>
</tr>
<tr>
<td>6.98.</td>
<td>Emissions into the Environment - T-WIWI-102634</td>
</tr>
<tr>
<td>6.100.</td>
<td>Employment Law II - T-INFO-101330</td>
</tr>
<tr>
<td>6.102.</td>
<td>Energy and Process Technology I - T-MACH-102211</td>
</tr>
<tr>
<td>6.103.</td>
<td>Energy and Process Technology II - T-MACH-102212</td>
</tr>
<tr>
<td>6.104.</td>
<td>Energy Conversion and Increased Efficiency in Internal Combustion Engines - T-MACH-105564</td>
</tr>
<tr>
<td>6.107.</td>
<td>Energy Networks and Regulation - T-WIWI-107503</td>
</tr>
</tbody>
</table>
Table Of Contents

6.110. Energy Trade and Risk Management - T-WIWI-102691 ...................... 300
6.112. Engineering FinTech Solutions - T-WIWI-106193 ................................ 303
6.117. Entrepreneurship Research - T-WIWI-102894 ...................................... 308
6.119. Environmental Communication - T-BGU-101676 ................................ 310
6.120. Environmental Economics and Sustainability - T-WIWI-102615 .......... 311
6.121. Environmental Law - T/INFO-101348 .................................................. 312
6.122. European and International Law - T/INFO-101312 ............................... 313
6.123. Examination Prerequisite Environmental Communication - T-BGU-106620 314
6.124. Experimental Economics - T-WIWI-102614 .......................................... 315
6.125. Extraordinary additional course in the module Cross-Functional Management Accounting - T-WIWI-108651 316
6.126. Fabrication Processes in Microsystem Technology - T-MACH-102166 .... 317
6.127. Facility Location and Strategic Supply Chain Management - T-WIWI-102704 319
6.128. Financial Analysis - T-WIWI-102900 .................................................. 320
6.130. Financial Intermediation - T-WIWI-102623 .......................................... 322
6.131. Firm creation in IT security - T-WIWI-110374 ...................................... 323
6.132. Fixed Income Securities - T-WIWI-102644 .......................................... 324
6.133. Freight Transport - T-BGU-106611 ..................................................... 326
6.136. Gas Engines - T-MACH-102197 ............................................................ 331
6.137. Gear Cutting Technology - T-MACH-102148 ........................................ 332
6.139. Global Optimization I and II - T-WIWI-103638 .................................... 336
6.140. Global Optimization II - T-WIWI-102727 ............................................. 338
6.143. Graph Theory and Advanced Location Models - T-WIWI-102723 .......... 346
6.144. Heat Economy - T-WIWI-102695 .......................................................... 347
6.145. High-Voltage Technology I - T-ETIT-101913 ...................................... 348
6.146. High-Voltage Technology II - T-ETIT-101914 ...................................... 349
6.147. High-Voltage Test Technique - T-ETIT-101915 .................................... 350
6.149. Incentives in Organizations - T-WIWI-105781 ..................................... 352
6.150. Industrial Services - T-WIWI-102822 .................................................. 353
6.151. Information Engineering - T-MACH-102209 ........................................ 355
6.152. Information Management for Public Mobility Services - T-BGU-106608 356
6.154. Information Systems and Supply Chain Management - T-MACH-102128 359
6.155. Innovation Lab - T-ETIT-110291 .......................................................... 360
6.158. Innovationtheory and -Policy - T-WIWI-102840 ................................... 363
6.159. Integrated Product Development - T-MACH-105401 ............................ 365
6.160. Integrated Production Planning in the Age of Industry 4.0 - T-MACH-109054 369
6.162. Intelligent CRM Architectures - T-WIWI-103549 .................................. 374
6.163. Interactive Information Systems - T-WIWI-108461 ............................... 376
6.165. International Management in Engineering and Production - T-WIWI-102882 379
6.166. International Selling - EU COR - T-WIWI-110381 .............................. 380
6.167. Internet Law - T/INFO-101307 ............................................................. 381

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019
Table Of Contents

6.168. Introduction to Hydrogeology - T-BGU-101499 ................................................................. 382
6.169. Introduction to Microsystems Technology I - T-MACH-105182 ........................................ 383
6.170. Introduction to Microsystems Technology II - T-MACH-105183 ....................................... 384
6.171. Introduction to Stochastic Optimization - T-WIWI-106546 ............................................... 385
6.172. IoT Platform for Engineering - T-MACH-106743 ............................................................ 386
6.173. IT-Security Law - T-INFO-109910 ................................................................................. 387
6.174. IT-Fundamentals of Logistics - T-MACH-105187 ............................................................ 388
6.175. Joint Entrepreneurship Summer School - T-WIWI-109064 ............................................ 390
6.176. Knowledge Discovery - T-WIWI-102666 ...................................................................... 391
6.177. Laboratory Production Metrology - T-MACH-108878 ...................................................... 393
6.178. Laboratory Work Water Chemistry - T-CIJWT-103351 .................................................. 395
6.179. Large-scale Optimization - T-WIWI-106549 .................................................................. 396
6.181. Law of Contracts - T-INFO-101316 ............................................................................... 398
6.182. Lean Construction - T-BGU-108800 .............................................................................. 399
6.183. Learning Factory “Global Production” - T-MACH-105783 .............................................. 400
6.184. Liberalised Power Markets - T-WIWI-107043 ............................................................... 403
6.185. Life Cycle Assessment - T-WIWI-110512 ........................................................................ 405
6.187. Long-Distance and Air Traffic - T-BGU-106301 ............................................................ 408
6.188. Machine Learning 1 - Basic Methods - T-WIWI-106340 ................................................ 409
6.189. Machine Learning 2 – Advanced Methods - T-WIWI-106341 ......................................... 410
6.190. Machine Tools and Industrial Handling - T-MACH-102158 ............................................ 412
6.191. Management Accounting 1 - T-WIWI-102800 ............................................................... 415
6.192. Management Accounting 2 - T-WIWI-102801 ............................................................... 417
6.193. Management of IT-Projects - T-WIWI-102667 ............................................................... 419
6.194. Management of Water Resources and River Basins - T-BGU-106597 ......................... 421
6.196. Manufacturing Technology - T-MACH-102105 ............................................................... 423
6.198. Market Research - T-WIWI-107720 ................................................................................ 427
6.201. Master Thesis - T-WIWI-103142 .................................................................................... 432
6.204. Metal Forming - T-MACH-105177 ................................................................................. 440
6.205. Methods and Models in Transportation Planning - T-BGU-101797 ............................ 442
6.208. Microactuators - T-MACH-101910 ................................................................................ 445
6.211. Mobility Services and new Forms of Mobility - T-BGU-103425 .................................... 450
6.212. Model Based Application Methods - T-MACH-102199 .................................................. 451
6.213. Modeling and Analyzing Consumer Behavior with R - T-WIWI-102899 ..................... 452
6.215. Morphodynamics - T-BGU-101859 ............................................................................... 455
6.216. Multivariate Statistical Methods - T-WIWI-103124 ....................................................... 456
6.217. Nanotechnology for Engineers and Natural Scientists - T-MACH-105180 .................. 457
6.218. Nanotechnology with Clusterbeams - T-MACH-102080 ............................................... 459
6.221. Non- and Semiparametrics - T-WIWI-103126 .............................................................. 464
6.223. Nonlinear Optimization I and II - T-WIWI-103637 ....................................................... 467
6.224. Nonlinear Optimization II - T-WIWI-102725 ................................................................ 467
Table Of Contents

6.230. Optical Transmitters and Receivers - T-ETIT-100639 ....................................................................................... 478
6.231. Optical Waveguides and Fibers - T-ETIT-101945 ............................................................................................. 479
6.233. Optimization under Uncertainty - T-WIWI-106545 .................................................................................. 481
6.234. Optoelectronic Components - T-ETIT-101907 ............................................................................................... 482
6.235. Panel Data - T-WIWI-103127 ...................................................................................................................... 483
6.236. Parametric Optimization - T-WIWI-102855 .................................................................................................... 484
6.238. Personalization and Services - T-WIWI-102848 ........................................................................................... 486
6.239. PH APL-ING-TL01 - T-WIWI-106291 ........................................................................................................... 488
6.240. PH APL-ING-TL02 - T-WIWI-106292 ........................................................................................................... 489
6.241. PH APL-ING-TL03 - T-WIWI-106293 ........................................................................................................... 490
6.242. PH APL-ING-TL04 ub - T-WIWI-106294 ........................................................................................................ 491
6.243. PH APL-ING-TL05 ub - T-WIWI-106295 ........................................................................................................ 492
6.244. PH APL-ING-TL06 ub - T-WIWI-106296 ........................................................................................................ 493
6.245. PH APL-ING-TL07 - T-WIWI-108384 ............................................................................................................ 494
6.246. Photovoltaic System Design - T-ETIT-100724 ................................................................................................. 495
6.247. Physics for Engineers - T-MACH-100530 ......................................................................................................... 496
6.248. Planning and Management of Industrial Plants - T-WIWI-102631 ............................................................. 498
6.249. PLM for Product Development in Mechatronics - T-MACH-102181 ............................................................ 499
6.250. PLM-CAD Workshop - T-MACH-102153 ....................................................................................................... 500
6.251. Plug-and-play material handling - T-MACH-106693 ....................................................................................... 501
6.253. Polymers in MEMS B: Physics, Microstructuring and Applications - T-MACH-102191 .............................. 504
6.254. Polymers in MEMS C: Biopolymers and Bioplastics - T-MACH-102200 ...................................................... 506
6.255. Portfolio and Asset Liability Management - T-WIWI-103128 ................................................................. 508
6.256. Power Network - T-ETIT-100830 .................................................................................................................. 509
6.258. Practical Course Polymers in MEMS - T-MACH-105556 ................................................................................. 511
6.259. Practical Seminar Digital Service Systems - T-WIWI-106563 ....................................................................... 512
6.261. Practical Seminar: Data-Driven Information Systems - T-WIWI-106207 ...................................................... 515
6.262. Practical Seminar: Health Care Management (with Case Studies) - T-WIWI-102716 ................................. 516
6.264. Practical Training in Basics of Microsystem Technology - T-MACH-102164 ............................................. 520
6.265. Predictive Mechanism and Market Design - T-WIWI-102862 ....................................................................... 522
6.266. Price Management - T-WIWI-105946 ............................................................................................................ 523
6.267. Price Negotiation and Sales Presentations - T-WIWI-102891 ....................................................................... 524
6.268. Pricing - T-WIWI-102883 ............................................................................................................................. 525
6.271. Process Mining - T-WIWI-109799 ................................................................................................................ 528
6.272. Product and Innovation Management - T-WIWI-109864 ................................................................................ 530
6.274. Production and Logistics Controlling - T-WIWI-103091 ............................................................................ 533
6.275. Production and Logistics Management - T-WIWI-102632 ........................................................................ 534
6.276. Project Lab Cognitive Automobiles and Robots - T-WIWI-109985 ...................................................... 535
6.277. Project Lab Machine Learning - T-WIWI-109983 ....................................................................................... 536
6.278. Project Management - T-WIWI-103134 ......................................................................................................... 537
6.279. Project Management in Construction and Real Estate Industry I - T-BGU-103432 .................................... 538
6.280. Project Management in Construction and Real Estate Industry II - T-BGU-103433 .................................... 539
6.281. Project Paper Lean Construction - T-BGU-101007 ..................................................................................... 540
6.282. Project Studies - T-BGU-101847 .................................................................................................................. 541
6.283. Public Management - T-WIWI-102740 .......................................................................................................... 542
6.284. Public Media Law - T-INFO-101311 ............................................................................................................. 543
6.286. Python for Computational Risk and Asset Management - T-WIWI-110213 ............................................. 546
6.287. Quality Management - T-MACH-102107 ...................................................................................................... 547
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Code</th>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
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<tr>
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<td>6.299. Selected Legal Issues of Internet Law</td>
<td>T/INFO-108462</td>
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<td>T-WIWI-103174</td>
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<td>6.319. Seminar: Legal Studies I</td>
<td>T/INFO-101997</td>
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<td>T/INFO-105945</td>
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<td>T-WIWI-105778</td>
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<td>T-WIWI-110166</td>
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<td>6.326. Simulation Game in Energy Economics</td>
<td>T-WIWI-108016</td>
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<td>6.327. Simulation of Stochastic Systems</td>
<td>T-WIWI-106552</td>
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<td>T-BGU-103427</td>
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<td>6.329. Smart Energy Infrastructure</td>
<td>T-WIWI-107464</td>
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<td>T-WIWI-102859</td>
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<td>T-WIWI-109249</td>
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<td>6.341. Strategic Transport Planning</td>
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<td>6.342. Strategy and Management Theory; Developments and “Classics”</td>
<td>T-WIWI-106190</td>
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<td>6.343. Supplement Enterprise Information Systems</td>
<td>T-WIWI-110346</td>
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<td>652</td>
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<td>6.355. Telecommunication and Internet Economics</td>
<td>656</td>
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<td>6.368. Turnkey Construction I</td>
<td>6.369. Turnkey Construction II - Trades and Technology</td>
<td>663</td>
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<td>6.381. Wildcard Key Competences Seminar 3</td>
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<td>6.385. Wildcard Key Competences Seminar 6</td>
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<td>6.392. Virtual Engineering</td>
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<td>6.393. Virtual Engineering Lab</td>
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<tr>
<td></td>
<td>6.394. Virtual Training Factory 4.X</td>
<td>677</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.395. Warehousing and Distribution Systems</td>
<td>678</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.396. Water Chemistry and Water Technology II</td>
<td>679</td>
<td></td>
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<tr>
<td></td>
<td>6.397. Water Chemistry and Water Technology II</td>
<td>680</td>
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<tr>
<td></td>
<td>6.398. Web Science</td>
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<td>6.399. Wildcard Key Competences Seminar 1</td>
<td>682</td>
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<td>684</td>
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<td>685</td>
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<td>6.403. Wildcard Key Competences Seminar 8</td>
<td>686</td>
<td></td>
</tr>
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<td>6.404. Workshop Business Wargaming - Analyzing Strategic</td>
<td>687</td>
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<td>6.405. Workshop Current Topics in Strategy and Management</td>
<td>688</td>
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</tr>
</tbody>
</table>
1 Welcome to the new module handbook of your study programme

We are delighted that you have decided to study at the KIT Department of Economics and Management and wish you a good start into the new semester!

The following contact persons are at your disposal for questions and problems at any time.

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Write to us!
2 About this handbook

2.1 Notes and rules

The program exists of several subjects (e.g. business administration, economics, operations research). Every subject is split into modules and every module itself consists of one or more interrelated module component exams. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module. Some of the modules are obligatory. According to the interdisciplinary character of the program, a great variety of individual specialization and deepening possibilities exists for a large number of modules. This enables the student to customize content and time schedule of the program according to personal needs, interest and job perspective. The module handbook describes the modules belonging to the program. It describes particularly:

- the structure of the modules
- the extent (in CP),
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

The module handbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the course catalog, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

2.1.1 Begin and completion of a module

Each module and each examination can only be selected once. The decision on the assignment of an examination to a module (if, for example, an examination in several modules is selectable) is made by the student at the moment when he / she is registered for the appropriate examination. A module is completed or passed when the module examination is passed (grade 4.0 or better). For modules in which the module examination is carried out over several partial examinations, the following applies: The module is completed when all necessary module partial examinations have been passed. In the case of modules which offer alternative partial examinations, the module examination is concluded with the examination with which the required total credit points are reached or exceeded. The module grade, however, is combined with the weight of the predefined credit points for the module in the overall grade calculation.

2.1.2 Module versions

It is not uncommon for modules to be revised due to, for example, new courses or cancelled examinations. As a rule, a new module version is created, which applies to all students who are new to the module. On the other hand, students who have already started the module enjoy confidence and remain in the old module version. These students can complete the module on the same conditions as at the beginning of the module (exceptions are regulated by the examination committee). The date of the student's "binding declaration" on the choice of the module in the sense of §5(2) of the Study and Examination Regulation is decisive. This binding declaration is made by registering for the first examination in this module.

In the module handbook, all modules are presented in their current version. The version number is given in the module description. Older module versions can be accessed via the previous module handbooks in the archive at http://www.wiwi.kit.edu/Archiv_MHB.php.

2.1.3 General and partial examinations

Module examinations can be either taken in a general examination or in partial examinations. If the module examination is offered as a general examination, the entire learning content of the module will be examined in a single examination. If the module examination is subdivided into partial examinations, the content of each course will be examined in corresponding partial examinations. Registration for examinations can be done online at the campus management portal. The following functions can be accessed on https://campus.studium.kit.edu/:

- Register/unregister for examinations
- Check for examination results
- Create transcript of records

For further and more detailed information, https://studium.kit.edu/Seiten/FAQ.aspx.

2.1.4 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.

2.1.5 Repeating exams

Principally, a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a
second repetition has to be made in written form to the examination committee two months after loosing the examination claim. A counseling interview is mandatory.

For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

2.1.6 Examiners

The examination committee has appointed the KIT examiners and lecturers listed in the module handbook for the modules and their courses as examiners for the courses they offer.

2.1.7 Additional accomplishments

Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Additional accomplishments with at most 30 CP may appear additionally in the certificate.

2.1.8 Further information

More detailed information about the legal and general conditions of the program can be found in the examination regulation of the program (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

2.2 Contact

If you have any questions about modules or exams, please contact the examination office of the KIT Department of Economics and Management:

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3 The Master’s degree program in Economics Engineering

3.1 Qualification objectives of the Master's program in Economics Engineering

Graduates of the interdisciplinary Master’s program in Economics Engineering have advanced and in-depth knowledge in economics, business administration, computer science and operations research. This mainly has its focus on business administration. Here, the students analyze how macroeconomic variables (e.g., the national product, the inflation rate or unemployment) are affected by interaction of individual decisions in alternative institutional arrangements and what roles the state and the increasing internationalization have to take up. Formal-theoretical models are analytically derived and simulated using quantitative methods. The objective here is a theoretically based derivation of economic policy recommendations. Other areas of specialization can be chosen based on individual interests. Depending on one’s wishes, courses on statistics, engineering sciences and law or sociology can be taken up and specialized in.

They have generalized or specialized expertise in the different disciplines.

The graduates are in a position to define and interpret the specifics, limits, terminologies and doctrines in the selected areas of these subjects, reproduce the current state of research and selectively use this as a basis for further development. Their extensive know-how enables them to think across the various disciplines as well as identify trends and macroeconomic developments at an early stage. They are able to evaluate, select and combine appropriate courses of action for research-related topics. They can then transfer and apply these to solve specific problems.

They can separately analyze extensive problems such as information and current challenges and analyze, compare and evaluate these using appropriate methods and concepts. They evaluate the complexity and risks, identify the improvement potentials and choose sustainable solution processes and improvement methods. This puts them in a position where they are able to make responsible and science-based decisions. They are able to come up with innovative ideas and apply them accordingly. They can oversee these approaches either independently or in teams. They are able to explain and discuss their decisions. They can independently interpret, validate and illustrate the obtained results.

The interdisciplinary use of knowledge also takes account of social, scientific and ethical insights.

The graduates can communicate with expert representatives on a scientific level and assume prominent responsibility both in local and international teams. Karlsruhe's economic engineers are characterized by their interdisciplinary thinking as well as their innovation and management capability. They are particularly qualified for industrial occupations, the service sector or in public administration as well as a downstream scientific career (PhD).

3.2 Structure of the Master's degree program in Economics Engineering (M.Sc.) SPO 2015

The Master’s degree program in Economics Engineering (M.Sc.) has 4 terms and consists of 120 credits (CP) including Master’s thesis. The Master’s degree program further deepens or complements the scientific qualifications acquired in the Bachelor program. The students should be made capable of independently applying scientific knowledge and methods and evaluate their implications and scope concerning solutions of complex scientific and social problems.

Furthermore, the student has to attend two seminars with a minimum of six CP within the seminar module. In addition to the key skills gained in the seminars (3 CP), the student has to acquire additional key skills totalling at least 3 credits.

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
<th>Business Administration</th>
<th>Economics</th>
<th>Informatics</th>
<th>Operations Research</th>
<th>Electives 1</th>
<th>Electives 2</th>
<th>Master Thesis</th>
</tr>
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<tr>
<td>1</td>
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<td>BUS 9 CP</td>
<td>ECON 9 CP</td>
<td>INFO 9 CP</td>
<td>OR 9 CP</td>
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<td>Elect. Module 3 9 CP</td>
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Figure 2: Structure of the Master’s degree program SPO 2015 (Recommendation)
Figure 2 shows the structure of the subjects and the credits allocated to the subjects. The student has to choose four elective modules of the mentioned disciplines. Thereby it is only possible to select a maximum of two modules from the same discipline and it is only allowed to choose either one module in law or in sociology.

It is left to the student's individual curriculum (taking into account the examination and module regulations), in which terms the chosen modules will be started and completed. However, it is highly recommended to complete all courses and seminars before beginning the Master’s thesis.

3.3 Key Skills

The master program Economics Engineering (M.Sc.) at the KIT Department of Economics and Management distinguishes itself by an exceptionally high level of interdisciplinarity. With the combination of business science, economics, informatics, operations research, mathematics as well as engineering and natural science, the integration of knowledge of different disciplines is an inherent element of the programme. As a result, interdisciplinary and connected thinking is encouraged in a natural way. Furthermore, the seminar courses in the master degree programme contribute significantly to the development of key skills by practicing to elaborate and write scientifically sound papers and presentations about special topics. The integrative taught key skills, which are acquired throughout the entire programme, can be classified into the following fields:

**Soft skills**
- Team work, social communication and creativity techniques
- Presentations and presentation techniques
- Logical and systematical arguing and writing
- Structured problem solving and communication

**Enabling skills**
- Decision making in business context
- Project management competences
- Fundamentals of business science
- English as a foreign language

**Orientational knowledge**
- Acquisition of interdisciplinary knowledge
- Institutional knowledge about economic and legal systems
- Knowledge about international organisations
- Media, technology and innovation

The integrative acquisition of key skills especially takes place in several obligatory courses during the master programme, namely

- Seminar module
- Mentoring of the Master’s thesis
- Business science, economics and informatics modules

Besides the integrated key skills, the additive acquisition of key skills, which are totalling at least three credits within the seminar module, is scheduled. Students may choose freely among the offered courses of HoC, ZAK and Sprachenzentrum.
4 Field of study structure

### Mandatory

<table>
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<tr>
<th>Module</th>
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<td>Informatics</td>
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</tr>
<tr>
<td>Operations Research</td>
<td>9 CR</td>
</tr>
<tr>
<td>Compulsory Elective Modules 1</td>
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#### 4.1 Master Thesis

**Mandatory**

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<td>Module Masterarbeit</td>
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**Modelled Conditions**
The following conditions have to be fulfilled:

1. You need to earn at least 60 credits in the following fields:
   - Business Administration
   - Informatics
   - Operations Research
   - Economics
   - Compulsory Elective Modules 1
   - Compulsory Elective Modules 2

#### 4.2 Economics

**Election block: Volkswirtschaftslehre (2 items)**

<table>
<thead>
<tr>
<th>Module ID</th>
<th>Module Name</th>
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<tr>
<td>M-WIWI-101497</td>
<td>Agglomeration and Innovation</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101453</td>
<td>Applied Strategic Decisions</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-101504</td>
<td>Collective Decision Making</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101505</td>
<td>Experimental Economics</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-101514</td>
<td>Innovation Economics</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101478</td>
<td>Innovation and Growth</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101500</td>
<td>Microeconomic Theory</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-101406</td>
<td>Network Economics</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101502</td>
<td>Economic Theory and its Application in Finance</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101468</td>
<td>Environmental Economics</td>
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<td>M-WIWI-101485</td>
<td>Transport Infrastructure Policy and Regional Development</td>
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<tr>
<td>M-WIWI-101511</td>
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<td>M-WIWI-101496</td>
<td>Growth and Agglomeration</td>
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## 4.3 Business Administration

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<tr>
<td>M-WIWI-101410 Business &amp; Service Engineering</td>
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<tr>
<td>M-WIWI-101498 Management Accounting</td>
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</tr>
<tr>
<td>M-WIWI-101510 Cross-Functional Management Accounting</td>
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</tr>
<tr>
<td>M-WIWI-101470 Data Science: Advanced CRM</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-103117 Data Science: Data-Driven Information Systems</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101647 Data Science: Evidence-based Marketing</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-105032 Data Science for Finance</td>
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<tr>
<td>M-WIWI-101480 Designing Interactive Information Systems</td>
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<tr>
<td>M-WIWI-103720 eEnergy: Markets, Services and Systems</td>
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</tr>
<tr>
<td>M-WIWI-101409 Electronic Markets</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101452 Energy Economics and Technology</td>
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<tr>
<td>M-WIWI-101488 Entrepreneurship (EnTechnon)</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101482 Finance 1</td>
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</tr>
<tr>
<td>M-WIWI-101483 Finance 2</td>
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<tr>
<td>M-WIWI-101480 Finance 3</td>
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<td>M-WIWI-101471 Industrial Production II</td>
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<td>M-WIWI-101411 Information Engineering</td>
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<td>M-WIWI-104068 Information Systems in Organizations</td>
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<tr>
<td>M-WIWI-101507 Innovation Management</td>
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<tr>
<td>M-WIWI-101446 Market Engineering</td>
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<tr>
<td>M-WIWI-101490 Marketing Management</td>
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<td>M-WIWI-101487 Sales Management</td>
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<td>M-WIWI-101506 Service Analytics</td>
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<td>M-WIWI-101448 Service Management</td>
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<td>M-WIWI-101503 Service Design Thinking</td>
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<td>M-WIWI-102754 Service Economics and Management</td>
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<tr>
<td>M-WIWI-103119 Advanced Topics in Strategy and Management</td>
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## 4.4 Informatics

<table>
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<tr>
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### 4.5 Operations Research

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<tr>
<td>M-WIWI-102805</td>
<td>Service Operations</td>
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<tr>
<td>M-WIWI-103289</td>
<td>Stochastic Optimization</td>
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### 4.6 Compulsory Elective Modules 1

<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
<td>27</td>
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</tbody>
</table>

**Election notes**

In the field "Compulsory Elective Modules 1", the **seminar module** (independent of subject) is to be attended over two seminars and further key qualification courses. In addition, **two elective modules** from the subjects of Economics, Business Administration, Informatics, Operations Research, Engineering sciences / Natural Sciences and Statistics are to be chosen in each of the two elective areas. Within a compulsory elective area, the modules must come from different subjects.

<table>
<thead>
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<th>Mandatory</th>
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<tbody>
<tr>
<td>M-WIWI-101808</td>
<td>Seminar Module</td>
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**Election block: Volkswirtschaftslehre (at most 9 credits)**

<table>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>9</td>
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</tbody>
</table>

| M-WIWI-101497 | Agglomeration and Innovation |
| M-WIWI-101453 | Applied Strategic Decisions |
| M-WIWI-101504 | Collective Decision Making |
| M-WIWI-101505 | Experimental Economics |
| M-WIWI-101478 | Innovation and Growth |
| M-WIWI-101514 | Innovation Economics |
| M-WIWI-101500 | Microeconomic Theory |
| M-WIWI-101406 | Network Economics |
| M-WIWI-101502 | Economic Theory and its Application in Finance |
| M-WIWI-101468 | Environmental Economics |
| M-WIWI-101485 | Transport Infrastructure Policy and Regional Development |
| M-WIWI-101511 | Advanced Topics in Public Finance |
| M-WIWI-101496 | Growth and Agglomeration |

**Election block: Betriebswirtschaftslehre (at most 9 credits)**

<table>
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<tbody>
<tr>
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</table>

| M-WIWI-101410 | Business & Service Engineering |
| M-WIWI-101498 | Management Accounting |
| M-WIWI-101510 | Cross-Functional Management Accounting |
| M-WIWI-101470 | Data Science: Advanced CRM |
| M-WIWI-103117 | Data Science: Data-Driven Information Systems |
| M-WIWI-101647 | Data Science: Evidence-based Marketing |
| M-WIWI-105032 | Data Science for Finance |
| M-WIWI-104080 | Designing Interactive Information Systems |
| M-WIWI-102808 | Digital Service Systems in Industry |
| M-WIWI-103720 | eEnergy: Markets, Services and Systems |
| M-WIWI-101409 | Electronic Markets |
| M-WIWI-101451 | Energy Economics and Energy Markets |
| M-WIWI-101452 | Energy Economics and Technology |
| M-WIWI-101488 | Entrepreneurship (EnTechnon) |
| M-WIWI-101482 | Finance 1 |
| M-WIWI-101483 | Finance 2 |
| M-WIWI-101480 | Finance 3 |
| M-WIWI-105036 | FinTech Innovations |
| M-WIWI-101471 | Industrial Production II |
| M-WIWI-101412 | Industrial Production III |
| M-WIWI-101411 | Information Engineering |
| M-WIWI-104068 | Information Systems in Organizations |
| M-WIWI-101507 | Innovation Management |
| M-WIWI-101446 | Market Engineering |
| M-WIWI-101490 | Marketing Management |
| M-WIWI-101487 | Sales Management |

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019
<table>
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<tr>
<th>Module Code</th>
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<td>M-WIWI-101503</td>
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<td>Service Economics and Management</td>
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<td>M-WIWI-102805</td>
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<td>M-MACH-101290</td>
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<td>Energy and Process Technology II</td>
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<td>Generation and Transmission of Renewable Power</td>
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<td>M-MACH-101276</td>
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<td>M-MACH-101282</td>
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<td>M-BGU-101064</td>
<td>Fundamentals of Transportation</td>
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<td>M-CIWWT-101120</td>
<td>Principles of Food Process Engineering</td>
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<td>High-Voltage Technology</td>
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<td>M-BGU-101884</td>
<td>Lean Management in Construction</td>
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<td>M-MACH-101280</td>
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<td>M-MACH-101277</td>
<td>Material Flow in Logistic Systems</td>
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<td>M-MACH-101278</td>
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<td>9 CR</td>
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<td>M-MACH-101303</td>
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<td>9 CR</td>
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<tr>
<td>M-BGU-101110</td>
<td>Process Engineering in Construction</td>
<td>9 CR</td>
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<td>Transportation Modelling and Traffic Management</td>
<td>9 CR</td>
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<td>M-MACH-101284</td>
<td>Specialization in Production Engineering</td>
<td>9 CR</td>
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## Compulsory Elective Modules 1

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<td>Virtual Engineering B</td>
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<td>Water Chemistry and Water Technology I</td>
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### Election block: Statistik (at most 9 credits)

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<tr>
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<td>Analytics and Statistics</td>
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<td>M-WIWI-101638</td>
<td>Econometrics and Statistics I</td>
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<td>Econometrics and Statistics II</td>
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## 4.7 Compulsory Elective Modules 2

**Election notes**

In the field "Compulsory Elective Modules 2", **two elective modules** are to be chosen from the subjects Economics, Business Administration, Informatics, Operations Research, Engineering/Natural Sciences and Statistics. Within a compulsory elective area, the modules must come from different subjects. In elective area 2, the subjects Law or Sociology can also be taken in one of the two elective modules.

<table>
<thead>
<tr>
<th>Election block: Volkswirtschaftslehre (at most 9 credits)</th>
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<tbody>
<tr>
<td>M-WIWI-101497  Agglomeration and Innovation</td>
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<tr>
<td>M-WIWI-101453  Applied Strategic Decisions</td>
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<td>M-WIWI-101504  Collective Decision Making</td>
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<td>M-WIWI-101505  Experimental Economics</td>
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<td>M-WIWI-101478  Innovation and Growth</td>
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<td>M-WIWI-101514  Innovation Economics</td>
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<td>M-WIWI-101500  Microeconomic Theory</td>
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<td>M-WIWI-101406  Network Economics</td>
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<td>M-WIWI-101502  Economic Theory and its Application in Finance</td>
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<td>M-WIWI-101468  Environmental Economics</td>
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<td>M-WIWI-101485  Transport Infrastructure Policy and Regional Development</td>
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<tr>
<td>M-WIWI-101511  Advanced Topics in Public Finance</td>
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<td>M-WIWI-101496  Growth and Agglomeration</td>
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<tr>
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<tr>
<td>M-WIWI-101410  Business &amp; Service Engineering</td>
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<tr>
<td>M-WIWI-101498  Management Accounting</td>
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<tr>
<td>M-WIWI-101510  Cross-Functional Management Accounting</td>
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<tr>
<td>M-WIWI-101470  Data Science: Advanced CRM</td>
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<tr>
<td>M-WIWI-103117  Data Science: Data-Driven Information Systems</td>
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<tr>
<td>M-WIWI-101647  Data Science: Evidence-based Marketing</td>
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<td>M-WIWI-105032  Data Science for Finance</td>
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<tr>
<td>M-WIWI-104080  Designing Interactive Information Systems</td>
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<tr>
<td>M-WIWI-102808  Digital Service Systems in Industry</td>
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<td>M-WIWI-103720  eEnergy: Markets, Services and Systems</td>
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<td>M-WIWI-101409  Electronic Markets</td>
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<tr>
<td>M-WIWI-101452  Energy Economics and Technology</td>
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<tr>
<td>M-WIWI-101488  Entrepreneurship (EnTechnon)</td>
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<td>M-WIWI-101483  Finance 2</td>
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<td>M-WIWI-105036  FinTech Innovations</td>
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<td>M-WIWI-101411  Information Engineering</td>
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<td>M-WIWI-101471  Industrial Production II</td>
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<td>M-WIWI-101412  Industrial Production III</td>
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<td>M-WIWI-101507  Innovation Management</td>
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<td>M-WIWI-101446  Market Engineering</td>
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<td>M-WIWI-101490  Marketing Management</td>
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<td>M-WIWI-101487  Sales Management</td>
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<td>M-WIWI-101506  Service Analytics</td>
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<td>M-WIWI-101503  Service Design Thinking</td>
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<td>M-WIWI-105011</td>
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**Election block: Informatik (at most 9 credits)**

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<td>M-WIWI-101630</td>
<td>Electives in Informatics</td>
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**Election block: Operations Research (at most 9 credits)**

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<td>M-WIWI-102832</td>
<td>Operations Research in Supply Chain Management</td>
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<tr>
<td>M-WIWI-102805</td>
<td>Service Operations</td>
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<td>M-WIWI-103289</td>
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**Election block: Natur- und Ingenieurwissenschaften (at most 9 credits)**

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<td>M-MACH-101298</td>
<td>Automated Manufacturing Systems</td>
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<td>Rail System Technology</td>
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<td>M-MACH-101290</td>
<td>BioMEMS</td>
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<td>M-ETIT-101164</td>
<td>Generation and Transmission of Renewable Power</td>
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<td>Global Production and Logistics</td>
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<td>Fundamentals of Transportation</td>
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<td>M-BGU-101884</td>
<td>Lean Management in Construction</td>
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<td>M-MACH-101280</td>
<td>Logistics in Value Chain Networks</td>
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<td>M-MACH-101277</td>
<td>Material Flow in Logistic Systems</td>
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<td>M-MACH-101278</td>
<td>Material Flow in Networked Logistic Systems</td>
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<td>Microfabrication</td>
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<td>M-MACH-101293</td>
<td>Microsystem Technology</td>
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<td>M-MACH-101294</td>
<td>Nanotechnology</td>
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<td>M-WIWI-104837</td>
<td>Natural Hazards and Risk Management</td>
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<td>9 CR</td>
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<td>M-CIWVT-101119</td>
<td>Specialization in Food Process Engineering</td>
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Economics Engineering M.Sc.  
Module Handbook as of 01.10.2019  
23
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<td>M-MACH-101286</td>
<td>Machine Tools and Industrial Handling</td>
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**Election block: Statistik (at most 9 credits)**

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<td>Analytics and Statistics</td>
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**Election block: Recht und Soziologie (at most 9 credits)**

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<td>Governance, Risk &amp; Compliance</td>
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<td>M/INFO-101217</td>
<td>Public Business Law</td>
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<td>M/INFO-101216</td>
<td>Private Business Law</td>
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## 5 Modules

### 5.1 Module: Advanced Module Logistics [M-MACH-104888]

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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student acquires

- well-founded knowledge and method knowledge in the main topics of logistics,
- ability for modeling logistic systems with adequate accuracy by using simple models,
- ability to evaluate logistic systems and to identify cause-and-effects-chains within logistic systems.

**Prerequisites**

One of the modules M-MACH-101279, M-MACH-101277 or M-MACH-101280 must be completed.

**Workload**

270 hours

**Learning type**

Lecture, tutorial.
Module: Advanced Topics in Public Finance [M-WIWI-101511]

**Responsible:** Prof. Dr. Berthold Wigger

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics
  - Compulsory Elective Modules 1 (Volkswirtschaftslehre)
  - Compulsory Elective Modules 2 (Volkswirtschaftslehre)

**Credits:** 9

**Recurrence:** Each term

**Duration:** 2 semester

**Language:** German

**Level:** 4

**Version:** 4

**Mandatory**

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<tr>
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<th>Course Title</th>
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<th>Recurrence</th>
<th>Duration</th>
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<td>T-WIWI-102740</td>
<td>Public Management</td>
<td>4,5 CR</td>
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<td>2 semester</td>
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**Election block: Ergänzungsangebot (between 4,5 and 5 credits)**

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<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>4,5 CR</td>
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<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-102739</td>
<td>Public Revenues</td>
<td>4,5 CR</td>
<td>Each term</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student

- understands the theory and politics of taxation
- has knowledge in the area of public debt.
- understands efficiency problems of public organizations.
- is able to work on fiscal problems.

**Prerequisites**
The course "Public Management" is compulsory and must be examined.

**Content**
As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs.

In the course of the lectures within this module the students achieve knowledge in the areas of public revenues, national and international law of taxation and theory of public sector organizations.

**Recommendation**
Basic knowledge in the area of public finance and public management is required.

**Annotation**
The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

Students who successfully passed the exam in „Public Management“ before the introduction of the module “Advanced Topics in Public Finance” in winter term 2014/15 are allowed to take both courses “Public Revenues” and “Specific Aspects in Taxation”.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.3 Module: Advanced Topics in Strategy and Management [M-WIWI-103119]

**Responsible:** Prof. Dr. Hagen Lindstädt

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

<table>
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<th>Credits</th>
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**Election block: Wahlpflichtangebot (9 credits)**

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<tr>
<td>T-WIWI-106188</td>
<td>Workshop Current Topics in Strategy and Management</td>
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<td>T-WIWI-106189</td>
<td>Workshop Business Wargaming – Analyzing Strategic Interactions</td>
<td>3</td>
<td>CR</td>
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<td>T-WIWI-106190</td>
<td>Strategy and Management Theory: Developments and “Classics”</td>
<td>3</td>
<td>CR</td>
<td>Lindstädt</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students

- are able to analyze business strategies and derive recommendations using appropriate frameworks
- learn to express their position through compelling reasoning in structured discussions
- are qualified to critically examine recent research topics in the field of strategic management
- can derive own conclusions from less structured information by using interdisciplinary knowledge

**Prerequisites**

None

**Content**

The module is divided into three main topics:

The students

- analyze and discuss a wide range of business strategies on the basis of collectively selected case studies.
- participate in a business wargaming workshop and analyze strategic interactions.
- write a paper about current topics in the field of strategic management theory.

**Recommendation**

None

**Annotation**

This course is admission restricted. After being admitted to one course of this module, the participation at the other courses will be guaranteed.

Every course of this module will be at least offered every second term. Thus, it will be possible to complete the module within two terms.

This module will be offered for the first time in the winter term 2017/18.
5.4 Module: Agglomeration and Innovation [M-WIWI-101497]

**Responsible:** Prof. Dr. Ingrid Ott

**Organisation:** KIT Department of Economics and Management

**Part of:** Economics

**Compulsory Elective Modules 1 (Volkswirtschaftslehre)**

**Compulsory Elective Modules 2 (Volkswirtschaftslehre)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Each term</td>
<td>1 semester</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**Election block: Wahlpflichtangebot (9 credits)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>CR</th>
<th>Tutor</th>
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<tbody>
<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4,5</td>
<td>CR</td>
<td>Mitusch</td>
</tr>
<tr>
<td>T-WIWI-109194</td>
<td>Dynamic Macroeconomics</td>
<td>4,5</td>
<td>CR</td>
<td>Brumm</td>
</tr>
<tr>
<td>T-WIWI-102840</td>
<td>Innovation Theory and -Policy</td>
<td>4,5</td>
<td>CR</td>
<td>Ott</td>
</tr>
<tr>
<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
<td>4,5</td>
<td>CR</td>
<td>Ott</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must add up to at least 9.
The overall grade for the module is the average of the grades for each course weighted by the credits.

**Competence Goal**
The student

- applies quantitative methods in the context of economic models
- learns advanced micro- and macroeconomic theories
- is able to derive policy recommendations based on theory
- can identify the importance of alternative incentive mechanisms for the development and spread of innovations
- begins to understand the connections between market form and the development of innovations
- analyzes the determinants of the spatial distribution of economic activity
- understands how processes of concentration result from the interplay of agglomeration and dispersion forces

**Prerequisites**
None

**Content**
The module comprises theories of incentives for the development of innovations as well as theories of wage-based labor mobility, which leads to spatial concentration processes. The microfounded optimality decisions of the actors are in each case transformed into macroeconomic results. In the context of the theory of innovations the diffusion of technological knowledge and the resulting effect on growth due to technological progress is discussed and economic-policy implications are derived. Spatial economics adds to the picture of economic activity by introducing a spatial point of view.

**Recommendation**
Successful completion of the courses *Economics I: Microeconomics* and *Economics II: Macroeconomics* is required.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.5 Module: Analytics and Statistics [M-WIWI-101637]

**Responsible:** Prof. Dr. Oliver Grothe

**Organisation:** KIT Department of Economics and Management

**Part of:** Compulsory Elective Modules 1 (Statistik) Compulsory Elective Modules 2 (Statistik)

<table>
<thead>
<tr>
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<th>Language</th>
<th>Level</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-103123</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Statistics</td>
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**Election block:** Ergänzungsangebot (between 4,5 and 5 credits)

<table>
<thead>
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<th>Level</th>
<th>Credits</th>
<th>CR</th>
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<tr>
<td>T-WIWI-106341</td>
<td></td>
<td></td>
<td>4,5</td>
<td>CR</td>
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<tr>
<td>Machine Learning 2 – Advanced Methods</td>
<td></td>
<td></td>
<td></td>
<td>Zöllner</td>
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<tr>
<td>T-WIWI-103124</td>
<td></td>
<td></td>
<td>4,5</td>
<td>CR</td>
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<tr>
<td>Multivariate Statistical Methods</td>
<td></td>
<td></td>
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<td>Grothe</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

A Student

- Deepens the knowledge of descriptive and inferential statistics.
- Deals with simulation methods.
- Learns basic and advanced methods of statistical analysis of multivariate and high-dimensional data.

**Prerequisites**

The course "Advanced Statistics" is compulsory.

**Content**

- Deriving estimates and testing hypotheses
- Stochastic processes
- Multivariate statistics, copulas
- Dependence measures
- Dimension reduction
- High-dimensional methods
- Prediction

**Annotation**

The planned lectures and courses for the next three years are announced online.

**Workload**

The total workload for this module is approximately 270 hours.
Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules 1 (Volkswirtschaftslehre)
Compulsory Elective Modules 2 (Volkswirtschaftslehre)

Credits: 9
Language: German/English
Level: 4
Version: 3

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students
- can model and analyze complex situations of strategic interaction using advanced game theoretic concepts;
- are provided with essential and advanced game theoretic solution concepts on a rigorous level and can apply them to understand real-life problems;
- learn about the experimental method, ranging from designing an economic experiment to data analysis.

Prerequisites
The course Advanced Game Theory is obligatory. Exception: The course Introduction to Game Theory [2520525] was completed.

Content
The module provides solid skills in game theory and offers a broad range of game theoretic applications. To improve the understanding of theoretical concepts, it pays attention to empirical evidence as well.

Recommendation
Basic knowledge in game theory is assumed.

Annotation
The course Predictive Mechanism and Market Design is not offered each year.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.7 Module: Automated Manufacturing Systems [M-MACH-101298]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
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<tr>
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<th>Duration</th>
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<th>Level</th>
<th>Version</th>
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<tbody>
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<td>Each summer term</td>
<td>1 semester</td>
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<td>4</td>
<td>1</td>
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</table>

Mandatory

| T-MACH-102162 | Automated Manufacturing Systems | 9 CR | Fleischer |

Competence Certificate
written exam (120 minutes)

Competence Goal
The students
- are able to analyze implemented automated manufacturing systems and describe their components.
- are capable to assess the implemented examples of implemented automated manufacturing systems and apply them to new problems.
- are able to name automation tasks in manufacturing plants and name the components which are necessary for the implementation of each automation task.
- are capable with respect to a given task to plan the configuration of an automated manufacturing system and to determine the necessary components to its realization.
- are able to design and select components for a given use case of the categories: "Handling Technology", "Industrial Robotics", "Sensory" and "Controls".
- are capable to compare different concepts for multi-machine systems and select a suitable concept for a given use case.

Prerequisites
none

Content
The lecture provides an overview of the structure and functioning of automated manufacturing systems. In the introduction chapter the basic elements for the realization of automated manufacturing systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- Quality assurance in automated manufacturing
- automatic machines, cells, centers and systems for manufacturing and assembly
- structures of multi-machine systems
- planning of automated manufacturing systems

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components (chassis and drive technology). The analysis of automated manufacturing systems for manufacturing of defined components is also included. In the field of vehicle power train both, the automated manufacturing process for the production of the conventional internal-combustion engine and the automated manufacturing process for the production of the prospective electric power train (electric motor and battery) are considered. In the field of car body, the focus is on the analysis of the process chain for the automated manufacturing of conventional sheet metal body parts, as well as for automated manufacturing of body components made out of fiber-reinforced plastics. Within tutorials, the contents from the lecture are advanced and applied to specific problems and tasks.

Workload
regular attendance: 63 hours
self-study: 207 hours

Learning type
Lectures, exercise, excursion
Module: BioMEMS [M-MACH-101290]

5.8 Module: BioMEMS [M-MACH-101290]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering
Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
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<th>Credits</th>
<th>Language</th>
<th>Level</th>
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Mandatory

<table>
<thead>
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<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
<td>T-MACH-100966</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I</td>
<td>3 CR</td>
<td>Guber</td>
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</table>

Election block: BioMEMS (at least 6 credits)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
<td>Last</td>
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<tr>
<td>T-MACH-102165</td>
<td>Selected Topics on Optics and Microoptics for Mechanical Engineers</td>
<td>3 CR</td>
<td>Mappes</td>
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<tr>
<td>T-MACH-100967</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II</td>
<td>3 CR</td>
<td>Guber</td>
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<tr>
<td>T-MACH-100968</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<tr>
<td>T-MACH-102172</td>
<td>Bionics for Engineers and Natural Scientists</td>
<td>3 CR</td>
<td>Hölscher</td>
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<tr>
<td>T-MACH-102176</td>
<td>Current Topics on BioMEMS</td>
<td>3 CR</td>
<td>Guber</td>
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</table>

Competence Certificate
The assessment is carried out as partial exams
(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- has basic as well as extensive knowledge about different fields of applications of BioMEMS
- understands continuative aspects of the related subjects optics and microoptics, micro actuators, replications techniques and bionics

Prerequisites
none

Content
Operations through small orifices, a pill which will take pictures on its way through your body or lab results right at the point of care - the need for easier and faster ways to help people is an important factor in research. The module BioMEMS (Bio(medical)-Micro-Electro-Mechanical-Systems) describes the application of microtechnology in the field of Life-Science, medical applications and Biotechnology and will teach you the necessary skills to understand and develop biological and medical devices.
The BioMEMS lectures will cover the fields of minimal invasive surgery, lab-on-chip systems, NOTES-Technology (Natural Orifice Transluminal Endoscopic Surgery), as well as endoscopic surgery and stent technology.
Additionally to the BioMEMS lectures you can specialize in various related fields like fabrication, actuation, optics and bionics. The course Replication processes will teach you some cost efficient and fast ways to produce parts for medical or biological devices. In the course Microactuation it is discussed how to receive movements in micrometer scale in a microsystem, this could be e.g. to drive micro pumps or micro valves. The necessary tools for optical measurement and methods of analysis to gain high resolution pictures are also part of this module. To deepen your knowledge and to get a hands-on experience this module contains a one week lab course. In the lecture bionics you can see how biological effects can be transferred into technical products.
Workload
270 hours
### 5.9 Module: Business & Service Engineering [M-WIWI-101410]

**Responsible:** Prof. Dr. Christof Weinhardt  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration  
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

<table>
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<tr>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>German/English</td>
<td>4</td>
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</tr>
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</table>

**Election block: Wahlpflichtangebot (9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>CR</th>
<th>Instructor</th>
</tr>
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<tbody>
<tr>
<td>T-WIWI-106201</td>
<td>Digital Transformation of Organizations</td>
<td>4.5</td>
<td>Mädche</td>
</tr>
<tr>
<td>T-WIWI-102639</td>
<td>Business Models in the Internet: Planning and Implementation</td>
<td>4.5</td>
<td>Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-102848</td>
<td>Personalization and Services</td>
<td>4.5</td>
<td>Sonnenbichler</td>
</tr>
<tr>
<td>T-WIWI-102847</td>
<td>Recommender Systems</td>
<td>4.5</td>
<td>Geyer-Schulz</td>
</tr>
<tr>
<td>T-WIWI-102799</td>
<td>Practical Seminar Service Innovation</td>
<td>4.5</td>
<td>Satzger</td>
</tr>
<tr>
<td>T-WIWI-102641</td>
<td>Service Innovation</td>
<td>4.5</td>
<td>Satzger</td>
</tr>
<tr>
<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4.5</td>
<td>Weinhardt</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student should:

- learn to develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- learn to restructure and develop new business processes in markets under those conditions
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services.
- improve his statistics skills and apply them to appropriate cases
- learn to elaborate solutions in a team

**Prerequisites**

None

**Content**

This module addresses the challenges of creating new kinds of products, processes, services, and markets from a service perspective in the context of new developed information and communication technologies and the globalization process. The module describes service competition as a business strategy in the long term that leads to the design of business processes, business models, forms of organization, markets, and competition. This will be shown by actual examples from personalized services, recommender services and social networks.

**Recommendation**

None

**Annotation**

All practical Seminars offered at the IM can be chosen for Special Topics in Information Systems. Please update yourself on www.iism.kit.edu/im/lehre.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.10 Module: Collective Decision Making [M-WIWI-101504]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management

Part of: Economics
Compulsory Elective Modules 1 (Volkswirtschaftslehre)
Compulsory Elective Modules 2 (Volkswirtschaftslehre)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tr>
<td>9</td>
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<td>English</td>
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</table>

Election block: Wahlpflichtangebot ()

| T-WIWI-102740 | Public Management | 4,5 CR | Wigger |
| T-WIWI-102859 | Social Choice Theory | 4,5 CR | Puppe |

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students
- are able to model practical problems of the public sector and to analyze them with respect to positive and normative questions,
- understand individual incentives and social outcomes of different institutional designs,
- are familiar with the functioning and design of democratic elections and can analyze them with respect to their individual incentives.

Prerequisites
None

Content
The focus of the module is on mechanisms of public decisions making, including voting and the aggregation of preferences and judgements.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
### Module: Combustion Engines I [M-MACH-101275]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)  
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
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<th>Duration</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Each winter term</td>
<td>1 semester</td>
<td>4</td>
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**Election block:** Wahlpflicht (between 1 and 2 items)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Credits</th>
<th>Lecturer(s)</th>
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</thead>
<tbody>
<tr>
<td>T-MACH-102194</td>
<td>Combustion Engines I</td>
<td>5 CR</td>
<td>Koch, Kubach</td>
</tr>
<tr>
<td>T-MACH-105564</td>
<td>Energy Conversion and Increased Efficiency in Internal Combustion Engines</td>
<td>4 CR</td>
<td>Koch, Kubach</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
The module examination contains of two oral examinations. The module score results from the two scores weighted according to the ECTS.

**Competence Goal**  
The student can name and explain the working principle of combustion engines. He is able to analyse and evaluate the combustion process. He is able to evaluate influences of gas exchange, mixture formation, fuels and exhaust gas aftertreatment on the combustion performance. He can solve basic research problems in the field of engine development.

The student can name all important influences on the combustion process. He can analyse and evaluate the engine process considering efficiency, emissions and potential.

**Prerequisites**  
None

**Content**  
Working Principle of ICE  
Characteristics Parameters  
Characteristics parameters  
Engine parts  
Crank drive  
Fuels  
Gasoline engine operation modes  
Diesel engine operation modes  
Emissions  
Fundamentals of ICE combustion  
Thermodynamics of ICE  
Flow field  
Wall heat losses  
Combustion in Gasoline and Diesel engines  
Heat release calculation  
Waste heat recovery

**Workload**  
regular attendance: 62 hours  
self-study: 208 hours
5.12 Module: Combustion Engines II [M-MACH-101303]

**Responsible:** Dr.-Ing. Heiko Kubach

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<th>Recurrence</th>
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<tbody>
<tr>
<td>9</td>
<td>Each term</td>
<td>4</td>
<td>2</td>
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</tbody>
</table>

**Mandatory**

- **T-MACH-104609** Combustion Engines II
- **T-MACH-105044** Fundamentals of Catalytic Exhaust Gas Aftertreatment
- **T-MACH-105173** Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines
- **T-MACH-105184** Fuels and Lubricants for Combustion Engines
- **T-MACH-105167** Analysis Tools for Combustion Diagnostics
- **T-MACH-102197** Gas Engines
- **T-MACH-102199** Model Based Application Methods
- **T-MACH-105169** Engine Measurement Techniques

**Election block: Verbrennungsmotoren II (at least 4 credits)**

- **T-MACH-105173** Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines 4 CR Deutschmann, Grunwaldt, Kubach, Lox
- **T-MACH-105173** Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines 4 CR Kehrwald, Kubach
- **T-MACH-105169** Analysis Tools for Combustion Diagnostics 4 CR Pfeil
- **T-MACH-102197** Gas Engines 4 CR Golloch, Kubach
- **T-MACH-102199** Model Based Application Methods 4 CR Kirschbaum
- **T-MACH-105169** Engine Measurement Techniques 4 CR Bernhardt

**Competence Certificate**
The assessment consists of an oral exam (60 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

**Competence Goal**
See courses.

**Prerequisites**
None

**Content**

**Compulsory:**
- Supercharging and air management
- Engine maps
- Emissions and Exhaust gas aftertreatment
- Transient engine operation
- ECU application
- Electrification and alternative powertrains

**Elective:**
- Fuels and lubricants for ICE
- Fundamentals of catalytic EGA
- Analysis tools for combustion diagnostics
- Engine measurement techniques
- Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines

**Workload**
- regular attendance: 62 h
- self-study: 208 h
5.13 Module: Control Engineering II [M-ETIT-101157]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann
Dr.-Ing. Mathias Kluwe

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<td>Automation of Discrete Event and Hybrid Systems</td>
<td>3 CR</td>
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<td>T-ETIT-100666</td>
<td>Control of Linear Multivariable Systems</td>
<td>6 CR</td>
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**Competence Certificate**
The assessment is carried out as partial written exams of the single courses of this module (T-ETIT-100981 and T-ETIT-100666). The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The students

- have deeper knowledge in the field of control theory and system dynamics,
- are able to analyze multivariable systems in state space and frequency domain and are familiar with adequate methods for the control design,
- know the basics of modelling, simulation, analyses and control of discrete-event and hybrid systems.

**Prerequisites**
none

**Content**
This module broadens the basic knowledge of system dynamics of the students to the multivariable case. Both I/O-models in frequency domain and mainly state space models are regarded, for which several methods for the analysis and the control design with different goals (decoupling, robustness) and constraints (disturbances, sensor failures) are presented. Above that, the basics of modelling, simulation, analysis and control of discrete-event and hybrid systems are discussed.

**Recommendation**
For this module a basic knowledge in system theory and control engineering is assumed. These subjects can be found in the course System Dynamics and Control Engineering (2303155) which is recommended to have been attended beforehand.

**Workload**
See German version.
5.14 Module: Cross-Functional Management Accounting [M-WIWI-101510]

**Responsible:** Prof. Dr. Marcus Wouters  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration  
  - Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
  - Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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<td>T-WIWI-108651</td>
<td>Extraordinary additional course in the module Cross-Functional Management Accounting</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students will be able to apply advanced management accounting methods to managerial decision-making problems in marketing, finance, organization and strategy.

**Prerequisites**

The course "Advanced Management Accounting" is compulsory.

The additional courses can only be chosen after the compulsory course has been completed successfully.

**Content**

The module includes a course on several advanced management accounting methods that can be used for various decisions in operations and innovation management. By selecting another course, each student looks in more detail at one interface between management accounting a particular field in management, namely marketing, finance, or organization and strategy.

**Recommendation**

None

**Annotation**

The module "Cross-functional Management Accounting" always includes the compulsory course "Advanced Management Accounting." Students look at the interface between management accounting and another field in management. Students build the module by adding a course from the specified list. Students can also suggest another suitable course for this module for evaluation by the coordinator.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.15 Module: Data Science for Finance [M-WIWI-105032]

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Business Administration

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<td>T-WIWI-102878</td>
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<td>T-WIWI-110213</td>
<td>Python for Computational Risk and Asset Management</td>
<td>3 CR</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module.

The assessment of "Computational Risk and Asset Management" is carried out in form of a written exam (90 minutes), the assessment of "Python for Computational Risk and Asset Management" is carried out in form of twelve weekly Python programming tasks and offered each winter term.

The overall grade of the module is the grade of the written exam weighted with factor 0.75 and the grade for the Python programming tasks weighted with factor 0.25. The resulting grade is truncated after the first decimal.

Competence Goal
Students learn how to implement solutions for advanced and real-world challenges in portfolio management. The focus of this module is on the realization of statistical concepts in Python and enable students to solve a broad range of problems along the investment process on their own.

Content
The module covers several topics, among them:

- Quantitative Portfolio Strategies: Extensions to Mean-Variance Portfolio Optimization
- Return Densities: Forecasting with Traditional and Machine Learning Approaches, Monte Carlo Simulation
- Financial Economics: Rationalizing Risk Premiums via Stochastic Discount Factor
- Multi-Asset Valuation: DCF Approach, No-Arbitrage and Ito Calculus

Recommendation
Good knowledge of statistics and first programming experience with Python is recommended.

Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module. The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
Module: Data Science: Advanced CRM [M-WIWI-101470]

5.16 Module: Data Science: Advanced CRM [M-WIWI-101470]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

Election block: Wahlpflichtangebot (9 credits)

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<td>Geyer-Schulz, Nazemi</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services,
- models, analyzes and optimizes the structure and dynamics of complex business applications,
- develops and realizes personalized services, especially in the field of recommendation services,
- analyzes social networks and knows their application field in CRM,
- works in teams.

Prerequisites
None

Content
Building on the basics of CRM from the Bachelor's degree program, the module "Data Science: Advanced CRM" is focusing on the use of information technology and its related economic issues in the CRM environment. The course "Intelligent CRM Architectures" deals with the design of modern intelligent systems. The focus is on the software architecture and design patterns that are relevant to learning systems. It also covers important aspects of machine learning that complete the picture of an intelligent system. Examples of presented systems are "Taste Map"-architectures, "Counting Services", as well as architectures of "Business Games". The impact of management decisions in complex systems is considered in the course "Business dynamics". The understanding, modeling and simulation of complex systems allows the analysis, the goal-oriented design and the optimization of markets, business processes and regulations throughout the company. Specific problems of intelligent systems are covered in the courses "Personalization and Services", "Recommender Systems", "Service Analytics" and "Social Network Analysis in CRM". The content includes procedures and methods to create user-oriented services. The measurement and monitoring of service systems, the design of personalized offers, and the generation of recommendations based on the collected data of products and customers are discussed. The importance of user modeling and -recognition, data security and privacy are addressed as well.

Recommendation
None

Annotation
The module has been renamed to "Data Science: Advanced CRM" in winter term 2016/2017.
Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.17 Module: Data Science: Data-Driven Information Systems [M-WIWI-103117]

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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Election block: Wahlpflichtangebot ()

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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Competence Goal
The student
- understands the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems and is capable of comparing and assessing strategic alternatives
- has the core skills to design, model, and control complex, inter-organisational analytical, processes, including various business functions as well as customers and markets
- understands the usage of performance indicators for a variety of controlling and management issues and is able to define models for generating the relevant performance indicators under considerations of data availability
- distinguishes different analytics methods and concepts and learn when to apply to better understand and anticipate business relationships and developments of industrial and in particular service companies to derive fact- and data-founded managerial actions and strategies.
- knows how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in decision support or business intelligence systems and analytical processes as a whole.

Prerequisites
None.
Content
The amount of business-related data available in modern enterprise information systems grows exponentially, and the various data sources are more and more integrated, transformed, and analyzed jointly to gain valuable business insights, pro-actively control and manage business processes, to leverage planning and decision making, and to provide appropriate, potentially novel services to customers based on relationships and developments observed in the data.

Also, data sources are more and more connected and single business unit that used to operate on separate data pools are now becoming highly integrated, providing tremendous business opportunities but also challenges regarding how the data should be represented, integrated, preprocessed, transformed, and finally used in analytics planning and decision processes.

The courses of this module equip the students with core skills to understand the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems. Students will be capable to designing, comparing, and evaluating strategic alternatives. Also, students will learn how to design, model, and control complex analytical processes, including various business functions of industrial and service companies including customers and markets. Students learn core skills to understand fundamental strategies for integrating analytic models and operative controlling mechanisms while ensuring the technical feasibility of the resulting information systems.

Furthermore, the student can distinguish different methods and concepts in the realm of data science and learns when to apply. She/he will know the means of characterizing and analyzing heterogeneous, high-dimensional data available in data warehouses and external data sources to gain additional insights valuable for enterprise planning and decision making. Also, the students know how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in business information and business intelligence systems.

The module offers the opportunity to apply and deepen this knowledge in a seminar and hands-on tutorials that are offered with all lectures.

Texteintrag

Recommendation
Basic knowledge of Information Management, Operations Research, Descriptive Statistics, and Inferential Statistics is assumed.

Annotation
The course „Business Data Strategy” can be chosen from winter term 2016 on.
5.18 Module: Data Science: Evidence-based Marketing [M-WIWI-101647]

**Responsible:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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<td>Market Research</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the rst decimal.

**Competence Goal**

Students
- possess advanced knowledge of relevant market research contents
- know many different qualitative and quantitative methods for measuring customer behavior, preparation of strategic decisions, making causal deductions, usage of social media data and sales forecasting
- possess the statistical skills required for working in marketing research

**Prerequisites**

Keine.

**Content**

This module provides in-depth knowledge of relevant quantitative and qualitative methods used in market research. Students can attend the following courses:

- The course “Market Research” provides contents of practical relevance for measuring customer attitudes and customer behavior. The participants learn using statistical methods for strategic decision-making in marketing. Students who are interested in writing their master thesis at the Marketing & Sales Research Group are required to take this course.
- The course „Marketing Analytics“ is based on „Market Research“ and teaches advanced statistical methods for analyzing relevant marketing and market research questions.

**Recommendation**

None

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
### 5.19 Module: Designing Interactive Information Systems [M-WIWI-104080]

**Responsible:** Prof. Dr. Alexander Mädche  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration  
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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<td>T-WIWI-105773</td>
<td>Digital Service Design</td>
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**Election block: Ergänzungsangebot (at most 4,5 credits)**

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

**Competence Goal**

The student

- has a comprehensive understanding of conceptual and theoretical foundations of interactive systems
- knows design processes for interactive systems
- is aware of the most important techniques and tools for designing interactive systems and knows how to apply them to real-world problems
- is able to apply design principles for the design of most important classes of interactive systems,
- creates new solutions of interactive systems teams

**Prerequisites**

The course “Interactive Information Systems” is compulsory and must be examined.

**Content**

Advanced information and communication technologies make interactive systems ever-present in the users’ private and business life. They are an integral part of smartphones, devices in the smart home, mobility vehicles as well as at the working place in production and administration (e.g. in the form of dashboards).

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. This module focuses on design processes and principles for interactive systems. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for the design of interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

Each lecture in the module is accompanied with a capstone project that is carried out with an industry partner.

**Annotation**


**Workload**

The total workload for this module is approximately 270 hours.
5.20 Module: Digital Service Systems in Industry [M-WIWI-102808]

- **Responsible:** Prof. Dr. Wolf Fichtner  
  Prof. Dr. Stefan Nickel
- **Organisation:** KIT Department of Economics and Management
- **Part of:** Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
  Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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- **Election block: Wahlpflichtangebot (9 credits)**

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<td>Challenges in Supply Chain Management</td>
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<td>T-WIWI-102822</td>
<td>Industrial Services</td>
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<td>Liberalised Power Markets</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
Students
- understand the basics of the management of digital services applied on an industrial context
- gain an industry-specific insight into the importance and most relevant characteristics of information systems as key components of the digitization of business processes, products and services
- are able to transfer and apply the models and methods introduced on practical scenarios and simulations.
- understand the control and optimization methods in the sector of service management and are able to apply them properly.

**Prerequisites**
This module can only be assigned as an elective module.

**Content**
This module aims at deepening the fundamental knowledge of digital service management in the industrial context. Various mechanisms and methods to shape and control connected digital service systems in different industries are discussed and demonstrated with real-life application cases.

**Recommendation**
None

**Annotation**
This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Econometrics and Statistics I [M-WIWI-101638]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules 1 (Statistik)
Compulsory Elective Modules 2 (Statistik)

Credits: 9
Recurrence: Each term
Language: German
Level: 4
Version: 3

Mandatory

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<th>Title</th>
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<tbody>
<tr>
<td>T-WIWI-103125</td>
<td>Applied Econometrics</td>
<td>4.5</td>
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Election block: Ergänzungsangebot (between 4,5 and 5 credits)

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<tr>
<td>T-WIWI-103066</td>
<td>Data Mining and Applications</td>
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</tr>
<tr>
<td>T-WIWI-103064</td>
<td>Financial Econometrics</td>
<td>4.5</td>
</tr>
<tr>
<td>T-WIWI-103126</td>
<td>Non- and Semiparametrics</td>
<td>4.5</td>
</tr>
<tr>
<td>T-WIWI-103127</td>
<td>Panel Data</td>
<td>4.5</td>
</tr>
<tr>
<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4.5</td>
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</table>

Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student shows an in depth understanding of advanced Econometric techniques suitable for different types of data. He/She is able to apply his/her theoretical knowledge to real world problems with the help of statistical software and to evaluate performance of different approaches based on statistical criteria.

Prerequisites
The course "Advanced Statistics" [2520020] is compulsory and must be examined.

Content
The courses of this module offer students a broad range of advanced Econometric techniques for state-of-the art data analysis.

Workload
The total workload for this module is approximately 270 hours.
5.22 Module: Econometrics and Statistics II [M-WIWI-101639]

**Responsible:** Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Compulsory Elective Modules 1 (Statistik)  
Compulsory Elective Modules 2 (Statistik)

<table>
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**Election block: Wahlpflichtangebot (between 9 and 10 credits)**

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<td>Financial Econometrics</td>
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<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
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<td>Non- and Semiparametrics</td>
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<td>Schienle</td>
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<td>T-WIWI-103127</td>
<td>Panel Data</td>
<td>4.5 CR</td>
<td>Heller</td>
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<tr>
<td>T-WIWI-103128</td>
<td>Portfolio and Asset Liability Management</td>
<td>4.5 CR</td>
<td>Safarian</td>
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<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4.5 CR</td>
<td>Heller</td>
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<tr>
<td>T-WIWI-103129</td>
<td>Stochastic Calculus and Finance</td>
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**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student shows an in depth understanding of advanced Econometric techniques suitable for different types of data. He/She is able to apply his/her theoretical knowledge to real world problems with the help of statistical software and to evaluate performance of different approaches based on statistical criteria.

**Prerequisites**
This module can only be passed if the module "Econometrics and Statistics I" has been finished successfully before.

**Content**
This modula builds on prerequisites acquired in Module "Econometrics and Statistics I". The courses of this module offer students a broad range of advanced Econometric techniques for state-of-the art data analysis.

**Workload**
The total workload for this module is approximately 270 hours.
Module: Economic Theory and its Application in Finance [M-WIWI-101502]

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:** Economics

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**Election block: Wahlpflichtangebot (1 item)**

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<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4,5</td>
<td>Mitusch</td>
</tr>
<tr>
<td>T-WIWI-102861</td>
<td>Advanced Game Theory</td>
<td>4,5</td>
<td>Ehrhart, Puppe, Reiß</td>
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**Election block: Ergänzungsangebot (1 item)**

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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4,5</td>
<td>Ruckes, Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-102622</td>
<td>Corporate Financial Policy</td>
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<td>T-WIWI-109050</td>
<td>Corporate Risk Management</td>
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<td>Financial Intermediation</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The students
- have learnt the methods of formal economic modeling, particularly of General Equilibrium Theory and contract theory
- will be able to apply these methods to the topics in Finance, specifically the areas of financial markets and institutions and corporate finance
- have gained many useful insights into the relationship between firms and investors and the functioning of financial markets

**Prerequisites**
One of the courses T-WIWI-102861 "Advanced Game Theory" and T-WIWI-102609 "Advanced Topics in Economic Theory" is compulsory.

**Content**
The mandatory course "Advanced Topics in Economic Theory" is devoted in equal parts to General Equilibrium Theory and to contract theory. The course "Asset Pricing" will apply techniques of General Equilibrium Theory to valuation of financial assets. The courses "Corporate Financial Policy" and "Finanzintermediation" will apply the techniques of contract theory to issues of corporate finance and financial institutions.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

Election block: Wahlpflichtangebot (at least 9 credits)

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<th>Level</th>
<th>Version</th>
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<td>T-WIWI-107503</td>
<td>Energy Networks and Regulation</td>
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<td>T-WIWI-107504</td>
<td>Smart Grid Applications</td>
<td>4,5 CR</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- is aware of design options for energy and especially electricity markets and can derive implications for the market results from the market design,
- knows about current trends regarding the Smart Grid and understands affiliated modelling approaches,
- can evaluate business models of electricity grids according to the regulation regime
- is prepared for scientific contributions in the field of energy system analysis.

Prerequisites
None.

Content
The module conveys scientific and practical knowledge to analyse energy markets and according business models. To do so the scientific discussion on energy market designs is evaluated and analysed. Different energy market models are presented and their design implications are evaluated. Furthermore, the electricity system is analysed with regards to being a network industry and resulting regulation and business models are discussed. Besides these traditional areas of energy economics we will look at methods and models of digitalisation in the energy sector.

Annotation
The lecture Smart Grid Applications will be available starting in the winter term 2018/19.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
## 5.25 Module: Electives in Informatics [M-WIWI-101630]

**Responsible:**
- Prof. Dr. Andreas Oberweis
- Prof. Dr. Harald Sack
- Prof. Dr. Ali Sunyaev
- Prof. Dr. York Sure-Vetter
- Prof. Dr. Melanie Volkamer
- Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:**
KIT Department of Economics and Management

**Part of:**
- Compulsory Elective Modules 1 (Informatik)
- Compulsory Elective Modules 2 (Informatik)

<table>
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**Election block: Wahlpflichtangebot ()**

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<td>4,5 CR</td>
<td>Shukla</td>
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<tr>
<td>T-WIWI-109248</td>
<td>Critical Information Infrastructures</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-109246</td>
<td>Digital Health</td>
<td>4,5 CR</td>
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<td>T-WIWI-109270</td>
<td>Human Factors in Security and Privacy</td>
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<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
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<td>T-WIWI-102668</td>
<td>Enterprise Architecture Management</td>
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<td>T-WIWI-110346</td>
<td>Supplement Enterprise Information Systems</td>
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<td>Supplement Software- and Systemsengineering</td>
<td>4,5 CR</td>
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<td>T-WIWI-106423</td>
<td>Information Service Engineering</td>
<td>4,5 CR</td>
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<td>T-WIWI-102666</td>
<td>Knowledge Discovery</td>
<td>4,5 CR</td>
<td>Sure-Vetter</td>
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<tr>
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<td>Management of IT-Projects</td>
<td>4,5 CR</td>
<td>Schätzle</td>
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<tr>
<td>T-WIWI-106340</td>
<td>Machine Learning 1 - Basic Methods</td>
<td>4,5 CR</td>
<td>Zöllner</td>
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<tr>
<td>T-WIWI-106341</td>
<td>Machine Learning 2 – Advanced Methods</td>
<td>4,5 CR</td>
<td>Zöllner</td>
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<tr>
<td>T-WIWI-102697</td>
<td>Business Process Modelling</td>
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<tr>
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<td>Nature-Inspired Optimization Methods</td>
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<td>Strategic Management of Information Technology</td>
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<td>T-WIWI-103112</td>
<td>Web Science</td>
<td>4,5 CR</td>
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**Election block: Seminare und Praktika ()**

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<td>Emerging Trends in Digital Health</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-110143</td>
<td>Emerging Trends in Internet Technologies</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-109249</td>
<td>Sociotechnical Information Systems Development</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-110548</td>
<td>Advanced Lab Informatics (Master)</td>
<td>4,5 CR</td>
<td>Professorenschaft des Fachbereichs Informatik</td>
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<td>Advanced Lab Security</td>
<td>4,5 CR</td>
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<td>T-WIWI-109271</td>
<td>Advanced Lab User Studies in Security</td>
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<td>4,5 CR</td>
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<td>Project Lab Machine Learning</td>
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<tr>
<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
<td>4,5 CR</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Prerequisites
None.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Annotation
Detailed information on the recognition of examinations in the field of Informatics can be found at http://www.aifb.kit.edu/web/Auslandsaufenthalt.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
### 5.26 Module: Electronic Markets [M-WIWI-101409]

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**Competence Certificate**

Please note that the course "Business Administration in Information Engineering and Management" is no longer offered and that the examination is only offered in exceptional cases (see description of T-WIWI-102886).

The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- knows coordination and motivation methods and analyzes them regarding their efficiency,
- classifies markets and describes the roles of the participants in a formal way,
- knows the conditions for market failure and knows and develops countermeasures,
- knows institutions and market mechanisms, their fundamental theories and empirical research results,
- knows the design criteria of market mechanisms and a systematic approach for creating new markets,
- models, analyzes and optimizes the structure and dynamics of complex business applications.

**Prerequisites**

None
Content
What are the conditions that make electronic markets develop and how can one analyse and optimize such markets?

In this module, the selection of the type of organization as an optimization of transaction costs is treated. Afterwards, the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure are described. Finally, motivational issues like bounded rationality and information asymmetries (private information and moral hazard), as well as the development of incentive schemes, are presented. Regarding the market design, especially the interdependencies of market organization, market mechanisms, institutions and products are described and theoretical foundations are lectured.

Electronic markets are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics such markets can be modelled. Simulations of complex systems allow the analysis and optimization of markets, business processes, policies, and organizations.

Topics include:
- classification, analysis, and design of markets
- simulation of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control

Recommendation
None

Annotation
The course Price Management is offered for the first time in summer term 2016.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
# 5.27 Module: Emphasis in Informatics [M-WIWI-101628]

**Responsible:**
Prof. Dr. Andreas Oberweis  
Prof. Dr. Harald Sack  
Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:**
KIT Department of Economics and Management

**Part of:**
- Compulsory Elective Modules 1 (Informatik)  
- Compulsory Elective Modules 2 (Informatik)

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**Election block: Wahlpflichtangebot (between 1 and 3 items)**

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<td>Computational Economics</td>
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<tr>
<td>T-WIWI-109248</td>
<td>Critical Information Infrastructures</td>
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<td>Sunyaev</td>
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<td>T-WIWI-109246</td>
<td>Digital Health</td>
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<td>T-WIWI-109270</td>
<td>Human Factors in Security and Privacy</td>
<td>4.5</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
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<tr>
<td>T-WIWI-102668</td>
<td>Enterprise Architecture Management</td>
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<td>T-WIWI-110346</td>
<td>Supplement Enterprise Information Systems</td>
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<td>T-WIWI-110372</td>
<td>Supplement Software- and Systemsengineering</td>
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<td>Information Service Engineering</td>
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<td>T-WIWI-102666</td>
<td>Knowledge Discovery</td>
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<td>Management of IT-Projects</td>
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<td>Machine Learning 1 - Basic Methods</td>
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<td>T-WIWI-106341</td>
<td>Machine Learning 2 – Advanced Methods</td>
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<td>T-WIWI-102697</td>
<td>Business Process Modelling</td>
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<td>T-WIWI-102679</td>
<td>Nature-Inspired Optimization Methods</td>
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<td>T-WIWI-109799</td>
<td>Process Mining</td>
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<tr>
<td>T-WIWI-102874</td>
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<td>Strategic Management of Information Technology</td>
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<td>T-WIWI-103112</td>
<td>Web Science</td>
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**Election block: Seminare und Praktika ()**

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<td>T-WIWI-110143</td>
<td>Emerging Trends in Internet Technologies</td>
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<td>T-WIWI-109249</td>
<td>Sociotechnical Information Systems Development</td>
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<td>Advanced Lab Informatics (Master)</td>
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<td>T-WIWI-109271</td>
<td>Advanced Lab User Studies in Security</td>
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<tr>
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<td>Project Lab Cognitive Automobiles and Robots</td>
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<td>Project Lab Machine Learning</td>
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<tr>
<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
<td>4.5</td>
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</table>
Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Prerequisites
None.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Annotation
Detailed information on the recognition of examinations in the field of Informatics can be found at http://www.aifb.kit.edu/web/Auslandsaufenthalt.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.28 Module: Energy and Process Technology I [M-MACH-101296]

**Responsible:** Heiner Wirbser

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<th>Level</th>
<th>Version</th>
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<tr>
<td>T-MACH-102211</td>
<td>Energy and Process Technology I</td>
<td>9 CR</td>
<td>Bauer, Schwitzke, Velji, Wirbser</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module, whose sum of credits must meet the requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
In this modul students achieve a basic understanding of the technical properties of energy conversion processes and machines.

**Prerequisites**
None

**Content**
Energy and Process Technology 1:
1. thermodynamic basics and cycle processes (ITT)
2. basics of piston engines (IFKM)
3. basics of turbomachines (FSM)
4. basics of thermal turbomachines (ITS)

**Annotation**
All lectures and exams are hold in German only.
5.29 Module: Energy and Process Technology II [M-MACH-101297]

**Responsible:** Heiner Wirbser  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)  
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<td>T-MACH-102212</td>
<td>Energy and Process Technology II</td>
<td>9 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module, whose sum of credits must meet the requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
In this modul students achieve the ability to evaluate solitary and interconnected energy systems with respect to societal and economical aspects.

**Prerequisites**
None

**Content**
Energy and Process Technology 2:
1. basics in combustion and pollutant formation (ITT)  
2. technical realisation and application of piston engines (IFKM) fluid flow engines (FSM) and thermal turbomachines (ITS)  
3. technical aspects of energy supply systems and networks (ITS)

**Annotation**
All lectures and exams are hold in German only.

- **Responsible:** Prof. Dr. Wolf Fichtner
- **Organisation:** KIT Department of Economics and Management
- **Part of:** Business Administration
  - Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
  - Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

**Credits:** 9
**Recurrence:** Each term
**Duration:** 1 semester
**Language:** German/English
**Level:** 4
**Version:** 5

### Mandatory

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<td>Liberalised Power Markets</td>
<td>3 CR</td>
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<td>T-WIWI-102691</td>
<td>Energy Trade and Risk Management</td>
<td>4 CR</td>
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<td>T-WIWI-102607</td>
<td>Energy Policy</td>
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<td>T-WIWI-107501</td>
<td>Energy Market Engineering</td>
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<td>T-WIWI-107446</td>
<td>Quantitative Methods in Energy Economics</td>
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<td>Regulation Theory and Practice</td>
<td>4.5 CR</td>
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**Election block: Ergänzungsangebot (at least 6 credits)**

- T-WIWI-107043 Liberalised Power Markets
- T-WIWI-102691 Energy Trade and Risk Management
- T-WIWI-102607 Energy Policy
- T-WIWI-107501 Energy Market Engineering
- T-WIWI-108016 Simulation Game in Energy Economics
- T-WIWI-107446 Quantitative Methods in Energy Economics
- T-WIWI-102712 Regulation Theory and Practice

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal. Additional courses might be accredited upon request.

**Competence Goal**

The student

- gains detailed knowledge about the new requirements of liberalised energy markets,
- describes the planning tasks on the different energy markets,
- knows solution approaches to respective planning tasks.

**Prerequisites**

The lecture Liberalised Power Markets has to be examined.

**Content**

- Liberalised Power Markets: The European liberalisation process, energy markets, pricing, market failure, investment incentives, market power
- Energy Trade and Risk Management: trade centres, trade products, market mechanisms, position and risk management
- Simulation Game in Energy Economics: Simulation of the German electricity system

**Recommendation**

The courses are conceived in a way that they can be attended independently from each other. Therefore, it is possible to start the module in winter and summer term.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5 MODULES

Module: Energy Economics and Technology [M-WIWI-101452]

5.31 Module: Energy Economics and Technology [M-WIWI-101452]

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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<th>Level</th>
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**Election block: Wahlpflichtangebot (at least 9 credits)**

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<td>Efficient Energy Systems and Electric Mobility</td>
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<td>T-WIWI-102650</td>
<td>Energy and Environment</td>
<td>4.5 CR</td>
<td>Karl</td>
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<td>T-WIWI-102830</td>
<td>Energy Systems Analysis</td>
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<td>T-WIWI-107464</td>
<td>Smart Energy Infrastructure</td>
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<td>T-WIWI-102695</td>
<td>Heat Economy</td>
<td>3 CR</td>
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**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student

- gains detailed knowledge about present and future energy supply technologies (focus on final energy carriers electricity and heat),
- knows the techno-economic characteristics of plants for energy provision, for energy transport as well as for energy distribution and demand,
- is able to assess the environmental impact of these technologies.

**Prerequisites**
None

**Content**
- Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions
- Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics
- Energy and Environment: emission factors, emission reduction measures, environmental impact
- Efficient Energy Systems and Electric Mobility: concepts and current trends in energy efficiency, Overview of and economical, ecological and social impacts through electric mobility

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.32 Module: Entrepreneurship (EnTechnon) [M-WIWI-101488]

**Responsible:** Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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**Election notes**
The courses "Business Planning for Founders - EUCOR" and the course "International Selling - EUCOR" must be taken together.

**Election block: Pflichtbestandteil (1 item)**

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**Election block: Wahlpflichtangebot (1 item)**

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<tr>
<td>T-WIWI-110389</td>
<td>Business Planning for Founders - EUCOR</td>
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<td>T-WIWI-102866</td>
<td>Design Thinking</td>
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<td>Entrepreneurial Leadership &amp; Innovation Management</td>
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<td>T-WIWI-102894</td>
<td>Entrepreneurship Research</td>
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<td>T-WIWI-110381</td>
<td>International Selling - EUCOR</td>
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**Election block: Ergänzungsangebot (1 item)**

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<td>T-WIWI-102851</td>
<td>Developing Business Models for the Semantic Web</td>
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<td>T-WIWI-102833</td>
<td>Entrepreneurial Leadership &amp; Innovation Management</td>
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<td>Terzidis</td>
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<td>Entrepreneurship Research</td>
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<td>T-WIWI-102852</td>
<td>Case Studies Seminar: Innovation Management</td>
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<td>Business Planning for Founders - EUCOR</td>
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<td>T-WIWI-110374</td>
<td>Firm creation in IT security</td>
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<td>T-WIWI-102893</td>
<td>Innovation Management: Concepts, Strategies and Methods</td>
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<td>T-WIWI-102612</td>
<td>Managing New Technologies</td>
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<td>T-WIWI-102853</td>
<td>Roadmapping</td>
<td>3</td>
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**Competence Certificate**
See German version.

**Competence Goal**
See German version.

**Prerequisites**
None

**Recommendation**
None

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.33 Module: Environmental Economics [M-WIWI-101468]

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics
- Compulsory Elective Modules 1 (Volkswirtschaftslehre)
- Compulsory Elective Modules 2 (Volkswirtschaftslehre)

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**Election block: Wahlpflichtangebot (at least 9 credits)**

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<th>Instructor</th>
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<tr>
<td>T-WIWI-102650</td>
<td>Energy and Environment</td>
<td>4.5</td>
<td>Karl</td>
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<tr>
<td>T-WIWI-100007</td>
<td>Transport Economics</td>
<td>4.5</td>
<td>Mitusch, Szimba</td>
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<tr>
<td>T-WIWI-102615</td>
<td>Environmental Economics and Sustainability</td>
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<td>Walz</td>
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<td>T-WIWI-102616</td>
<td>Environmental and Resource Policy</td>
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<tr>
<td>T-INFO-101348</td>
<td>Environmental Law</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The students
- understand the treatment of non-market resources as well as future resource shortages
- are able to model markets of energy and environmental goods
- are able to assess the results of government intervention
- know legal basics and are able to evaluate conflicts with regard to legal situation

**Prerequisites**
None

**Content**
Environmental degradation and increasing resource use are global challenges, which have to be tackled on a worldwide level. The module addresses these challenges from the perspective of economics, and imparts the fundamental knowledge of environmental and sustainability economics, and environmental and resource policy to the students. Additional courses address environmental law, environmental pressure, and applications to the transport sector.

**Recommendation**
Knowledge in the area of microeconomics and of the content of the course Economics I: Microeconomics[2600012], respectively, is required.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.34 Module: Experimental Economics [M-WIWI-101505]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: Economics
- Compulsory Elective Modules 1 (Volkswirtschaftslehre)
- Compulsory Elective Modules 2 (Volkswirtschaftslehre)

Credits: 9
Language: German
Level: 4
Version: 5

Election block: Wahlpflichtangebot (2 items)

<table>
<thead>
<tr>
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<tr>
<td>T-WIWI-105781</td>
<td>Incentives in Organizations</td>
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<tr>
<td>T-WIWI-102862</td>
<td>Predictive Mechanism and Market Design</td>
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<td>Reiß</td>
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<td>T-WIWI-102863</td>
<td>Topics in Experimental Economics</td>
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<td>Reiß</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students
- are acquainted with the methods of Experimental Economics along with its strengths and weaknesses;
- understand how theory-guided research in Experimental Economics interacts with the development of theory;
- are provided with foundations in data analysis;
- design an economic experiment and analyze its outcome.

Prerequisites
None.

Content
The module Experimental Economics offers an introduction into the methods and topics of Experimental Economics. It also fosters and extends knowledge in theory-guided experimental economics and its interaction with theory development. Throughout the module, readings of selected papers are required.

Recommendation
Basic knowledge in mathematics, statistics, and game theory is assumed.

Annotation
The course “Predictive Mechanism and Market Design” is offered every second winter semester, e.g. WS2013 / 14, WS2015 / 16, ...

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Extracurricular Module in Engineering [M-WIWI-101404]

Responsible: Prüfungsausschuss der KIT-Fakultät für Wirtschaftswissenschaften
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

Credits
9
Recurrence
Once
Level
4
Version
4

Election block: Wahlpflichtangebot (between 9 and 12 credits)

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<td>PH APL-ING-TL02</td>
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<td>PH APL-ING-TL03</td>
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Competence Certificate
The assessment of the module is determined by the respective module coordinator. It can either be in the form of a general exam or partial exams, and must contain at least 9 credit points (max. 12 credits) and at least 6 hours per week (max. 8 hours per week). The examination may contain presentations, experiments, laboratories, term papers, etc. At least 50 percent of the module examination has to be in the form of a written or an oral examination (according to Section 4 (2), 1 or 2 of the examination regulation).

The formation of the overall grade of the module will be determined by the respective module coordinator.

Competence Goal
See German version.

Prerequisites
The intended composition of courses, the module designation and the details of the examination for an Extracurricular Module in Engineering must be confirmed by a module coordinator (professor) of the responsible engineering department. The module coordinator makes sure that the individual courses of the module complement each other in a meaningful way and that no random sequence of various individual examinations is combined.

The responsible module coordinator certifies that the examination can be taken as described and that the details of the courses in the application are correct.

The informal application (not handwritten!) will then be submitted to the Examination Office of the KIT Department of Economics and Management.

The examination board of the KIT Department of Economics and Management decides on the basis of the rules and regulations that have been adopted, in particular with regard to the content (see also https://www.wiwi.kit.edu/Genehmigung_Ingenieurmodul.php_Ingenieurmodul.php) as well as the application form completed by the student and signed by the respective module coordinator.

A maximum of one Extracurricular Module in Engineering can be taken.
5.36 Module: Finance 1 [M-WIWI-101482]

**Responsible:** Prof. Dr. Martin Ruckes  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration  
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

<table>
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**Election block: Wahlpflichtangebot (9 credits)**

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<tr>
<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102621</td>
<td>Valuation</td>
<td>4.5 CR</td>
<td>Ruckes</td>
</tr>
<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4.5 CR</td>
<td>Ruckes, Uhrig-Homburg</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student
- has core skills in economics and methodology in the field of finance
- assesses corporate investment projects from a financial perspective
- is able to make appropriate investment decisions on financial markets

**Prerequisites**

None

**Content**

The courses of this module equip the students with core skills in economics and methodology in the field of modern finance. Securities which are traded on financial and derivative markets are presented, and frequently applied trading strategies are discussed. A further focus of this module is on the assessment of both profits and risks in security portfolios and corporate investment projects from a financial perspective.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Finance 2 [M-WIWI-101483]

**Responsible:** Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

<table>
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**Election block: Wahlpflichtangebot (9 credits)**

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<th>Course</th>
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<tr>
<td>T-WIWI-110513</td>
<td>Advanced Empirical Asset Pricing</td>
<td>4.5 CR</td>
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<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4.5 CR</td>
<td>Ruckes, Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>4.5 CR</td>
<td>Schuster, Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102622</td>
<td>Corporate Financial Policy</td>
<td>4.5 CR</td>
<td>Ruckes</td>
</tr>
<tr>
<td>T-WIWI-109050</td>
<td>Corporate Risk Management</td>
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<td>Ruckes</td>
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<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
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<td>T-WIWI-109941</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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<td>T-WIWI-102644</td>
<td>Fixed Income Securities</td>
<td>4.5 CR</td>
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<td>Financial Analysis</td>
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<td>Financial Intermediation</td>
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<td>T-WIWI-102626</td>
<td>Business Strategies of Banks</td>
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**Compétence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Compétence Goal**
The student is in a position to discuss, analyze and provide answers to advanced economic and methodological issues in the field of modern finance.

**Prerequisites**
It is only possible to choose this module in combination with the module Finance 1. The module is passed only after the final partial exam of Finance 1 is additionally passed.

**Content**
The module Finance 2 is based on the module Finance 1. The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

**Annotation**
The courses eFinance: Information Engineering and Management for Securities Trading [2540454] and Financial Analysis [2530205] can be chosen from summer term 2015 on.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.38 Module: Finance 3 [M-WIWI-101480]

**Responsible:** Prof. Dr. Martin Ruckes  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**  
- Business Administration  
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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**Election block: Wahlpflichtangebot (at least 9 credits)**

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<tr>
<td>T-WIWI-110513</td>
<td>Advanced Empirical Asset Pricing</td>
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<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
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<td>Ruckes, Uhrig-Homburg</td>
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<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>4,5</td>
<td>Schuster, Uhrig-Homburg</td>
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<td>T-WIWI-102622</td>
<td>Corporate Financial Policy</td>
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<td>T-WIWI-109050</td>
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<td>Business Strategies of Banks</td>
<td>3 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student is in a position to discuss, analyze and provide answers to advanced economic and methodological issues in the field of modern finance.

**Prerequisites**
It is only possible to choose this module in combination with the module Finance 1 and Finance 2. The module is passed only after the final partial exams of Finance 1 and Finance 2 are additionally passed.

**Content**
The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
**5.39 Module: FinTech Innovations [M-WIWI-105036]**

**Responsible:** Prof. Dr Maxim Ulrich  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration  
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

<table>
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<tr>
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</table>

**Mandatory**

| T-WIWI-106193 Engineering FinTech Solutions | 9 CR  | Ulrich |

**Competence Certificate**  
The assessment is carried out in form of a written thesis based on the course “Engineering FinTech Solutions”.

**Competence Goal**  
Students with a strong technological background and/or a strong interest for software development and investments will learn how to build a prototype that automates essential steps for a fully automated investment and risk management process. Students also learn to organize themselves efficiently in teams of several developers in order to complete a prototype in a limited amount of time. Moreover, students deepen their understanding of finance and technology and learn how to combine both in an effective way. Students will hence be well prepared to become leaders and pioneers for upcoming FinTech innovations (and beyond) to help society to better invest for the future and to better protect from adverse risks.

**Prerequisites**  
see T-WIWI-106193 “Engineering FinTech Solutions”

**Content**  
The module is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

**Recommendation**  
None

**Workload**  
Total effort for 9 credit points: approx. 270 hours.
Module: Fundamentals of Transportation [M-BGU-101064]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<th>Language</th>
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**Election block: Pflichtleistung (between 1 and 2 items as well as between 3 and 6 credits)**

- T-BGU-106609 Characteristics of Transportation Systems 3 CR Vortisch
- T-BGU-106610 Transportation Systems 3 CR Vortisch

**Election block: Wahlpflicht (between 1 and 2 items as well as between 3 and 6 credits)**

- T-BGU-106611 Freight Transport 3 CR Chlond
- T-BGU-106301 Long-Distance and Air Traffic 3 CR Chlond
- T-BGU-101005 Tendering, Planning and Financing in Public Transport 3 CR Vortisch
- T-BGU-100014 Seminar in Transportation 3 CR Chlond, Vortisch
- T-WIWI-103174 Seminar Mobility Services (Master) 3 CR Satzger, Stryja
- T-BGU-103425 Mobility Services and new Forms of Mobility 3 CR Kagerbauer
- T-BGU-103426 Strategic Transport Planning 3 CR Waßmuth
- T-BGU-106608 Information Management for Public Mobility Services 3 CR Vortisch

**Competence Goal**

See German version.

**Prerequisites**

None

**Recommendation**

None
5.41 Module: Generation and Transmission of Renewable Power [M-ETIT-101164]

Responsible: Dr.-Ing. Bernd Hoferer
Prof. Dr.-Ing. Thomas Leibfried

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

Credits: 9
Recurrence: Each term
Duration: 2 semester
Language: German
Level: 4
Version: 2

Election block: Wahlpflichtblock (at least 9 credits)

<table>
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<tr>
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<th>Recurrence</th>
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<tr>
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<td>6 CR</td>
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<td>T-ETIT-101941</td>
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<td>4 CR</td>
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</table>

Competence Goal
The student
- has wide knowledge of electrical power engineering.
- is capable to analyse and develop electrical power engineering systems.

Prerequisites
None

Content
The module deals with wide knowledge about the electrical power engineering. This ranges from the electric power equipment networks in terms of function, structure and interpretation on the calculation of electrical power networks to special areas such as the FACTS elements or power transformers.
Module: Global Production and Logistics [M-MACH-101282]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<tr>
<td>9</td>
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<td>3</td>
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**Mandatory**

- **T-MACH-105158** Global Production and Logistics - Part 1: Global Production
  - 4 CR
  - Lanza

- **T-MACH-105159** Global Production and Logistics - Part 2: Global Logistics
  - 4 CR
  - Furmans

**Election block: Globale Produktion und Logistik (Ergänzungsbereich) (1 Item)**

- **T-MACH-102128** Information Systems and Supply Chain Management
  - 3 CR
  - Kilger

- **T-MACH-105188** Integrative Strategies in Production and Development of High Performance Cars
  - 4 CR
  - Schlichtenmayer

- **T-MACH-105783** Learning Factory "Global Production"
  - 4 CR
  - Lanza

- **T-MACH-105165** Automotive Logistics
  - 4 CR
  - Furmans

- **T-WIWI-103091** Production and Logistics Controlling
  - 3 CR
  - Rausch

- **T-MACH-102107** Quality Management
  - 4 CR
  - Lanza

- **T-MACH-110176** Digitalization from Production to the Customer in the Optical Industry
  - 4 CR
  - Wawerla

**Competence Certificate**

- Oral exams: duration approx. 5 min per credit point
- Written exams: duration approx. 20 - 25 min per credit point

Amount, type and scope of the success control can vary according to the individually choice.

**Competence Goal**

The students

- are able to analyze the main topics of global production and logistics.
- can explain the main topics about planning and operations of global supply chains and are able to use simple models for planning.
- are capable to name the main topics about planning of global production networks.

**Prerequisites**

None

**Content**

The module Global Production and Logistics provides comprehensive and well-founded basics for the main topics of global production and logistics. The lectures aim to show opportunities and market conditions for global enterprises. Part 1 focuses on economic backgrounds, opportunities and risks of global production. Part 2 focuses on the structure of international logistics, their modeling, design and analysis. The threats in international logistics are discussed in case studies.

**Workload**

The work load is about 270 hours, corresponding to 9 credit points.

**Learning type**

Lectures, seminars, workshops, excursions
### Module: Governance, Risk & Compliance [M-INFO-101242]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Compulsory Elective Modules 2 (Recht und Soziologie)

<table>
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#### Election block: Governance, Risk & Compliance (at least 1 item as well as at least 6 credits)

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<td>Law of Contracts</td>
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<td>Dreier</td>
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<td>T-INFO-108405</td>
<td>Data Protection by Design</td>
<td>3 CR</td>
<td>Raabe</td>
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<tr>
<td>T-INFO-102047</td>
<td>Seminar: Governance, Risk &amp; Compliance</td>
<td>3 CR</td>
<td>Dreier</td>
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<td>T-INFO-109910</td>
<td>IT-Security Law</td>
<td>3 CR</td>
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</table>
Module: Growth and Agglomeration [M-WIWI-101496]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules 1 (Volkswirtschaftslehre)
Compulsory Elective Modules 2 (Volkswirtschaftslehre)

Credits: 9
Recurrence: Each term
Duration: 1 semester
Language: German/English
Level: 4
Version: 3

Election block: Wahlpflichtangebot (9 credits)

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<td>Dynamic Macroeconomics</td>
<td>4.5 CR</td>
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<td>T-WIWI-102785</td>
<td>Theory of Endogenous Growth</td>
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<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
<td>4.5 CR</td>
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Competence Certificate
The assessment is carried out as partial written exams (see the lectures descriptions).
The overall grade for the module is the average of the grades for each course weighted by the credits.

Competence Goal
The student
- gains deepened knowledge of micro-based general equilibrium models
- understands how based on individual optimizing decisions aggregate phenomena like economic growth or agglomeration (cities / metropolises) result
- is able to understand and evaluate the contribution of these phenomena to the development of economic trends
- can derive policy recommendations based on theory

Prerequisites
None

Content
The module includes the contents of the lectures Endogenous Growth Theory [2561503], Spatial Economics [2561260] and International Economic Policy [2560254]. While the first two lectures have a more formal-analytic focus, the third lecture approaches fundamental ideas and problems from the field of international economic policy from a more verbal perspective.
The common underlying principle of all three lectures in this module is that, based on different theoretical models, economic policy recommendations are derived.

Recommendation
Attendance of the course Introduction Economic Policy [2560280] is recommended.
Successful completion of the courses Economics I: Microeconomics and Economics II: Macroeconomics is required.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.45 Module: High-Voltage Technology [M-ETIT-101163]

Responsible: Dr.-Ing. Bernd Hoferer
Prof. Dr.-Ing. Thomas Leibfried

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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Mandatory

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<td>High-Voltage Technology I</td>
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<td>T-ETIT-101914</td>
<td>High-Voltage Technology II</td>
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Competence Goal

The student

- has wide knowledge of electrical power engineering.
- is capable to analyse and develop electrical power engineering systems.

Content

The module deals with wide knowledge about the electrical power engineering. This ranges from the electric power equipment networks in terms of function, structure and interpretation on the calculation of electrical power networks to special areas such as the FACTS elements or power transformers.
Module: Industrial Production II [M-WIWI-101471]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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Mandatory

T-WIWI-102631 Planning and Management of Industrial Plants 5.5 CR Schultmann

Election block: Ergänzungsangebot aus dem Modul Industrielle Produktion III (at most 1 item)

T-WIWI-102763 Supply Chain Management with Advanced Planning Systems 3.5 CR Bosch, Göbelt
T-WIWI-102826 Risk Management in Industrial Supply Networks 3.5 CR Wiens
T-WIWI-102828 Supply Chain Management in the Automotive Industry 3.5 CR Heupel, Lang
T-WIWI-103134 Project Management 3.5 CR Schultmann

Election block: Ergänzungsangebot (at most 1 item)

T-WIWI-102634 Emissions into the Environment 3.5 CR Karl
T-WIWI-102882 International Management in Engineering and Production 3.5 CR Sasse
T-WIWI-110512 Life Cycle Assessment 3.5 CR Schultmann

Competence Certificate
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course Planning and Managing of Industrial Plants [2581952] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal

- Students shall be able to describe the tasks of tactical production management with special attention drawn upon industrial plants.
- Students shall understand the relevant tasks in plant management (projection, realisation and supervising tools for industrial plants).
- Students shall be able to describe the special need of a techno-economic approach to solve problems in the field of tactical production management.
- Students shall be proficient in using selected techno-economic methods like investment and cost estimates, plant layout, capacity planning, evaluation principles of production techniques, production systems as well as methods to design and optimize production systems.
- Students shall be able to evaluate techno-economical approaches in planning tactical production management with respect to their efficiency, accuracy and relevance for industrial use.

Prerequisites
The course Planning and Managing of Industrial Plants [2581952] and at least one additional activity are compulsory and must be examined.

Content

- Planning and Management of Industrial Plants: Basics, circulation flow starting from projecting to techno-economic evaluation, construction and operating up to plant dismantling.

Annotation
Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production III.
Workload
Total effort will account to 270 hours (9 credit points) and can be allocated according to the credit point rating. Therefore, a course with 3.5 credits requires an effort of approximately 105h and a course with 5.5 credits 165h.

The total effort for each course consists of attending lectures and tutorials, examination times and the time an average student needs to prepare himself in order to pass the exam with an average grade.
5.47 Module: Industrial Production III [M-WIWI-101412]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management

Part of:
- Business Administration
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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Mandatory
T-WIWI-102632 Production and Logistics Management 5,5 CR Schultmann

Election block: Ergänzungsangebot aus dem Modul Industrielle Produktion II (at most 1 item)
T-WIWI-102634 Emissions into the Environment 3,5 CR Karl
T-WIWI-102882 International Management in Engineering and Production 3,5 CR Sasse
T-WIWI-110512 Life Cycle Assessment 3,5 CR Schultmann

Election block: Ergänzungsangebot (at most 1 item)
T-WIWI-102763 Supply Chain Management with Advanced Planning Systems 3,5 CR Bosch, Göbelt
T-WIWI-102826 Risk Management in Industrial Supply Networks 3,5 CR Wiens
T-WIWI-102828 Supply Chain Management in the Automotive Industry 3,5 CR Heupel, Lang
T-WIWI-103134 Project Management 3,5 CR Schultmann

Competence Certificate
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course Production and Logistics Management [2581954] and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
- Students describe the tasks concerning general problems of an operative production and logistics management.
- Students describe the planning tasks of supply chain management.
- Students use proficiently approaches to solve general planning problems.
- Students explain the existing interdependencies between planning tasks and applied methods.
- Students describe the main goals and set-up of software supporting tools in production and logistics management (i.e. APS, PPS-, ERP- and SCM Systems).
- Students discuss the scope of these software tools and their general disadvantages.

Prerequisites
The course Production and Logistics Management [2581954] and at least one additional activity are compulsory and must be examined.

Content
- Planning tasks and exemplary methods of production planning and control in supply chain management.
- Supporting software tools in production and logistics management (APS, PPS- and ERP Systems).
- Project management in the field of production and supply chain management.

Annotation
Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production II.
Workload
The total amount of work for this module is approx. 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module.

The total number of hours per course results from the effort required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
### 5.48 Module: Informatics [M-WIWI-101472]

**Responsible:**
- Prof. Dr. Andreas Oberweis
- Prof. Dr. Harald Sack
- Prof. Dr. Ali Sunyaev
- Prof. Dr. York Sure-Vetter
- Prof. Dr. Melanie Volkamer
- Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:**
KIT Department of Economics and Management

**Part of:** Informatics

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<td>4,5 CR</td>
<td>Shukla</td>
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<tr>
<td>T-WIWI-109248</td>
<td>Critical Information Infrastructures</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<td>T-WIWI-109246</td>
<td>Digital Health</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-109270</td>
<td>Human Factors in Security and Privacy</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
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<td>Enterprise Architecture Management</td>
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<td>T-WIWI-110346</td>
<td>Supplement Enterprise Information Systems</td>
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<td>Supplement Software- and Systemsengineering</td>
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<td>Knowledge Discovery</td>
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<td>Machine Learning 1 - Basic Methods</td>
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<td>Strategic Management of Information Technology</td>
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<td>Web Science</td>
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#### Election block: Seminare und Praktika (between 0 and 1 items)

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<td>T-WIWI-110143</td>
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<td>T-WIWI-110548</td>
<td>Advanced Lab Informatics (Master)</td>
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<td>Advanced Lab User Studies in Security</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<td>T-WIWI-109985</td>
<td>Project Lab Cognitive Automobiles and Robots</td>
<td>4,5 CR</td>
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<td>T-WIWI-109983</td>
<td>Project Lab Machine Learning</td>
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<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Please note the following information about the module component exams of Prof. Dr. H. Schmeck:

Competence Goal
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Prerequisites
It is only allowed to choose one lab.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Annotation
Detailed information on the recognition of examinations in the field of Informatics can be found at http://www.aifb.kit.edu/web/Auslandsaufenthalt.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.49 Module: Information Engineering [M-WIWI-101411]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

**Compulsory Elective Modules 1 (Betriebswirtschaftslehre)**

**Compulsory Elective Modules 2 (Betriebswirtschaftslehre)**

**Credits**

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<td>T-WIWI-107501</td>
<td>Energy Market Engineering</td>
<td>4.5</td>
<td>Each term</td>
<td>1 semester</td>
<td>4</td>
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<tr>
<td>T-WIWI-102640</td>
<td>Market Engineering: Information in Institutions</td>
<td>4.5</td>
<td>Each term</td>
<td>1 semester</td>
<td>4</td>
<td>6</td>
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<tr>
<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4.5</td>
<td>Each term</td>
<td>1 semester</td>
<td>4</td>
<td>6</td>
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</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- understands and analyzes the central role of information as an economic good, a production factor, and a competitive factor,
- identifies, evaluates, prices, and markets information goods,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

**Content**

In the lecture Foundations of Information Systems, a clear distinction of information as a production, competitive, and economic good is introduced. The central role of information is explained through the concept of the "information lifecycle". The single phases from existence/generation through allocation and evaluation until the distribution and usage of information are analyzed from the business administration perspective and the microeconomic perspective.

In a second course the student can deepen his knowledge on the one hand on the design and operation of markets and on the other hand on the impact of digital goods in network industries regarding the pricing policies, business strategies and regulation issues. If chosen, the course Special Topics in Information Engineering & Management additionally provides an opportunity of practical research in the aforementioned range of subjects.

**Annotation**

All practical Seminars offered at the IM can be chosen for Special Topics in Information Systems. Please update yourself on www.iism.kit.edu/im/lehre.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.50 Module: Information Systems in Organizations [M-WIWI-104068]

- **Responsible:** Prof. Dr. Alexander Mädche
- **Organisation:** KIT Department of Economics and Management
- **Part of:** Business Administration
  - Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
  - Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

### Election block: Wahlpflichtangebot (at least 9 credits)

<table>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tr>
<td>T-WIWI-105777</td>
<td>Business Intelligence Systems</td>
<td>4.5 CR</td>
<td>Mädche, Nadj, Toreini</td>
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<tr>
<td>T-WIWI-106201</td>
<td>Digital Transformation of Organizations</td>
<td>4.5 CR</td>
<td>Mädche</td>
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<tr>
<td>T-WIWI-108461</td>
<td>Interactive Information Systems</td>
<td>4.5 CR</td>
<td>Mädche, Morana</td>
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<tr>
<td>T-WIWI-108437</td>
<td>Practical Seminar: Information Systems and Service Design</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- has a comprehensive understanding of conceptual and theoretical foundations of information systems in organizations
- is aware of the most important classes of information systems used in organizations: process-centric, information-centric and people-centric information systems.
- knows the most important activities required to execute in the pre-implementation, implementation and post-implementation phase of information systems in organizations in order to create business value
- has a deep understanding of key capabilities of business intelligence systems and/or interactive information systems used in organizations

**Prerequisites**

None

**Content**

During the last decades we witnessed a growing importance of Information Technology (IT) in the business world along with faster and faster innovation cycles. IT has become core for businesses from an operational company-internal and external customer perspective. Today, companies have to rethink their way of doing business, from an internal as well as an external digitalization perspective.

This module focuses on the internal digitalization perspective. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for information systems in organizations. The students get the necessary knowledge to guide the successful digitalization of organizations. Each lecture in the module is accompanied with a capstone project that is carried out in cooperation with an industry partner.

**Annotation**

New module starting summer term 2018.

**Workload**

The total workload for this module is approximately 270 hours.
5.51 Module: Innovation and Growth [M-WIWI-101478]

### Responsible
Prof. Dr. Ingrid Ott

### Organisation
KIT Department of Economics and Management

### Part of:
- Economics
- Compulsory Elective Modules 1 (Volkswirtschaftslehre)
- Compulsory Elective Modules 2 (Volkswirtschaftslehre)

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<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
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**Election block: Wahlpflichtangebot (between 9 and 10 credits)**

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<td>Dynamic Macroeconomics</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-102785</td>
<td>Theory of Endogenous Growth</td>
<td>4,5 CR</td>
<td>Ott</td>
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<tr>
<td>T-WIWI-102840</td>
<td>Innovation and -Policy</td>
<td>4,5 CR</td>
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**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
Students shall be given the ability to

- know the basic techniques for analyzing static and dynamic optimization models that are applied in the context of micro- and macroeconomic theories
- understand the important role of innovation to the overall economic growth and welfare
- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

**Prerequisites**
None

**Content**
The module includes courses that deal with issues of innovation and growth in the context of micro- and macroeconomic theories. The dynamic analysis makes it possible to analyze the consequences of individual decisions over time, and sheds light on the tension between static and dynamic efficiency in particular. In this context is also analyzed, which policy is appropriate to carry out corrective interventions in the market and thus increase welfare in the presence of market failure.

**Recommendation**
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

**Workload**
Total expenditure of time for 9 credits: 270 hours

- Attendance time per lecture: 3x14h
- Preparation and wrap-up time per lecture: 3x14h
- Rest: Exam Preparation

The exact distribution is subject to the credits of the courses of the module.
### 5.52 Module: Innovation Economics [M-WIWI-101514]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- Economics
- Compulsory Elective Modules 1 (Volkswirtschaftslehre)
- Compulsory Elective Modules 2 (Volkswirtschaftslehre)

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<th>Duration</th>
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<th>Level</th>
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**Election block: Wahlpflichtangebot (between 9 and 10 credits)**

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<th>Credits</th>
<th>Examiner</th>
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<tbody>
<tr>
<td>T-WIWI-102840</td>
<td>Innovationtheory and -Policy</td>
<td>4.5 CR</td>
<td>Ott</td>
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<tr>
<td>T-WIWI-102906</td>
<td>Methods in Economic Dynamics</td>
<td>1.5 CR</td>
<td>Ott</td>
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<tr>
<td>T-WIWI-109864</td>
<td>Product and Innovation Management</td>
<td>3 CR</td>
<td>Klarmann</td>
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<tr>
<td>T-WIWI-102789</td>
<td>Seminar in Economic Policy</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students shall be given the ability to

- understand the important role of innovation for economic growth and welfare
- understand the relevance of alternative incentive mechanisms for the emergence and dissemination of innovations
- know basic terms of product and innovation concepts
- know fundamental concepts of innovation management
- work with fundamental theoretical innovation models and to implement them in appropriate computer algebra systems
- query appropriate data sources and to analyse and visualise them using statistical methods

**Prerequisites**

None

**Content**

The module provides students with knowledge about implications of technological and organizational changes. Addressed economic issues are incentives for developing innovations, diffusion processes, and associated effects. In this context the module analyses appropriate policies in the presence of market failures to take corrective action on the market process and thus to increase the dynamic efficiency of economies.

Furthermore, the module offers the possibility to learn about different aspects of theoretical modelling of innovation-based growth as a part of the seminar and the methods-workshop. This includes the implementation of formal models in computer algebra systems as well as recording, processing and econometric analysis of related data from relational databases (concerning for example patents or trademarks). Moreover, methods of network theory are applied.

Finally, the module emphasises the business perspective: Issues of all stages of innovation processes will be discussed, from innovation strategies up to the market commercialisation.

**Recommendation**

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantitative-mathematical methods.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
**Module: Innovation Management [M-WIWI-101507]**

**Responsible:** Prof. Dr. Marion Weissenberger-Eibl

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

**Credits:** 9

**Recurrence:** Each term

**Duration:** 1 semester

**Language:** German/English

**Level:** 4

**Version:** 6

**Mandatory**

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102893</td>
<td>Innovation Management: Concepts, Strategies and Methods</td>
<td>3</td>
<td>Weissenberger-Eibl</td>
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**Election block: Wahlpflichtangebot (1 item)**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102873</td>
<td>Current Issues in Innovation Management</td>
<td>3</td>
<td>Weissenberger-Eibl</td>
</tr>
<tr>
<td>T-WIWI-108875</td>
<td>Digital Transformation and Business Models</td>
<td>3</td>
<td>Koch</td>
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<tr>
<td>T-WIWI-102852</td>
<td>Case Studies Seminar: Innovation Management</td>
<td>3</td>
<td>Weissenberger-Eibl</td>
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<tr>
<td>T-WIWI-108774</td>
<td>Analyzing and Evaluating Innovation Processes</td>
<td>3</td>
<td>Beyer</td>
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<tr>
<td>T-WIWI-110234</td>
<td>Innovation Processes Live</td>
<td>3</td>
<td>Beyer</td>
</tr>
<tr>
<td>T-WIWI-110263</td>
<td>Methods in Innovation Management</td>
<td>3</td>
<td>Koch</td>
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<tr>
<td>T-WIWI-102853</td>
<td>Roadmapping</td>
<td>3</td>
<td>Koch</td>
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<tr>
<td>T-WIWI-109932</td>
<td>A Closer Look at Social Innovation</td>
<td>3</td>
<td>Beyer</td>
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<tr>
<td>T-WIWI-102858</td>
<td>Technology Assessment</td>
<td>3</td>
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<td>T-WIWI-102854</td>
<td>Technologies for Innovation Management</td>
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**Election block: Ergänzungsangebot (1 item)**

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<tr>
<td>T-WIWI-102873</td>
<td>Current Issues in Innovation Management</td>
<td>3</td>
<td>Weissenberger-Eibl</td>
</tr>
<tr>
<td>T-WIWI-102866</td>
<td>Design Thinking</td>
<td>3</td>
<td>Terzidis</td>
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<td>T-WIWI-108875</td>
<td>Digital Transformation and Business Models</td>
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<td>Koch</td>
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<td>T-WIWI-102833</td>
<td>Entrepreneurial Leadership &amp; Innovation Management</td>
<td>3</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-102864</td>
<td>Entrepreneurship</td>
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<td>T-WIWI-102852</td>
<td>Case Studies Seminar: Innovation Management</td>
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<td>Weissenberger-Eibl</td>
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<tr>
<td>T-WIWI-108774</td>
<td>Analyzing and Evaluating Innovation Processes</td>
<td>3</td>
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<td>T-WIWI-110234</td>
<td>Innovation Processes Live</td>
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<td>T-WIWI-110263</td>
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<td>A Closer Look at Social Innovation</td>
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<td>T-WIWI-102858</td>
<td>Technology Assessment</td>
<td>3</td>
<td>Koch</td>
</tr>
</tbody>
</table>

**Competence Certificate**
See German version.

**Competence Goal**
Students develop a comprehensive understanding of the innovation process and its conditionality. There is an additional focus on the concepts and processes which are of particular relevance with regard to shaping the entire process. Various strategies and methods are then taught based on this.

After completing the module, students should have developed a systemic understanding of the innovation process and be able to shape this by developing and applying suitable methods.

**Prerequisites**
The lecture “Innovation Management: Concepts, Strategies and Methods” and one of the seminars of the chair for Innovation and Technology Management are compulsory. The third course can be chosen from the courses of the module.
Content
The Innovation Management: Concepts, Strategies and Methods lecture course teaches concepts, strategies and methods which help students to form a systemic understanding of the innovation process and how to shape it. Building on this holistic understanding, the seminar courses then go into the subjects in greater depth and address specific processes and methods which are central to innovation management.

Recommendation
None

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5. Module: Integrated Production Planning [M-MACH-101272]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

**Credits:** 9

**Recurrence:** Each summer term

**Duration:** 1 semester

**Language:** German

**Level:** 4

**Version:** 3

<table>
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<th>Mandatory</th>
<th>T-MACH-109054</th>
<th>Integrated Production Planning in the Age of Industry 4.0</th>
<th>9 CR</th>
<th>Lanza</th>
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</thead>
</table>

**Competence Certificate**

Written Exam (120 min)

**Competence Goal**

The students

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

**Prerequisites**

none

**Content**

Within this engineering sciences-oriented module the students will get to learn principle aspects of organization and planning of production systems.

**Workload**

regular attendance: 63 hours
self-study: 207 hours

**Learning type**

Lecture, exercise, excursion

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Compulsory Elective Modules 2 (Recht und Soziologie)

<table>
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<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
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<td>German</td>
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**Election block: Recht des Geistigen Eigentums (at least 1 item as well as at least 9 credits)**

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<td>T-INFO-101308</td>
<td>Copyright</td>
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<td>T-INFO-101310</td>
<td>Patent Law</td>
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<td>T-INFO-101313</td>
<td>Trademark and Unfair Competition Law</td>
<td>3 CR</td>
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<td>T-INFO-101307</td>
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<td>Selected Legal Issues of Internet Law</td>
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**Prerequisites**

None
5.56 Module: Lean Management in Construction [M-BGU-101884]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
          Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<td>Lean Construction</td>
<td>4,5</td>
<td>Each winter term</td>
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<td>Each winter term</td>
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Election block: Wahlpflicht (between 1 and 2 items as well as between 3 and 4,5 credits)

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<td>T-BGU-103429</td>
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<td>3</td>
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<tr>
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<td>T-BGU-103433</td>
<td>Project Management in Construction and Real Estate Industry II</td>
<td>3</td>
<td>Each winter term</td>
<td>German</td>
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</table>

Competence Certificates
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

The exam must be repeated at the latest 2 semesters after the first try. The exam will be based on the content of the latest lecture.

The exam of of the course Lean Construction consists of a preparatory and oral examination. The preparatory examination is a group work and consists of an assignment with presentation. The preparatory examination is precondition to attend the oral examination (30 min) of the course Lean Construction. The grade of the exam Lean Construction is defined by weighted average of grades for oral examination (75 %) and preparatory assignment (25 %).

Examination of courses Projektmanagement in der Bau- und Immobilienwirtschaft I, Projektmanagement in der Bau- und Immobilienwirtschaft II, and Baurecht are carried out written. Combinations of courses Schlüsselfertiges Bauen I, Schlüsselfertiges Bauen II, Bauleitung, and Nachtragsmanagementare examined orally.

Competence Goal
see German version

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Prerequisites
The course Lean Construction is compulsory and must be examined.

Content
see German version

Recommendation
It is recommend to take the module Fundamentals of construction [W13INGBGU3] from the Bachelor’s degree program.

Annotation
none

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Literature
5.57 Module: Logistics in Value Chain Networks [M-MACH-101280]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of:
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
<thead>
<tr>
<th>Election block: Logistik in Wertschöpfungsnetzwerken (Kernbereich) (1 item as well as at least 6 credits)</th>
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</thead>
<tbody>
<tr>
<td>T-MACH-105181 Supply Chain Management</td>
</tr>
<tr>
<td>T-MACH-102089 Logistics - Organisation, Design and Control of Logistic Systems</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Election block: Logistik in Wertschöpfungsnetzwerken (Ergänzungsbereich) (1 item as well as at least 3 credits)</th>
</tr>
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<tbody>
<tr>
<td>T-MACH-105174 Warehousing and Distribution Systems</td>
</tr>
<tr>
<td>T-MACH-105175 Airport Logistics</td>
</tr>
<tr>
<td>T-MACH-105165 Automotive Logistics</td>
</tr>
<tr>
<td>T-MACH-102128 Information Systems and Supply Chain Management</td>
</tr>
<tr>
<td>T-WIWI-103091 Production and Logistics Controlling</td>
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</tbody>
</table>

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- is able to plan logistic systems and evaluate their performance,
- can use approaches of Supply Chain Management within the operational practice,
- identifies, analyses and evaluates risks within logistic systems.

Prerequisites
none

Content
The module Logistics in value chain networks provides basics for the main topics of logistics. Within the lecture basic methods for planning and running logistic systems are introduced. Furthermore special issues like supply chain management and risks in logistic systems are focused. To gain a deeper understanding, the course is accompanied by exercises.

Workload
270 hours
Module: Machine Tools and Industrial Handling [M-MACH-101286]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
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<th>Level</th>
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<td>9</td>
<td>Each winter term</td>
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**Mandatory**

<table>
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<th>Credits</th>
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<tbody>
<tr>
<td>T-MACH-102158</td>
<td>Machine Tools and Industrial Handling</td>
<td>9</td>
<td>Fleischer</td>
</tr>
</tbody>
</table>

**Competence Certificate**
Written exam (120 minutes)

**Competence Goal**
The students

- are able to assess the use and application of machine tools and handling equipment and to differentiate between them in terms of their characteristics and design
- can describe and discuss the essential elements of the machine tool (frame, main spindle, feed axes, peripheral equipment, control unit)
- are able to select and dimension the essential components of a machine tool
- are capable of selecting and evaluating machine tools according to technical and economic criteria.

**Prerequisites**
None

**Content**
The module overviews the construction, use and application of machine tools and industrial handling equipment. A well-founded and practice-oriented knowledge is imparted about the selection, design and evaluation of machine tools. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

The individual topics are:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

**Workload**
regular attendance: 63 hours
self-study: 207 hours

**Learning type**
Lecture, exercise, excursio
5.59 Module: Major Field: Integrated Product Development [M-MACH-102626]

**Responsible:** Prof. Dr.-Ing. Albert Albers  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)  
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

| Mandatory |  |  |  |  |  |  |  |
|-----------|------------------|----------|--------|--------|--------|
| T-MACH-105401 | Integrated Product Development | 18 CR | 18 | Albers, Albers Assistenten |

**Competence Certificate**
oral examination (60 minutes)

**Competence Goal**
By working practically in experience-based learning arrangements with industrial development tasks, graduates are able to succeed in new and unknown situations when developing innovative products by using methodological and systematic approaches. They can apply and adapt strategies of development and innovation management, technical system analysis and team leadership to the situation. As a result, they are able to foster the development of innovative products in industrial development teams in prominent positions, taking into account social, economic and ethical aspects.

**Prerequisites**
None

**Content**
Organizational integration: integrated product development model, core team management and simultaneous engineering, informational integration: innovation management, cost management, quality management and knowledge management  
Personal integration: team development and leadership  
Guest lectures from the industry

**Annotation**
The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK homepage from april to july. The selection itself is made by Prof. Albers in personal interviews.

**Workload**
The work load is about 480 hours, corresponding to 16 credit points.

**Learning type**
lecture  
tutorial  
product development project
5.60 Module: Management Accounting [M-WIWI-101498]

**Responsible:** Prof. Dr. Marcus Wouters

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
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<td>T-WIWI-102800</td>
<td>Management Accounting 1</td>
<td>4,5 CR</td>
<td>Each term</td>
<td>2 semester</td>
<td>English</td>
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<tr>
<td>T-WIWI-102801</td>
<td>Management Accounting 2</td>
<td>4,5 CR</td>
<td>Each term</td>
<td>2 semester</td>
<td>English</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students

- are familiar with various management accounting methods,
- can apply these methods for cost estimation, profitability analysis, and product costing,
- are able to analyze short-term and long-decisions with these methods,
- have the capacity to devise instruments for organizational control.

**Prerequisites**

None

**Content**

The module consists of two courses “Management Accounting 1” and “Management Accounting 2”. The emphasis is on structured learning of management accounting techniques.

**Annotation**

The following courses are part of this module:

- The course Management Accounting 1, which is offered in every summer semester
- The course Management Accounting 2, which is offered in every winter semester

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.1 Module: Manufacturing Technology [M-MACH-101276]

**Responsible:** Prof. Dr.-Ing. Volker Schulze

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<tr>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<td>Each winter term</td>
<td>1 semester</td>
<td>German</td>
<td>4</td>
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</tbody>
</table>

**Mandatory**

| T-MACH-102105 | Manufacturing Technology | 9 CR | Schulze, Zanger |

**Competence Certificate**

Written Exam (180 min)

**Competence Goal**

The students

- can name different manufacturing processes, can describe their specific characteristics and are capable to depict the general function of manufacturing processes and are able to assign manufacturing processes to the specific main groups.
- are enabled to identify correlations between different processes and to select a process depending on possible applications.
- are capable to describe the theoretical basics for the manufacturing processes they got to know within the scope of the course and are able to compare the processes.
- are able to correlate based on their knowledge in materials science the processing parameters with the resulting material properties by taking into account the microstructural effects.
- are qualified to evaluate different processes on a material scientific basis.

**Prerequisites**

None

**Content**

Within this engineering sciences-oriented module the students will get to learn principle aspects of manufacturing technology. Further information can be found at the description of the lecture "Manufacturing Technology".

**Workload**

regular attendance: 63 hours
self-study: 207 hours

**Learning type**

Lectures, exercise, excursion
5.62 Module: Market Engineering [M-WIWI-101446]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration

Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

Credits
Recurrence
Duration
Language
Level
Version

Mandatory
T-WIWI-102640 Market Engineering: Information in Institutions 4,5 CR Weinhardt

Election block: Ergänzungsangebot (4,5 credits)
T-WIWI-102613 Auction Theory 4,5 CR Ehrhart
T-WIWI-108880 Blockchains & Cryptofinance 4,5 CR Schuster, Uhrig-Homburg
T-WIWI-109941 eFinance: Information Systems for Securities Trading 4,5 CR Weinhardt
T-WIWI-107501 Energy Market Engineering 4,5 CR Weinhardt
T-WIWI-107503 Energy Networks and Regulation 4,5 CR Weinhardt
T-WIWI-102614 Experimental Economics 4,5 CR Weinhardt
T-WIWI-107504 Smart Grid Applications 4,5 CR Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The students
- know the design criteria of market mechanisms and the systematic approach to create new markets,
- understand the basics of the mechanism design and auction theory,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

Prerequisites
The course Market Engineering: Information in Institutions [2540460] is compulsory and must be examined.

Content
This module explains the dependencies between the design of markets and their success. Markets are complex interaction of different institution and participants in a market behave strategically according to the market rules. The development and the design of markets or market mechanisms has a strong influence on the behavior of the participants. A systematic approach and a thorough analysis of existing markets is inevitable to design, create and operate a market place successfully. The approaches for a systematic analysis are explained in the mandatory course Market Engineering [2540460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

Recommendation
None

Annotation
The course "Computational Economics" [2590458] will not be offered any more in this module from winter term 2015/2016 on. The examination will be offered latest until summer term 2016 (repeaters only).

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.63 Module: Marketing Management [M-WIWI-101490]

**Responsible:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

<table>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<td>9</td>
<td>Each summer term</td>
<td>1 semester</td>
<td>German/English</td>
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**Elective block: Wahlpflichtangebot (at least 1 item)**

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<tr>
<td>T-WIWI-107720</td>
<td>Market Research</td>
<td>4,5</td>
<td>KLarmann</td>
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<tr>
<td>T-WIWI-102883</td>
<td>Pricing</td>
<td>4,5</td>
<td>Feurer</td>
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<tr>
<td>T-WIWI-109864</td>
<td>Product and Innovation Management</td>
<td>3</td>
<td>Klarmann</td>
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</table>

**Elective block: Ergänzungsangebot (at most 1 item)**

<table>
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<th>Code</th>
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<th>CR</th>
<th>Responsible</th>
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<tr>
<td>T-WIWI-106137</td>
<td>Country Manager Simulation</td>
<td>1,5</td>
<td>Feurer</td>
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<tr>
<td>T-WIWI-102835</td>
<td>Marketing Strategy Business Game</td>
<td>1,5</td>
<td>Klarmann</td>
<td></td>
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</tbody>
</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singed partial exam the respective minimum requirements has to be achieved.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students

- have an advanced knowledge about central marketing contents
- have a fundamental understanding of the marketing instruments
- know and understand several strategic concepts and how to implement them
- are able to implement their extensive marketing knowledge in a practical context
- know several qualitative and quantitative approaches to prepare decisions in Marketing
- have the theoretical knowledge to write a master thesis in Marketing
- have the theoretical knowledge to work in/together with the Marketing department

**Prerequisites**

None

**Content**
The aim of this module is to deepen central marketing contents in different areas. Therefore the students can choose between the following marketing courses:

- Product and Innovation Management
- Market Research – this course has to be completed successfully by students interested in seminar or master thesis positions at the chair of marketing
- Marketing Strategy Business Game
- Country Manager Simulation

**Annotation**

Please note that only one of the listed 1,5-ECTS courses can be chosen in the Marketing Management module.

**Workload**
The total workload for this module is approximately 270 hours.
Module: Material Flow in Logistic Systems [M-MACH-101277]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
           Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

Credits: 9
Language: German
Level: 4
Version: 3

Mandatory
T-MACH-102151 Material Flow in Logistic Systems 9 CR Furmans

Competence Certificate
The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade.):
  - 40% assessment of the result of the case studies as group work,
  - 20% assessment of the oral examination during the case study colloquiums as individual performance.

A detailed description of the learning control can be found under T-MACH-102151.

Competence Goal
The student

- acquires comprehensive and well-founded knowledge on the main topics of logistics, an overview of different logistic questions in practice and knows the functionality of material handling systems,
- is able to illustrate logistic systems with adequate accuracy by using simple models,
- is able to realize coherences within logistic systems,
- is able to evaluate logistic systems by using the learnt methods.

Prerequisites
none

Content
The module Material Flow in Logistic Systems provides comprehensive and well-founded basics for the main topics of logistics. Within the lectures, the interaction between several components of logistic systems will be shown. The module focuses on technical characteristics of material handling systems as well as on methods for illustrating and evaluating logistics systems. To gain a deeper understanding, the course is accompanied by exercises and case studies.

Workload
270 hours

Learning type
Lectures, tutorials.
5.65 Module: Material Flow in Networked Logistic Systems [M-MACH-101278]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
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Mandatory

- T-MACH-105189 Mathematical Models and Methods for Production Systems 6 CR Baumann, Furmans

Election block: Materialfluss in vernetzten Logistiksystemen (at least 3 credits)

- T-MACH-105174 Warehousing and Distribution Systems 3 CR Furmans
- T-MACH-105175 Airport Logistics 3 CR Richter
- T-WIWI-103091 Production and Logistics Controlling 3 CR Rausch
- T-MACH-105159 Global Production and Logistics - Part 2: Global Logistics 4 CR Furmans
- T-MACH-102128 Information Systems and Supply Chain Management 3 CR Kliger
- T-MACH-105187 IT-Fundamentals of Logistics 3 CR Thomas
- T-MACH-105171 Safety Engineering 4 CR Kany
- T-MACH-105151 Energy Efficient Intralogistic Systems 4 CR Braun, Schönung

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- acquires in-depth knowledge on the main topics of logistics, gets an overview of different logistic questions in practice,
- is able to evaluate logistic systems by using the learnt methods,
- is able to analyze and explain the phenomena of industrial material and value streams.

Prerequisites
none

Content
The module Material Flow in networked Logistic Systems provides in-depth basics for the main topics of logistics and industrial material and value streams. The obligatory lecture focuses on queuing methods to model production systems. To gain a deeper understanding, the course is accompanied by exercises.

Recommendation
It is recommended to successfully complete the course "Material Flow in Logistics Systems" [T-MACH-102151] before starting the module.

Workload
Regular attendance: 270 hours (9 credits). Lectures with 180 hours attendance 6 credits. Lectures with 120 hours 4 credits.

Learning type
Lecture, tutorial.
5 MODULES

5.66 Module: Mathematical Programming [M-WIWI-101473]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Operations Research
Compulsory Elective Modules 1 (Operations Research)
Compulsory Elective Modules 2 (Operations Research)

<table>
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<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>Each term</td>
<td>1 semester</td>
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Election block: Wahlpflichtangebot (at most 2 items)

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<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I</td>
<td>4,5 CR</td>
<td>Stein</td>
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<td>T-WIWI-102726</td>
<td>Global Optimization I</td>
<td>4,5 CR</td>
<td>Stein</td>
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<td>T-WIWI-103638</td>
<td>Global Optimization I and II</td>
<td>9 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-102856</td>
<td>Convex Analysis</td>
<td>4,5 CR</td>
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<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I</td>
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Election block: Ergänzungsangebot (at most 2 items)

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<th>Instructor</th>
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<tr>
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<td>Advanced Stochastic Optimization</td>
<td>4,5 CR</td>
<td>Rebennack</td>
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<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II</td>
<td>4,5 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-102727</td>
<td>Global Optimization II</td>
<td>4,5 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models</td>
<td>4,5 CR</td>
<td>Nickel</td>
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<td>T-WIWI-106549</td>
<td>Large-scale Optimization</td>
<td>4,5 CR</td>
<td>Rebennack</td>
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<td>Multivariate Statistical Methods</td>
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<td>Grothe</td>
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<td>Nonlinear Optimization II</td>
<td>4,5 CR</td>
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<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4,5 CR</td>
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<td>T-WIWI-110162</td>
<td>Optimization Models and Applications</td>
<td>4,5 CR</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- names and describes basic notions for advanced optimization methods, in particular from continuous and mixed integer programming,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to makes suggestions to adapt them to practical problems.

Prerequisites
At least one of the courses "Mixed Integer Programming I", "Parametric Optimization", "Convex Analysis", "Nonlinear Optimization I" and "Global Optimization I" has to be taken.

Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.
Content
The module focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous and mixed integer decision variables.

Annotation
The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).
For the lectures of Prof. Stein a grade of 30% of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
**5.67 Module: Microeconomic Theory [M-WIWI-101500]**

**Responsible:** Prof. Dr. Clemens Puppe

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics
- Compulsory Elective Modules 1 (Volkswirtschaftslehre)
- Compulsory Elective Modules 2 (Volkswirtschaftslehre)

**Credits:** 9

**Language:** German/English

**Level:** 4

**Version:** 3

**Election block: Wahlpflichtangebot (at least 9 credits)**

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<td>T-WIWI-102861</td>
<td>Advanced Game Theory</td>
<td>4,5</td>
<td>Ehrhart, Puppe, Reiß</td>
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<td>T-WIWI-102859</td>
<td>Social Choice Theory</td>
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<td>T-WIWI-102613</td>
<td>Auction Theory</td>
<td>4,5</td>
<td>Ehrhart</td>
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<td>T-WIWI-105781</td>
<td>Incentives in Organizations</td>
<td>4,5</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students are able to model practical microeconomic problems mathematically and to analyze them with respect to positive and normative questions,

- understand individual incentives and social outcomes of different institutional designs.

An example of a positive question is: which regulation policy results in which firm decisions under imperfect competition? An example of a normative question is: which voting rule has appealing properties?

**Prerequisites**

None

**Content**

The student should gain an understanding of advanced topics in economic theory, game theory and welfare economics. Core topics are, among others, strategic interactions in markets, cooperative and non-cooperative bargaining (Advanced Game Theory), allocation under asymmetric information and general equilibrium over time (Advanced Topics in Economic Theory), voting and the aggregation of preferences and judgements (Social Choice Theory).

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
### Module: Microfabrication [M-MACH-101291]

- **Responsible:** Prof. Dr. Jan Gerrit Korvink
- **Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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#### Mandatory

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<td>Fabrication Processes in Microsystem Technology</td>
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<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-100530</td>
<td>Physics for Engineers</td>
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<td>T-MACH-102167</td>
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<td>T-MACH-102191</td>
<td>Polymers in MEMS B: Physics, Microstructuring and Applications</td>
<td>3 CR</td>
<td>Worgull</td>
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<tr>
<td>T-MACH-102192</td>
<td>Polymers in MEMS A: Chemistry, Synthesis and Applications</td>
<td>3 CR</td>
<td>Rapp</td>
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<td>T-MACH-102200</td>
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<td>3 CR</td>
<td>Rapp, Worgull</td>
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<td>Practical Course Polymers in MEMS</td>
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<td>X-ray Optics</td>
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#### Workload

270 hours

#### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

#### Competence Goal

The student

- gains advanced knowledge concerning fabrication techniques in micrometer scale
- acquires knowledge in up-to-date developing research
- can detect and use causal relation in microfabrication process chains.

#### Prerequisites

none

#### Content

This engineering module allows the student to gain advanced knowledge in the area of microfabrication. Different manufacturing methods are described and analyzed in an advanced manner. Necessary interdisciplinary knowledge from physics, chemistry, materials science and also up-to-date developments (nano and x-ray optics) in micro fabrication is offered.
5.69 Module: Microoptics [M-MACH-101292]

**Responsible:** Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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**Election block:** Mikrooptik (at least 9 credits)

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<td>T-MACH-102165</td>
<td>Selected Topics on Optics and Microoptics for Mechanical Engineers</td>
<td>3</td>
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<td>T-MACH-101910</td>
<td>Microactuators</td>
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<td>T-ETIT-100741</td>
<td>Laser Physics</td>
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<td>T-ETIT-101945</td>
<td>Optical Waveguides and Fibers</td>
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**Competence Certificate**
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student

- basic knowledge for the applications of microoptical systems
- understanding fabrication processes of microoptical elements & systems
- analyzing strengths and weaknesses of lithography processes
- knowledge on the basics of optical sources and detectors and their use in technical systems
- fundamental knowledge on different lasers and their design
- knowledge on X-ray imaging methods

**Prerequisites**
none

**Content**
Optical imaging, measuring and sensor systems are a base for modern natural sciences. In particular life sciences and telecommunications have an intrinsic need for the application of optical technologies. Numerous fields of physics and engineering, e.g. astronomy and material sciences, require optical techniques. Micro optical systems are introduced in medical diagnostics and biological sensing as well as in products of the daily life.

In this module, an introduction to the basics of optics is provided; optical effects are presented with respect to their technical use.

Optical elements and instruments are presented. Fabrication processes of micro optical systems and elements, in particular lithography, are discussed.

In addition X-ray optics and X-ray imaging systems are presented as well as elements of optical telecommunication. A closer look on the physics behind lasers, being one of the most important technical light sources, is provided. As high end technology and clean room equipment is present in all the lectures of this module, the students will have a hands-on training with several experiments in micro optics.

**Workload**
270 hours
Module: Microsystem Technology [M-MACH-101293]

**Responsible:** Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

**Mandatory**

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<td>3 CR Badilita, Jouda, Korvink</td>
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**Election block: Mikrosystemtechnik (Ergänzungsbereich) (at least 6 credits)**

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<td>Selected Topics on Optics and Microoptics for Mechanical Engineers</td>
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<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II</td>
<td>3 CR Guber</td>
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<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III</td>
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<td>Bionics for Engineers and Natural Scientists</td>
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<td>Introduction to Microsystem Technology II</td>
<td>3 CR Jouda, Korvink</td>
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<td>Microactuators</td>
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<td>Nanotechnology with Clusterbeams</td>
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<td>Novel Actuators and Sensors</td>
<td>4 CR Kohl, Sommer</td>
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<td>Optoelectronic Components</td>
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<td>Physics for Engineers</td>
<td>6 CR Dienwiebel, Gumbsch, Nesterov-Müller, Weygard</td>
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<td>Polymers in MEMS A: Chemistry, Synthesis and Applications</td>
<td>3 CR Rapp</td>
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<td>Polymers in MEMS B: Physics, Microstructuring and Applications</td>
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<td>Polymers in MEMS C: Biopolymers and Bioplastics</td>
<td>3 CR Rapp, Worgull</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

**Prerequisites**
none

**Workload**
270 hours
5.71 Module: Module Masterarbeit [M-WIWI-101659]

**Responsible:** Prof. Dr. Martin Ruckes

**Organisation:** KIT Department of Economics and Management

**Part of:** Master Thesis

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**Mandatory**

| T-WIWI-103142 | Master Thesis | 30 CR | Studiendekan der KIT-Fakultät für Informatik, Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften |

**Competence Certificate**

See German version.

**Competence Goal**

The student can independently handle a complex and unfamiliar subject based on scientific criteria and on the current state of research.

He/she is in a position to critically analyze and structure the researched information as well as derive principles and regularities. He/she knows how to apply the thereby achieved results to solve the task at hand. Taking into account this knowledge and his/her interdisciplinary knowledge, he/she can draw own conclusions, derive improvement potentials, propose and implement science-based decisions.

This is basically also done under consideration of social and/or ethical aspects.

He/she can interpret, evaluate and if required, graphically present the obtained results.

He/she is in a position to sensibly structure a research paper, document them and clearly communicate the results in scientific form.

**Prerequisites**

See German version.

**Content**

See German version.

**Annotation**

See German version.

**Workload**

The total workload for this module is approximately 900 hours. For further information see German version.
5.72 Module: Nanotechnology [M-MACH-101294]

**Responsible:** Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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**Election block:** Nanotechnologie (Ergänzungsbereich) (at least 5 credits)

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<td>Nanotechnology with Clusterbeams</td>
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<td>T-MACH-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>3 CR</td>
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### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Competence Goal

The student
- has detailed knowledge in the field of nanotechnology
- is able to evaluate the specific characteristics of nanosystems.

### Prerequisites

none

### Content

The module deals with the most important principles and fundamentals of modern nanotechnology. The compulsory module “Nanotechnology with scanning probe methods” introduces the basics of nanotechnology and nanoanalytics. The specific phenomena and properties found in nanoscale systems are the main topic of the module.

### Workload

270 hours
5.73 Module: Natural Hazards and Risk Management [M-WIWI-104837]

**Responsible:** Prof. Dr. Michael Kunz

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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**Election block: Wahlpflichtangebot (between 9 and 12 credits)**

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<td>T-BGU-108943</td>
<td>Engineering Hydrology</td>
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<td>Ehret</td>
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<td>Morphodynamics</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

See German version

**Prerequisites**

None

**Content**

See German version

**Annotation**

Students, who successfully completed both modules "Understanding and Prediction of Disasters" I and II (alternatively: one of the modules in Bachelor and Master) can get a certificate of the module coordinator (CEDIM). This certificate lists the successful completed courses within the two modules.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.74 Module: Network Economics [M-WIWI-101406]

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:** Economics

**Compulsory Elective Modules 1 (Volkswirtschaftslehre)**

**Compulsory Elective Modules 2 (Volkswirtschaftslehre)**

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**Election block: Wahlpflichtangebot (9 credits)**

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<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4,5 CR</td>
<td>Mitusch</td>
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<tr>
<td>T-WIWI-100007</td>
<td>Transport Economics</td>
<td>4,5 CR</td>
<td>Mitusch, Szimba</td>
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<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4,5 CR</td>
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<td>T-WIWI-102712</td>
<td>Regulation Theory and Practice</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-102713</td>
<td>Telecommunication and Internet Economics</td>
<td>4,5 CR</td>
<td>Mitusch</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The students

- have acquired the basic knowledge for a future job in a network company or in a regulatory agency, ministry etc.
- recognize the specific characterizations of network sectors, know fundamental methods for an economic analysis of network sectors and recognize the interfaces for an interdisciplinary cooperation of economists, engineers and lawyers
- understand the interactions between infrastructures, control systems, and the users of networks, especially concerning their implications on investments, price setting and competitive behavior, and they can model or simulate exemplary applications
- can assess the necessity of regulation of natural monopolies and identify regulatory measures that are important for networks.

**Prerequisites**

None

**Content**

The module is concerned with network or infrastructure industries in the economy, e.g. telecommunication, traffic and energy sectors. These sectors are characterized by close interdependencies of operators and users of infrastructure as well as on states. States intervene in various forms, by the public and regulation authorities, due to the importance of network industries and due to limited abilities of markets to work properly in these industries. The students are supposed to develop a broad knowledge of these sectors and of the political options available.

**Recommendation**

Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
### 5.75 Module: Operations Research in Supply Chain Management [M-WIWI-102832]

**Responsible:** Prof. Dr. Stefan Nickel  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- Operations Research  
- Compulsory Elective Modules 1 (Operations Research)  
- Compulsory Elective Modules 2 (Operations Research)

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#### Election block: Wahlpflichtangebot (at most 2 items)

<table>
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<tr>
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<th>Module Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models</td>
<td>4.5 CR</td>
<td>Nickel</td>
</tr>
<tr>
<td>T-WIWI-106200</td>
<td>Modeling and OR-Software: Advanced Topics</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4.5 CR</td>
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#### Election block: Ergänzungsangebot (at most 2 items)

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<tbody>
<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization</td>
<td>4.5 CR</td>
<td>Rebennack</td>
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<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I</td>
<td>4.5 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II</td>
<td>4.5 CR</td>
<td>Stein</td>
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<td>T-WIWI-106549</td>
<td>Large-scale Optimization</td>
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<td>Optimization Models and Applications</td>
<td>4.5 CR</td>
<td>Sudermann-Merx</td>
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<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4.5 CR</td>
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</table>

#### Competence Certificate

The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

#### Competence Goal

The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of SCM and their respective optimization problems,
- is acquainted with classical location problem models (in planes, in networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

#### Prerequisites

At least one of the courses "Operations Research in Supply Chain Management", "Graph Theory and Advanced Location Models", "Modeling and OR-Software: Advanced Topics" and "Special Topics of Stochastic Optimization (elective)" has to be taken. Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

**Exemption for the summer term 2017:**

In the summer term 2017, the two OR master modules "Mathematical Optimization" and "Operations Research in Supply Chain Management" can be taken without compulsory courses. This corresponds to the already existing regulation when taking OR modules in the elective area. The derogation does not apply to the **winter term 2017/18**.
Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

This module considers several areas of SCM. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of Supply Chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of supply chain management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Supply Chain Management, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.

Recommendation
Basic knowledge as conveyed in the module Introduction to Operations Research [WI1OR] is assumed.

Annotation
Some lectures and courses are offered irregularly.
The planned lectures and courses for the next three years are announced online.

Workload
Total effort for 9 credits: ca. 270 hours

- Presence time: 84 hours
- Preparation/Wrap-up: 112 hours
- Examination and examination preparation: 74 hours
5.76 Module: Optoelectronics and Optical Communication [M-MACH-101295]

**Responsible:** Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<tr>
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<td>German</td>
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**Election block: Optoelektronik und Optische Kommunikationstechnik (Kernbereich) (1 item)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>T-ETIT-100639</td>
<td>Optical Transmitters and Receivers</td>
<td>6 CR</td>
<td>Freude</td>
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**Election block: Optoelektronik und Optische Kommunikationstechnik (Ergänzungsbereich) (at least 5 credits)**

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
<td>Kohl, Sommer</td>
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<tr>
<td>T-ETIT-101938</td>
<td>Communication Systems and Protocols</td>
<td>5 CR</td>
<td>Becker</td>
</tr>
<tr>
<td>T-ETIT-100741</td>
<td>Laser Physics</td>
<td>4 CR</td>
<td>Koos</td>
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<tr>
<td>T-ETIT-100740</td>
<td>Quantum Functional Devices and Semiconductor Technology</td>
<td>3 CR</td>
<td>Koos</td>
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<tr>
<td>T-ETIT-101945</td>
<td>Optical Waveguides and Fibers</td>
<td>4 CR</td>
<td>Koos</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams
(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
Student has basic knowledge of optical communication systems and related device and fabrication technologies.

- He/she can apply this knowledge to specific problems.

**Prerequisites**
one

**Content**
This module covers practical and theoretical aspects in the areas of optical communications and optoelectronics. System aspects of communication networks are complemented by fundamental principles and device technologies of optoelectronics as well as and microsystem fabrication technologies.

**Workload**
270 hours
Module: Principles of Food Process Engineering [M-CIWVT-101120]

**Responsible:** Dr. Volker Gaukel

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:**
- Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
- Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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**Mandatory**

| T-CIWVT-101874 | Principles of Food Process Engineering | 9 CR | Gaukel |

**Competence Goal**

See German version.

**Prerequisites**

none
5.78 Module: Private Business Law [M-INFO-101216]

**Responsible:** Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** Compulsory Elective Modules 2 (Recht und Soziologie)

<table>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
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**Election block: Recht der Wirtschaftsunternehmen (at least 1 item as well as at least 9 credits)**

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<tr>
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<tbody>
<tr>
<td>T-INFO-101329</td>
<td>Employment Law I</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-INFO-101330</td>
<td>Employment Law II</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-INFO-101315</td>
<td>Tax Law I</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-INFO-101314</td>
<td>Tax Law II</td>
<td>3 CR Dietrich, Dreier</td>
</tr>
<tr>
<td>T-INFO-101316</td>
<td>Law of Contracts</td>
<td>3 CR</td>
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</tbody>
</table>

**Competence Goal**

The student

- has gained in-depth knowledge of German company law, commercial law and civil law;
- is able to analyze, evaluate and solve complex legal and economic relations and problems;
- is well grounded in individual labour law, collective labour law and commercial constitutional law, evaluates and critically assesses clauses in labour contracts;
- recognizes the significance of the parties to collective labour agreements within the economic system and has differentiated knowledge of labour disputes law and the law governing the supply of temporary workers and of social law;
- possesses detailed knowledge of national earnings and corporate tax law and is able to deal with provisions of tax law in a scientific manner and assesses the effect of these provisions on corporate decision-making.

**Prerequisites**

None

**Content**

The module provides the student with knowledge in special matters in business law, like employment law, tax law and business law, which are essential for managerial decisions.
5.79 Module: Process Engineering in Construction [M-BGU-101110]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

M Mandatory

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<th>Duration</th>
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<tbody>
<tr>
<td>T-BGU-101844</td>
<td>Process Engineering</td>
<td>3 CR</td>
<td>Each winter term</td>
<td>1 semester</td>
<td>4</td>
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Election block: Wahlpflicht (between 2 and 3 items as well as between 6 and 7.5 credits)

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<tr>
<td>T-BGU-101845</td>
<td>Construction Equipment</td>
<td>3 CR</td>
<td>Each winter term</td>
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<tr>
<td>T-BGU-101832</td>
<td>Operation Methods for Foundation and Marine Construction</td>
<td>1.5 CR</td>
<td>Each winter term</td>
<td>1 semester</td>
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<tr>
<td>T-BGU-101801</td>
<td>Operation Methods for Earthmoving</td>
<td>1.5 CR</td>
<td>Each winter term</td>
<td>1 semester</td>
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<tr>
<td>T-BGU-101846</td>
<td>Tunnel Construction and Blasting Engineering</td>
<td>3 CR</td>
<td>Each winter term</td>
<td>1 semester</td>
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<tr>
<td>T-BGU-101847</td>
<td>Project Studies</td>
<td>3 CR</td>
<td>Each winter term</td>
<td>1 semester</td>
<td>4</td>
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<tr>
<td>T-BGU-101850</td>
<td>Disassembly Process Engineering</td>
<td>3 CR</td>
<td>Each winter term</td>
<td>1 semester</td>
<td>4</td>
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Competence Certificate
- 'Teilleistung' T-BGU-101844 with written examination according to § 4 Par. 2 No. 1 according to selected course:
  - 'Teilleistung' T-BGU-101845 with written examination according to § 4 Par. 2 No. 1
  - 'Teilleistung' T-BGU-101832 with oral examination according to § 4 Par. 2 No. 2
  - 'Teilleistung' T-BGU-101801 with oral examination according to § 4 Par. 2 No. 2
  - 'Teilleistung' T-BGU-101846 with oral examination according to § 4 Par. 2 No. 2
  - 'Teilleistung' T-BGU-101847 with oral examination according to § 4 Par. 2 No. 2
  - 'Teilleistung' T-BGU-101850 with oral examination according to § 4 Par. 2 No. 2
- details about the learning controls see at the respective 'Teilleistung'

Competence Goal
Students understand different processes and the related construction equipment, its technology, capabilities and constraints. Students can define process solutions consisting of machinery and devices. They can evaluate existing processes through knowledge about process performance and operating conditions, and can identify potential for improvement.

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Prerequisites
The course Verfahrenstechnik [6241704] is compulsory and must be examined.

Content
Within the frame of this module, various construction and conditioning processes will be presented as well as performance calculations conducted. Students learn about the construction machinery and devices of these processes. Transmission, generation, conversion and controlling of power are explained with the help of various practical examples. Moreover, the module includes possibilities for an on-site familiarization.

Recommendation
none

Annotation
None

Workload
see German version
### Module: Project Management in Construction [M-BGU-101888]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)  
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)  

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<tr>
<td>T-BGU-103432</td>
<td>Project Management in Construction and Real Estate Industry I</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-103431</td>
<td>Turnkey Construction II - Trades and Technology</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
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</table>

**Election block: Wahlpflicht (between 1 and 2 items as well as between 3 and 4,5 credits)**

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<th>Course Name</th>
<th>Credits</th>
<th>Instructor</th>
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<tr>
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<td>Site Management</td>
<td>1.5 CR</td>
<td>Haghsheno</td>
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<tr>
<td>T-BGU-103430</td>
<td>Turnkey Construction I - Processes and Methods</td>
<td>1.5 CR</td>
<td>Haghsheno</td>
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<td>T-BGU-103428</td>
<td>Supplementary Claim Management</td>
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<td>Haghsheno</td>
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<tr>
<td>T-BGU-103429</td>
<td>Building Laws</td>
<td>3 CR</td>
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<tr>
<td>T-BGU-103433</td>
<td>Project Management in Construction and Real Estate Industry II</td>
<td>3 CR</td>
<td>Haghsheno</td>
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**Competence Certificate**

- ‘Teilleistung’ T-BGU-103432 with written examination according to § 4 Par. 2 No. 1  
- ‘Teilleistung’ T-BGU-103431 with oral examination according to § 4 Par. 2 No. 2  
  according to selected course:

- ‘Teilleistung’ T-BGU-103427 with written examination according to § 4 Par. 2 No. 2  
- ‘Teilleistung’ T-BGU-103430 with oral examination according to § 4 Par. 2 No. 2  
- ‘Teilleistung’ T-BGU-103428 with oral examination according to § 4 Par. 2 No. 2  
- ‘Teilleistung’ T-BGU-103429 with oral examination according to § 4 Par. 2 No. 2  
- ‘Teilleistung’ T-BGU-103433 with oral examination according to § 4 Par. 2 No. 2  
  details about the learning controls see at the respective ‘Teilleistung’

**Competence Goal**

see German version

**Module grade calculation**

grade of the module is CP weighted average of grades of the partial exams

**Prerequisites**

The courses Projektmanagement in der Bau- und Immobilienwirtschaft I and Schlüsselfertiges Bauen II are compulsory and must be examined.

**Content**

see German version

**Recommendation**

none

**Annotation**

none

**Workload**

see German version
Literature
DIETHLEM, G.: Projektmanagement, Band 1: Grundlagen, Verlag Neue Wirtschafts-Briefe, Herne, 2000
ESCHENBRUCH, K.: Recht der Projektsteuerung, Werner Verlag, München, 2003
VOLKMANN, W.: Projektabwicklung, Verlag für Wirtschaft und Verwaltung Hubert Wingen, Essen, 2002
HELLER, Jörg: Sicherung der Nachtragsvergütung nach VOB und BGB, Zeittechnik-Verlag, Neu-Isenburg, 2000
5.81 Module: Public Business Law [M-INFO-101217]

- **Responsible:** Prof. Dr. Matthias Bäcker
- **Organisation:** KIT Department of Informatics
- **Part of:** Compulsory Elective Modules 2 (Recht und Soziologie)

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<th>Level</th>
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<td>9</td>
<td>Each term</td>
<td>1 semester</td>
<td>German</td>
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**Election block: Öffentliches Wirtschaftsrecht (at least 1 item as well as at least 9 credits)**

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tr>
<td>T-INFO-101309</td>
<td>Telecommunications Law</td>
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<td>Marsch</td>
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<tr>
<td>T-INFO-101303</td>
<td>Data Protection Law</td>
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<tr>
<td>T-INFO-101311</td>
<td>Public Media Law</td>
<td>3</td>
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<tr>
<td>T-INFO-101312</td>
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<td>3</td>
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</table>

**Competence Certificate**

see course description.
5.82 Module: Rail System Technology [M-MACH-101274]

Responsible: Prof. Dr.-Ing. Peter Gratzfeld
Organisation: KIT Department of Mechanical Engineering

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

Credits 9 Language German Level 4 Version 4

Mandatory
T-MACH-102143 Rail System Technology 9 CR Gratzfeld

Competence Certificate
Oral examination
Duration: ca. 45 minutes
No tools or reference materials may be used during the exam.

Competence Goal
- The students understand relations and interdependencies between rail vehicles, infrastructure and operation in a rail system.
- Based on operating requirements and legal framework they derive the requirements concerning a capable infrastructure and suitable concepts of rail vehicles.
- They recognize the impact of alignment, understand the important function of the wheel-rail-contact and estimate the impact of driving dynamics on the operating program.
- They evaluate the impact of operating concepts on safety and capacity of a rail system.
- They know the infrastructure to provide power supply to rail vehicles with different drive systems.
- The students learn the role of rail vehicles and understand their classification. They understand the basic structure und know the functions of the main systems. They understand the overall tasks of vehicle system technology.
- They learn functions and requirements of car bodies and judge advantages and disadvantages of design principles. They know the functions of the car body's interfaces.
- They know about the basics of running dynamics and bogies.
- The students learn about advantages and disadvantages of different types of traction drives and judge, which one fits best for each application.
- They understand brakes from a vehicular and an operational point of view. They assess the fitness of different brake systems.
- They know the basic setup of train control management system and understand the most important functions.
- They specify and define suitable vehicle concepts based on requirements for modern rail vehicles.

Content
1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)
9. Vehicle system technology: structure and main systems of rail vehicles
10. Car body: functions, requirements, design principles, crash elements, interfaces
11. Bogies: forces, running gears, axle configuration
12. Drives: vehicle with/without contact wire, dual-mode vehicle
13. Brakes: tasks, basics, principles, blending, brake control
14. Train control management system: definitions, networks, bus systems, components, examples
15. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019

120
Annotation
A bibliography is available for download (Ilias-platform).
The lectures can be attended in the same term.

Workload
1. Regular attendance: 42 hours
2. Self-study: 42 hours
3. Exam and preparation: 186 hours

Learning type
Lectures
5.83 Module: Sales Management [M-WIWI-101487]

**Responsible:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration
- Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
- Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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**Election notes**
The courses "Business Planning for Founders - EUCOR" and the course "International Selling - EUCOR" must be taken together.

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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course.

**Competence Goal**

Students

- have an advanced knowledge about sales management (design and structure of sales systems, relationship with sales partners and important customers)
- have a fundamental understanding of price management (in particular consumer behavior of pricing, pricing strategy, price determination)
- are able to handle particularities and challenges in sales management
- know several qualitative and quantitative approaches to prepare decisions in Marketing
- are able to implement their extensive sales and pricing knowledge in a practical context
- have the theoretical knowledge to write a master thesis in Marketing
- have the theoretical knowledge to work in/together with the sales department

**Prerequisites**
The course "Sales Management and Retailing" is compulsory.

**Content**
The aim of the module is to deepen the sales management knowledge of the students. Theoretical approaches often have a combined view on marketing and sales, whereas in practical surroundings the sales department is completely separated from the marketing tasks. Given this fact, we concentrate on pure sales management topics and address different facets of the sales management.

**Annotation**
For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu).

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
### 5.84 Module: Seminar Module [M-WIWI-101808]

**Responsible:** Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Compulsory Elective Modules 1 (mandatory)

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**Election block: Seminar Wirtschaftswissenschaften, Mathematik und Recht (between 3 and 6 credits)**

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<td>T-INFO-105945</td>
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**Election block: Seminar Ingenieurwissenschaften (at most 1 item)**

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<td>T-MACH-109062</td>
<td>Seminar Production Technology</td>
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<tr>
<td>T-MACH-108737</td>
<td>Seminar Data-Mining in Production</td>
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<td>T-BGU-100014</td>
<td>Seminar in Transportation</td>
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**Election block: SQ-Seminar (between 3 and 4 credits)**

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</table>
Competence Certificate
The modul examination consists of two seminars and of at least one key qualification (KQ) course (according to §4 (3), 3 of the examination regulation). A detailed description of every single assessment is given in the specific course characterization.

The final mark for the module is the average of the marks for each of the two seminars weighted by the credits and truncated after the first decimal. Grades of the KQ courses are not included.

Competence Goal
- The students are in a position to independently handle current, research-based tasks according to scientific criteria.
- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Prerequisites
The course specific preconditions must be observed.

- **Seminars**: Two seminars out of the course list, that have at least 3 CP each and are offered by a representative of the Department of Economics and Management or of the Center for applied legal studies (Department of Informatics), have to be chosen.
- Alternatively one of the two seminars can be absolved at an engineering department. The seminar has to be offered by a representative of the respective department as well. The assessment has to meet the demands of the Department of Economics and Management (active participation, term paper with a workload of at least 80 h, presentation). This alternative seminar requires an official approval and can be applied at the examination office of the Department of Economics and Management. Seminars at the institutes wbk and IFL do not require these approval.
- **Key Qualification (KQ)-course(s)**: One or more courses with at least 3 CP in total of additional key qualifications have to be chosen among the courses [HoC, ZAK, Sprachenzentrum].

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailed description of these qualifications is given in the section “Key Qualifications” of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.85 Module: Service Analytics [M-WIWI-101506]

**Responsible:** Prof. Dr. Hansjörg Fromm  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management  
Part of: Business Administration  
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

**Credits** | **Language** | **Level** | **Version**
---|---|---|---
9 | German | 4 | 5

**Election block: Wahlpflichtangebot (9 credits)**

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<tr>
<td>T-WIWI-108715</td>
<td>Artificial Intelligence in Service Systems</td>
<td>4.5 CR</td>
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<td>4.5 CR</td>
<td>Mädche, Nadj, Toreini</td>
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<td>Industrial Services</td>
<td>4.5 CR</td>
<td>Fromm</td>
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<tr>
<td>T-WIWI-102899</td>
<td>Modeling and Analyzing Consumer Behavior with R</td>
<td>4.5 CR</td>
<td>Dorner, Weinhardt</td>
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<td>T-WIWI-105778</td>
<td>Service Analytics A</td>
<td>4.5 CR</td>
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<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

**Prerequisites**

None

**Content**

The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data “Big Data” and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.

It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

**Recommendation**

The course Service Analytics A [2595501] should be taken.

**Annotation**

This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.
Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Service Design Thinking [M-WIWI-101503]

Mandatory
T-WIWI-102849 Service Design Thinking 12 CR Satzger

Competence Certificate
The assessment is carried out as a general exam (according to Section 4(2), 3 of the examination regulation). The overall grade of the module is the grade of the examination (according to Section 4(2), 3 of the examination regulation).

Competence Goal
- Deep knowledge of the innovation method Design Thinking, as introduced and promoted by Stanford University
- Development of new, creative solutions through extensive observation of oneself and one's environment, in particular with regard to the relevant service users
- Know how to use prototyping and experimentation to visualize one’s ideas, to test and iteratively develop them, and to converge on a solution
- Learn to apply the method to a real innovation projects issued by industry partners.

Prerequisites
None

Content
- Paper Bike: Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges. The bikes will be tested in a race during an international Kick-Off event with other universities of the SUGAR network (intern. Design Thinking network).
- Design Space Exploration: Exploring the problem space through customer and user observation as well as desk research.
- Critical Function Prototype: Identification of critical features from the customer’s perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- Dark Horse Prototype: Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions. Developing radically new ideas are in the focus of this phase.
- Funky Prototype: Integration of the individually tested and successful functions to several complete solution scenarios, which are further tested and developed.
- Functional Prototype: Selection of successful scenarios from the previous phase and building a higher resolution prototype. The final solution to the challenge is laid out in detail and tested with users.
- Final Prototype: Implementing the functional prototype and presenting it to the customer.

Recommendation
This course is held in English – proficiency in writing and communication is required.
Our past students recommend to take this course at the beginning of the masters program.

Annotation
Due to practical project work as a component of the program, access is limited. The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June.
For more information on the application process and the program itself are provided in the module component description and the program’s website (http://sdt-karlsruhe.de).
Furthermore, the KSRI conducts an information event for applicants every year in May.
This module is part of the KSRI Teaching Program „Digital Service Systems“. For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.
Workload
The total amount of work for this module is approx. 270 hours (9 credits). The workload for this course is comparably high as the course runs in cooperation with partner universities from around the world as well as partner companies. This causes overhead.
5.87 Module: Service Economics and Management [M-WIWI-102754]

**Responsible:**
Prof. Dr. Gerhard Satzger  
Prof. Dr. Christof Weinhardt

**Organisation:**
KIT Department of Economics and Management

**Part of:**
Business Administration  
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

| Election block: Wahlpflichtangebot (9 credits) |
|---|---|---|---|
| T-WIWI-110280 | Digital Services: Business Models and Transformation | 4.5 CR | Satzger |
| T-WIWI-106201 | Digital Transformation of Organizations | 4.5 CR | Mädche |
| T-WIWI-102640 | Market Engineering: Information in Institutions | 4.5 CR | Weinhardt |

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

**Students**

- understand the scientific basics of the management of digital services and corresponding systems
- gain a comprehensive insight in the importance and the most important features of information systems as an central component of the digitalization of business processes, products and services
- know the most relevant concepts and theories to shape the digital transformation process of service systems successfully
- understand the OR methods in the sector of service management and apply them adequately
- are able to use large amounts of available data systematically for the planning, operation and improvement of complex service offers and to design and control information systems
- are able to develop market-oriented coordination mechanisms and apply service systems.

**Prerequisites**
None

**Content**
This module provides the foundation for the management of digital services and corresponding systems. The courses in this module cover the major concepts for a successful management of service systems and their digital transformation. Current examples from the research and practice enhance the relevance of the discussed topics.

**Recommendation**
None

**Annotation**
This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
5.88 Module: Service Innovation, Design & Engineering [M-WIWI-102806]

**Responsible:** Prof. Dr. Alexander Mädche  
Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:**  
Business Administration  
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)  
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

**Credits** 9  
**Language** German  
**Level** 4  
**Version** 2

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<td>T-WIWI-105773 Digital Service Design 4,5 CR Mädche</td>
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<tr>
<td>T-WIWI-102639 Business Models in the Internet: Planning and Implementation 4,5 CR Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-108437 Practical Seminar: Information Systems and Service Design 4,5 CR Mädche</td>
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<td>T-WIWI-102799 Practical Seminar Service Innovation 4,5 CR Satzger</td>
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**Competence Certificate**  
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**  
Students

- know about the challenges, concepts, methods and tools of service innovation management and are able to use them successfully.
- have a profound comprehension of the development and design of innovative services and are able to apply suitable methods and tools on concrete and specific issues.
- are able to embed the concepts of innovation management, development and design of services into organisations
- are aware of the strategic importance of services, are able to present value creation in the context of services systems and to strategically exploit the possibilities of their digital transformation
- elaborate concrete and problem-solving solutions for practical tasks in teams.

**Prerequisites**  
Dependencies between courses:  
The course Practical Seminar Service Innovation cannot be applied in combination with the course Practical Seminar Digital Service Design.

**Content**  
This module is designed to constitute the basis for the development of successful ICT supported innovations thus including the methods and tools for innovation management, for the design and the development of digital services and the implementation of new business models. Current examples from science and practice enhance the relevance of the topics addressed.

**Recommendation**  
Attending the course Practical Seminar Service Innovation [2595477] is recommended in combination with the course Service Innovation [2595468].
Attending the course Practical Seminar Digital Service Design [new] is recommended in combination with the course Digital Service Design [new].

**Annotation**  
This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.
Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.89 Module: Service Management [M-WIWI-101448]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of:
- Business Administration
  - Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
  - Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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Mandatory

| T-WIWI-110280 | Digital Services: Business Models and Transformation | 4.5 CR | Satzger |

Election block: Ergänzungsangebot (4.5 credits)

| T-WIWI-108715 | Artificial Intelligence in Service Systems | 4.5 CR | Satzger |
| T-WIWI-106201 | Digital Transformation of Organizations | 4.5 CR | Mädche |
| T-WIWI-102822 | Industrial Services | 4.5 CR | Fromm |
| T-WIWI-102899 | Modeling and Analyzing Consumer Behavior with R | 4.5 CR | Dorner, Weinhardt |
| T-WIWI-105778 | Service Analytics A | 4.5 CR | Fromm |
| T-WIWI-102641 | Service Innovation | 4.5 CR | Satzger |

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The students
- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- systematically use vast amounts of available data for planning, operation, personalization and improvement of complex service offerings, and
- understand and analyze innovation processes in corporations.

Prerequisites
The course "Digital Services: Business Models and Transformation" is compulsory and must be examined.

Content
The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to systematically analyze vast amounts of data for planning, operation and improvement for complex service offerings. These tools enhance operational and strategic decision support and help to analyze and understand the overall innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Recommendation
None

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
5.0 Module: Service Operations [M-WIWI-102805]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Operations Research
- Compulsory Elective Modules 1 (Operations Research)
- Compulsory Elective Modules 2 (Operations Research)

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<th>Level</th>
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<td>T-WIWI-102718 Discrete-Event Simulation in Production and Logistics</td>
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<td>T-WIWI-102884 Operations Research in Health Care Management</td>
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<td>T-WIWI-102716 Practical Seminar: Health Care Management (with Case Studies)</td>
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<td>T-WIWI-102872 Challenges in Supply Chain Management</td>
<td>4.5 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

**Prerequisites**
At least one of the four courses Operations Research in Supply Chain Management, Operations Research in Health Care Management, Practical seminar: Health Care Management or Discrete-Event Simulation in Production and Logistics has to be assigned.
Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

**Content**
The importance of services in modern economies is most evident - nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data "Big Data" and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.
It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

**Recommendation**
The course Practical Seminar Health Care should be combined with the course OR in Health Care Management.

**Annotation**
This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.
Workload
The total workload for this module is approximately 270 hours. For further information see German version.
# 5.91 Module: Sociology [M-GEISTSOZ-101169]

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** Compulsory Elective Modules 2 (Recht und Soziologie)

**Credits:** 9  
**Recurrence:** Each term  
**Duration:** 1 semester  
**Level:** 4  
**Version:** 2

## Mandatory

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<tr>
<td>T-GEISTSOZ-109052</td>
<td>Application of Social Science Methods (WiWi)</td>
<td>9 CR</td>
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## Competence Goal

The student

- Gains theoretical and methodical knowledge of social processes and structures,
- learns a script based data analysis tool (R, Stata, Python),
- gathers his/her data within an own framework and/or analyzes complex data,
- is able to present his/her work results in a precise and clear way.

## Prerequisites

Students must pass three exercise sheets within the seminar "Computer based data analysis".

## Content

The Sociology module offers students the opportunity to learn a data analysis tool (R, Stata, Python) within the framework of a two-semester course and to independently transfer this tool to a content-related question. Both the tool and the contents are determined by the lecturers. The contents can refer to the analysis of large population surveys (SOEP, Microcensus, ALLBUS), to own experiments, to own field studies or to Big Data analyses.

## Annotation

Basic knowledge in multivariate regression and inference statistics is required.
5.92 Module: Specialization in Food Process Engineering [M-CIWVT-101119]

**Responsible:** Dr. Volker Gaukel

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

<table>
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<th>Duration</th>
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**Mandatory**

| T-CIWVT-101875 | Specialization in Food Process Engineering | 9 CR | Gaukel |

**Competence Goal**

See German version.

**Prerequisites**

The module "Principles of Food Process Engineering" must be passed.

**Content**

See courses.
# 5.93 Module: Specialization in Production Engineering [M-MACH-101284]

**Responsible:** Prof. Dr.-Ing. Volker Schulze  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)  
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<tr>
<td>T-MACH-110176</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>4 CR</td>
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<td>T-MACH-105188</td>
<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>4 CR</td>
<td>Schlichtenmayer</td>
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<tr>
<td>T-MACH-105783</td>
<td>Learning Factory “Global Production”</td>
<td>4 CR</td>
<td>Lanza</td>
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<tr>
<td>T-MACH-108878</td>
<td>Laboratory Production Metrology</td>
<td>4 CR</td>
<td>Häfner</td>
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<tr>
<td>T-MACH-110318</td>
<td>Product- and Production-Concepts for modern Automobiles</td>
<td>4 CR</td>
<td>Kienzle, Steegmüller</td>
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<tr>
<td>T-MACH-102107</td>
<td>Quality Management</td>
<td>4 CR</td>
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<td>T-MACH-105185</td>
<td>Control Technology</td>
<td>4 CR</td>
<td>Gönnheimer</td>
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<tr>
<td>T-MACH-105177</td>
<td>Metal Forming</td>
<td>3 CR</td>
<td>Herlan</td>
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<tr>
<td>T-MACH-102148</td>
<td>Gear Cutting Technology</td>
<td>4 CR</td>
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</table>

**Competence Certificate**  
Oral exams: duration approx. 5 min per credit point  
Written exams: duration approx. 20 - 25 min per credit point  
Amount, type and scope of the success control can vary according to the individually choice.

**Competence Goal**  
The students  
- are able to apply the methods of production science to new problems.  
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.  
- are able to use their knowledge target-oriented to achieve an efficient production technology.  
- are able to analyze new situations and choose methods of production science target-oriented based on the analyses, as well as justifying their selection.  
- are able to describe and compare complex production processes exemplarily.

**Prerequisites**  
one

**Content**  
Within this module the students will get to know and learn about production science. Manifold lectures and excursions as part of several lectures provide specific insights into the field of production science.

**Workload**  
The work load is about 270 hours, corresponding to 9 credit points.

**Learning type**  
Lectures, seminars, workshops, excursions
5.94 Module: Stochastic Optimization [M-WIWI-103289]

| Responsible: | Prof. Dr. Steffen Rebennack |
| Organisation: | KIT Department of Economics and Management |
| Part of: | Operations Research |
| Credits | 9 |
| Recurrence | Each term |
| Duration | 1 semester |
| Language | German/English |
| Level | 4 |
| Version | 8 |

**Election block: Wahlpflichtangebot (between 1 and 2 items)**

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<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-106548</td>
<td>Advanced Stochastic Optimization</td>
<td>4.5 CR</td>
</tr>
<tr>
<td>T-WIWI-106549</td>
<td>Large-scale Optimization</td>
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**Election block: Ergänzungsangebot (at most 1 item)**

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<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I</td>
<td>4.5 CR</td>
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<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II</td>
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<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
<td>4.5 CR</td>
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<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-110162</td>
<td>Optimization Models and Applications</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-106552</td>
<td>Simulation of Stochastic Systems</td>
<td>4.5 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student

- names and describes basic notions for advanced stochastic optimization methods, in particular, ways to algorithmically exploit the special model structures,
- knows the indispensable methods and models for quantitative analysis of stochastic optimization problems,
- models and classifies stochastic optimization problems and chooses the appropriate solution methods to solve also challenging stochastic optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to makes suggestions to adapt them to practical problems.

**Prerequisites**
At least one of the courses “Advanced Stochastic Optimization” and “Large-scale Optimization” has to be taken. Students who choose the module in the field “compulsory elective modules” may select any two courses of the module.

**Content**
The module focuses on the modeling as well as the imparting of theoretical principles and solution methods for optimization problems with special structure, which occur for example in the stochastic optimization.

**Recommendation**
It is recommended to listen to the lecture “Introduction to Stochastic Optimization” before the lecture “Advanced Stochastic Optimization” is visited.
Annotation
The course "Introduction to Stochastic Optimization" will be offered until the summer semester 2019 as an additional option in the elective offer of the module. Thereafter, the course can only be selected in the supplementary offer.

The courses are sometimes offered irregularly. The curriculum, planned for three years in advance, can be found on the Internet at http://sop.ior.kit.edu/28.php.

Workload
The total workload for this module is approximately 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module. The total number of hours per course is determined by the amount of time spent attending the lectures and exercises, as well as the exam times and the time required to achieve the module's learning objectives for an average student for an average performance.
Module: Student Innovation Lab (SIL) 1 [M-WIWI-105010]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann
Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:** Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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<td>T-WIWI-110166</td>
<td>SIL Entrepreneurship Project</td>
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<td>T-WIWI-110287</td>
<td>SIL Entrepreneurship Emphasis</td>
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</table>

**Competence Certificate**
The assessment of this module comprises a written examination of 60 minutes on the lecture contents of the lecture “Entrepreneurship” as well as two seminars. All examinations are graded. In both seminars the following tasks have to be fulfilled:

- "SIL Entrepreneurship Project": Presentation of the Value Profile & submission of the Business Plan
- "SIL Entrepreneurship Emphasis": Submission of price calculation, market potential analysis, competition analysis, financial plan, risk analysis, decision basis for funding and legal form

In addition, both courses provide for smaller, ungraded tasks to monitor progress.

The grade consists of 60 % of the written examination, 20 % of the examination "SIL Entrepreneurship Project" and 20 % of the examination "SIL Entrepreneurship Advanced".
Competence Goal

Personal competence

- Ability to reflect: Students can analyse certain elements of their actions in social interaction, critically assess them and develop alternative actions.
- Decision-making ability: Students can prepare a decision template in due time and provide the necessary factual arguments for alternative decisions and thus make timely decisions.
- Interdisciplinary cooperation: Students can recognise the limits of their domain competence and adjust to domains outside their subject area. The students are able to recognise missing (own) competences and to supplement them with complementary competences (of other persons in the team). Students can communicate their domain to others and develop a basic understanding of foreign domains.
- Value-based action: Students can use selected tools of psychology to recognize their own values. They can compare these values with other team members and critically reflect on whether their offers match these values.

Social competence

- Ability to cooperate: Students can analyse and assess their cooperation behaviour in the group.
- Communication skills: Students can present their information in a convincing, focused and target group-oriented way.
- Conflict ability: Students can recognize conflicts at an early stage, analyse conflict situations and name solution concepts.

Innovation and Entrepreneurship Competence

- Agile product development: Students can apply methods of agile product development such as Scrum.
- Methodical innovation finding: Students can perform user- or technology-centric innovation processes to develop sustainable value propositions for dedicated target groups (e.g. Design Thinking (DT), Technology Application Selection (TAS) process).
- Orientation on the management of new technology-based companies (NTBF): Students can name the central concepts of intellectual property and legal form. Students can name the most important tasks of entrepreneurial leadership. They can identify the relevant forms of business modelling and draw up a business plan. Students know the central approaches to building an organisation. Students will be able to identify the ownership structure of investments and how to develop a strategy. The students can name marketing concepts and create a business model.
- Create investment readiness: The students are able to create a rudimentary sales and cost planning. Furthermore, they are able to create a project plan for a company and derive an investment plan from it. The students can present the business plan to potential investors and develop investor empathy.
- Business model development competence: Students are able to use relevant tools for business modelling, e.g. the Business Model Canvas. Students can develop and evaluate alternative business models.
- Dealing with risks: Students can identify the basic risks in terms of desirability, technical feasibility and profitability. Students can use customer interaction methods to test desirability and willingness to pay. Students can draw up a rudimentary competitive analysis. Students can identify and identify risks and possible reactions.

Systemic technical competence

- Problem-solving competence: Students can analyse, assess and solve a technical problem in a structured way.
- Agile Methodology of System Development: Students can name the different system development processes and apply them appropriately.
- Validation in a volatile environment: Students can perform a technical and economic validation under volatile boundary conditions. For this purpose they can name the boundary conditions and interpret the results of the validation.
- Functional decomposition: Students are able to identify and interpret complex customer needs and derive functional requirements from them.
- Architecture development: The students are able to recognize correlations from the functional requirements and to derive a suitable system architecture.

Prerequisites

The module can only be completed together with the module M-WIWI-105011 “Student Innovation Lab 2”.

An application is required for participation in the modules Student Innovation Lab (SIL) 1 and Student Innovation Lab (SIL) 2. Information about the application can be found at http://www.kit-student-innovation-lab.de/index.php/for-students/.
Content
In a real laboratory, the module imparts professional, social and personal competences in entrepreneurship and in the respective technical domain. The aim is to prepare students in the best possible way for an entrepreneurial activity within or outside an established organisation. Our teaching is research-based and practice-oriented.

As an integral part, the lecture Entrepreneurship offers the theoretical basis and gives an overview of important theoretical concepts and empirical evidence. Current case studies and practical experiences of successful founders underline the theoretical and empirical contents. In order to operate a company on a long-term basis, important specialist knowledge is also of decisive importance. The content of the lecture therefore includes an introduction to Entrepreneurial Marketing and Leadership as well as the basics of Opportunity Recognition and Business Modeling. Customer-centric development methods, the lean start-up approach and methods for technology-oriented innovation are presented. Future founders must be able to develop and manage resources such as financial and human capital, infrastructure and intellectual property. Further aspects relate to the establishment of an organisation and the financing of one's own project.

The knowledge gained in the lecture Entrepreneurship will be applied in a practice-oriented seminar and in the labs. We use an action learning approach to complement the knowledge with skills and reflective attitudes. In five-member teams, the students experience their way from idea generation to the final investor pitch.

With regard to the labs, students have the following options:
- As an innovation platform, the Automation Innovation Lab offers flying robots for cooperative swarm solutions.
- The Industry 4.0 Innovation Lab enables innovations in the area of the next industrial revolution with mobile robot platforms.
- In the Internet of Things Innovation Lab, innovations in Assisted Living and Smart Housing are made possible by a comprehensive kit of mobile robots and sensors.

The module also teaches methods of agile system development (Scrum) and the associated validation methods as well as methods of functional prototyping. Gate plans are applied within the module to determine project progress.

Methods for the reflection of individual & team work are treated and applied as well as group work specific knowledge about different roles of team members, solution of conflict situations and interdisciplinary teams are obtained.

Annotation

Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module. The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
Module: Student Innovation Lab (SIL) 2 [M-WIWI-105011]

**Responsible:**
Prof. Dr.-Ing. Sören Hohmann
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork
Prof. Dr. Orestis Terzidis
Prof. Dr.-Ing. Thomas Zwick

**Organisation:**
KIT Department of Economics and Management

**Part of:**
Compulsory Elective Modules 1 (Betriebswirtschaftslehre)
Compulsory Elective Modules 2 (Betriebswirtschaftslehre)

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<tr>
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</table>

**Mandatory**

| T-ETIT-110291 | Innovation Lab | 9 CR Hohmann, Sax, Stork, Zwick |

**Competence Certificate**
The examination in this module comprises the submission of graded intermediate results in the form of prototypes (low fidelity and high fidelity) as well as various technical and economic reports (according to § 4 (2), 3 SPO):

1. Submission of a technical report with requirements list and system architecture
2. Submission of the reflection of the gate plans
3. Presentation of the High-fidelity

The module grade consists of 50% of the evaluation of the low fidelity prototype including intermediate results of a technical and economic nature and 50% of the evaluation of the high fidelity prototype including intermediate results of a technical and economic nature.
 Competence Goal

Personal competence

- Ability to reflect: Students can analyse certain elements of their actions in social interaction, critically assess them and develop alternative actions.
- Decision-making ability: Students can prepare a decision template in due time and provide the necessary factual arguments for alternative decisions and thus make timely decisions.
- Interdisciplinary cooperation: Students can recognise the limits of their domain competence and adjust to domains outside their subject area. The students are able to recognise missing (own) competences and to supplement them with complementary competences (of other persons in the team). Students can communicate their domain to others and develop a basic understanding of foreign domains.
- Value-based action: Students can use selected tools of psychology to recognize their own values. They can compare these values with other team members and critically reflect on whether their offers match these values.

Social competence

- Ability to cooperate: Students can analyse and assess their cooperation behaviour in the group.
- Communication skills: Students can present their information in a convincing, focused and target group-oriented way.
- Conflict ability: Students can recognise conflicts at an early stage, analyse conflict situations and name solution concepts.

Innovation and Entrepreneurship Competence

- Agile product development: Students can apply methods of agile product development such as Scrum.
- Methodical innovation finding: Students can perform user- or technology-centric innovation processes to develop sustainable value propositions for dedicated target groups (e.g. Design Thinking (DT), Technology Application Selection (TAS) process).
- Orientation on the management of new technology-based companies (NTBF): Students can name the central concepts of intellectual property and legal form. Students can name the most important tasks of entrepreneurial leadership. They can identify the relevant forms of business modelling and draw up a business plan. Students know the central approaches to building an organisation. Students will be able to identify the ownership structure of investments and how to develop a strategy. The students can name marketing concepts and create a business model.
- Create investment readiness: The students are able to create a rudimentary sales and cost planning. Furthermore, they are able to create a project plan for a company and derive an investment plan from it. The students can present the business plan to potential investors and develop investor empathy.
- Business model development competence: Students are able to use relevant tools for business modelling, e.g. the Business Model Canvas. Students can develop and evaluate alternative business models.
- Dealing with risks: Students can identify the basic risks in terms of desirability, technical feasibility and profitability. Students can use customer interaction methods to test desirability and willingness to pay. Students can draw up a rudimentary competitive analysis. Students can identify and identify risks and possible reactions.

Systemic technical competence

- Problem-solving competence: Students can analyse, assess and solve a technical problem in a structured way.
- Agile Methodology of System Development: Students can name the different system development processes and apply them appropriately.
- Validation in a volatile environment: Students can perform a technical and economic validation under volatile boundary conditions. For this purpose they can name the boundary conditions and interpret the results of the validation.
- Functional decomposition: Students are able to identify and interpret complex customer needs and derive functional requirements from them.
- Architecture development: The students are able to recognize correlations from the functional requirements and to derive a suitable system architecture.

Prerequisites

The module can only be completed together with the module M-WIWI-105010 "Student Innovation Lab (SIL) 1".

An application is required for participation in the modules Student Innovation Lab (SIL) 1 and Student Innovation Lab (SIL) 2. Information about the application can be found at http://www.kit-student-innovation-lab.de/index.php/for-students/.
Content
In a real laboratory, the module imparts professional, social and personal competences in entrepreneurship and in the respective technical domain. The aim is to prepare students in the best possible way for an entrepreneurial activity within or outside an established organisation. Our teaching is research-based and practice-oriented.

As an integral part, the lecture Entrepreneurship offers the theoretical basis and gives an overview of important theoretical concepts and empirical evidence. Current case studies and practical experiences of successful founders underline the theoretical and empirical contents. In order to operate a company on a long-term basis, important specialist knowledge is also of decisive importance. The content of the lecture therefore includes an introduction to Entrepreneurial Marketing and Leadership as well as the basics of Opportunity Recognition and Business Modeling. Customer-centric development methods, the lean start-up approach and methods for technology-oriented innovation are presented. Future founders must be able to develop and manage resources such as financial and human capital, infrastructure and intellectual property. Further aspects relate to the establishment of an organisation and the financing of one’s own project.

The knowledge gained in the lecture Entrepreneurship will be applied in a practice-oriented seminar and in the labs. We use an action learning approach to complement the knowledge with skills and reflective attitudes. In five-member teams, the students experience their way from idea generation to the final investor pitch.

With regard to the labs, students have the following options:
- As an innovation platform, the Automation Innovation Lab offers flying robots for cooperative swarm solutions.
- The Industry 4.0 Innovation Lab enables innovations in the area of the next industrial revolution with mobile robot platforms.
- In the Internet of Things Innovation Lab, innovations in Assisted Living and Smart Housing are made possible by a comprehensive kit of mobile robots and sensors.

The module also teaches methods of agile system development (Scrum) and the associated validation methods as well as methods of functional prototyping. Gate plans are applied within the module to determine project progress.

Methods for the reflection of individual & team work are treated and applied as well as group work specific knowledge about different roles of team members, solution of conflict situations and interdisciplinary teams are obtained.

Annotation

Workload
The module comprises a total of 270 hours (8 hours attendance time, 213 hours preparation and follow-up time, 49 hours preparation time for examination), which corresponds to a total of 9 credit points for two semesters.
Module: Technical Logistics [M-MACH-101279]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<tr>
<td>T-MACH-109920</td>
<td>Basics of Technical Logistics II</td>
<td>5 CR</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the requirement of credits of this module. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

T-MACH-109920 "Basics of Technical Logistics II" is based on T-MACH-109919 "Basics of Technical Logistics I". The contents are taught one after the other in one course in the winter semester. The individual exams are taken on one day at the end of the semester.

Competence Goal
The student
- acquires well-founded knowledge on the main topics of technical logistics
- gets an overview of different applications of technical logistics in practice,
- acquires expertise and understanding about functionality of material handling systems.

Prerequisites
none

Content
The module Technical Logistics provides in-depth basics on the main topics of technical logistics. The module focuses on technical characteristics of material handling technology. To gain a deeper understanding, the course is accompanied by exercises.

Workload
270 hours
5.98 Module: Transport Infrastructure Policy and Regional Development [M-WIWI-101485]

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics
- Compulsory Elective Modules 1 (Volkswirtschaftslehre)
- Compulsory Elective Modules 2 (Volkswirtschaftslehre)

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**Election block: Wahlpflichtangebot (2 Items)**

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<td>Spatial Economics</td>
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<td>4.5 CR</td>
<td>Transport Economics</td>
<td></td>
<td></td>
<td>Mitusch, Szimba</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The students

- understand the economic issues related to transport and regional development with a main focus on economic policy issues generated by the relationship of transport and regional development with the public sector
- are able to compare different considerations of politics, regulation and the private sector and to analyse and assess the respective decision problems both qualitatively and by applying appropriate methods from economic theory
- are prepared for careers in the public sector, particularly for public companies, politics, regulatory agencies, related consultancies, mayor construction companies or infrastructure project corporations

**Prerequisites**

None

**Content**

The development infrastructure (e.g. transport, energy, telecommunications) has always been one of the most relevant factors for economic development and particularly influences the development of the regional economy. From the repertoire of state actions, investments into transport infrastructure are often regarded the most important measure to foster regional economic growth. Besides the direct effects of transport policy on passenger and freight transport, a variety of individual economic activities is significantly dependent on the available or potential transport options. Decisions on the planning, financing and realization of major infrastructure projects require a solid and far-reaching consideration of direct and indirect growth effects with the occurring costs.

Through its combination of lectures the module reflects the complex interdependencies between infrastructure policy, transport industry and regional policy and provides its participants with a comprehensive understanding of the functionalities of one of the most important sectors of the economy and its relevance for economic policy.

**Annotation**

The courses Assessment of Public Policies and Projects I (winter term) and Assessment of Public Policies and Projects II (summer term) will no longer be part of this module. Student who have already had exams in these courses can integrate these exams in this module.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Transportation Modelling and Traffic Management [M-BGU-101065]

Responsible: Prof. Dr.-Ing. Peter Vortisch

Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

Credits: 9
Recurrence: Each term
Duration: 2 semester
Language: German/English
Level: 4
Version: 3

Election block: Pflichtleistung (between 2 and 3 items as well as between 6 and 9 credits)

- T-BGU-101797 Methods and Models in Transportation Planning 3 CR Vortisch
- T-BGU-101798 Traffic Engineering 3 CR Vortisch
- T-BGU-101799 Traffic Management and Transport Telematics 3 CR Vortisch
- T-BGU-101800 Traffic Flow Simulation 3 CR Vortisch

Election block: Wahlpflicht (at most 1 item as well as between 0 and 3 credits)

- T-BGU-100010 Transportation Data Analysis 3 CR Kagerbauer
- T-BGU-106611 Freight Transport 3 CR Chlond
- T-BGU-106301 Long-Distance and Air Traffic 3 CR Chlond
- T-BGU-101005 Tendering, Planning and Financing in Public Transport 3 CR Vortisch
- T-BGU-100014 Seminar in Transportation 3 CR Chlond, Vortisch
- T-WIWI-103174 Seminar Mobility Services (Master) 3 CR Satzger, Stryja
- T-BGU-103425 Mobility Services and new Forms of Mobility 3 CR Kagerbauer
- T-BGU-103426 Strategic Transport Planning 3 CR Waßmuth
- T-BGU-106608 Information Management for Public Mobility Services 3 CR Vortisch

Competence Goal
See German version.

Prerequisites
None

Recommendation
None
5.100 Module: Virtual Engineering A [M-MACH-101283]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<td>Business Administration for Engineers and IT professionals</td>
<td>4 CR</td>
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<td>T-MACH-102185</td>
<td>CATIA CAD Training Course</td>
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<td>T-MACH-105312</td>
<td>CATIA Advanced</td>
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<td>T-MACH-108491</td>
<td>Digitalization of Products, Services &amp; Production</td>
<td>4 CR</td>
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<td>PLM-CAD Workshop</td>
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<td>PLM for Product Development in Mechatronics</td>
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<td>T-MACH-106740</td>
<td>Virtual Engineering Lab</td>
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<td>Virtual Training Factory 4.X</td>
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Election block: Virtual Engineering A (at least 5 credits)

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The students should:
- have basic knowledge about the industrial application of Information Technology in product development,
- have understanding about current and future application of information systems in product development processes in the context of Product Lifecycle Management and Virtual Engineering,
- be able to operate current CAx- and PLM-systems in the product development process
- understands demands and relevance of interconnected IT-systems and respective methods for product development

Prerequisites
None

Content
The Module Virtual Engineering A gives an overview about product development processes, beginning with requirement engineering, verification of manufacturing feasibility and virtual operation in the scope of Digital Factory. The guest-lectures contained in this module complete the content of the lecture with introducing current product development processes focusing.

Workload
- regular attendance: 140 hours
- Preparation and reworking: 20 hours
- Exam and exam revision/preparation: 110 hours

Learning type
Lecture, exercise
5.101 Module: Virtual Engineering B [M-MACH-101281]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering
Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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T-MACH-102124 Virtual Engineering II 4 CR Ovtcharova

Election block: Virtual Engineering B (at least 5 credits)

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T-MACH-109933 Business Administration for Engineers and IT professionals 4 CR Sebregondi
T-MACH-102185 CATIA CAD Training Course 2 CR Ovtcharova
T-MACH-105312 CATIA Advanced 4 CR Ovtcharova
T-MACH-108491 Digitalization of Products, Services & Production 4 CR Pätzold
T-MACH-102209 Information Engineering 3 CR Ovtcharova
T-MACH-106743 IoT Platform for Engineering 4 CR Ovtcharova
T-MACH-102181 PLM for Product Development in Mechatronics 4 CR Eigner
T-MACH-102153 PLM-CAD Workshop 4 CR Ovtcharova
T-MACH-106740 Virtual Engineering Lab 4 CR Ovtcharova
T-MACH-106741 Virtual Training Factory 4.X 4 CR Ovtcharova

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The students should:

- have basic knowledge about industrial practice of Information Technology in the field of product development,
- have basic knowledge about innovative visualization techniques like Virtual Reality and feasible application of Virtual Mock-Ups (VMU) for validating product properties.
- is able to estimate potentials and risks of current Virtual Reality Systems in product development.
- understands demands and relevance of interconnected IT-systems and respective methods for product development

Prerequisites
keine

Content
The module Virtual Engineering B communicates basics of Virtual Reality applications and their fields of application for validating product properties and for supporting product development processes.

Optional courses of this module complete the content with practical application of VR techniques in product development (Virtual Reality Exercise) and current product development processes.

Workload
Workload at 9 graduate credits / credit points: ca. 270 hours.

- regular attendance: 100 hours
- Preparation and reworking: 50 hours
- Exam and exam revision/preparation: 120 hours

Detailed apportionment results from credit points of the courses of the module
Learning type
Lecture, Exercise.
### M 5.102 Module: Water Chemistry and Water Technology I [M-CIWVT-101121]

**Responsible:** Prof. Dr. Harald Horn  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)  
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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<td>T-CIWVT-103351</td>
<td>Laboratory Work Water Chemistry</td>
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**Competence Goal**

The student

- has knowledge of types and sum of the water constituents and their interaction with each other and with the water molecules,
- knows and understands the basics of water chemistry and the most important methods for the treatment of different types of raw water.

**Prerequisites**

none

**Content**

This module gives the basis to understand the most important methods of raw water treatment. Therefore types and sum of water constituents and their interaction with each other and with water molecules are introduced. The effects of the different treatment and purification methods are shown.
5.103 Module: Water Chemistry and Water Technology II [M-CIWVT-101122]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: Compulsory Elective Modules 1 (Natur- und Ingenieurwissenschaften)
Compulsory Elective Modules 2 (Natur- und Ingenieurwissenschaften)

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Mandatory

| T-CIWVT-101901 | Water Chemistry and Water Technology II | 9 CR | Horn |

Competence Goal
The student
- has knowledge of types and sum of the water constituents and their interaction with each other and with the water molecules,
- knows and understands the basics of water chemistry and the most important methods for the treatment of different types of raw water.
- knows about the different types of water treatment and water purification methods to convert, reduce or concentrate water constituents.

Prerequisites
The Module "Water Chemistry and Water Technology I" must be passed.

Content
The effects of the different treatment and purification methods are shown and it is explained how they can convert, reduce or concentrate water constituents.
6 Courses

6.1 Course: A Closer Look at Social Innovation [T-WIWI-109932]

**Responsible:** Dr. Daniela Beyer  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

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**Exams**

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<td>Soziale Innovationen unter die Lupe genommen</td>
<td>Prüfung (PR)</td>
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**Competence Certificate**
Non exam assessment (following §4(2) 3 of the examination regulation). The grade consists of an innovation plan (comparable to an exposé) (15%), a guideline interview (25%), a presentation of the results (20%) and a seminar paper (40%).

**Prerequisites**
None

**Recommendation**
The previous attendance of the lecture Innovation Management is recommended.
6.2 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

**Responsible:** Jun.-Prof. Dr. Julian Thimme

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

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<td>WS 19/20 2530570</td>
<td>1</td>
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**Competence Certificate**

The success control takes place in form of a written examination (60 min) during the semester break (according to §4(2), 1 SPO). If the number of participants is low, an oral examination (according to §4 (2), 2 SPO) may also be offered. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Recommendation**

We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course. In addition, prior participation in the Asset Pricing Master course is strongly recommended.

**Annotation**

New course from winter semester 2019/2020.

*Below you will find excerpts from events related to this course:*

**Advanced Empirical Asset Pricing**

2530569, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Notes**

In this course we will discuss the fundamentals of Asset Pricing and how to test them. Although this is an Empirical Asset Pricing course, we deal with some concepts from Asset Pricing Theory that we can test afterwards (CAPM, ICAPM, CCAPM, recursive utility). Besides, the course will cover the most important empirical methods to do so. For that purpose, we will discuss the overarching tool Generalized Method of Moments, and the special cases of OLS and FMB regressions. Every second week, we will meet for a programming session, in which we will look at the data to draw our own conclusions. An introduction to the software MATLAB will be given at the beginning of the course. Students should bring a laptop to these sessions. Programming skills are not required but helpful.

We start with a review of the Stochastic Discount Factor, which is already known from the course „Asset Pricing“. We then derive the CAPM and the Consumption-CAPM as special cases from the general consumption-savings optimization problem of the rational investor. In the first part of the course we discuss the CAPM and, as natural extensions, models with multiple factors. Prominent phenomena such as the value premium and momentum are discussed. In the second part of the lecture we will study extensions of Consumption-CAPM and study the implications of exotic preferences.
### 6.3 Course: Advanced Game Theory [T-WIWI-102861]

**Responsible:**
- Prof. Dr. Karl-Martin Ehrhart
- Prof. Dr. Clemens Puppe
- Prof. Dr. Johannes Philipp Reiß

**Organisation:**
KIT Department of Economics and Management

**Part of:**
- M-WIWI-101453 - Applied Strategic Decisions
- M-WIWI-101500 - Microeconomic Theory
- M-WIWI-101502 - Economic Theory and its Application in Finance

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<td>Übung zu Advanced Game Theory</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
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**Exams**

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<tbody>
<tr>
<td>SS 2019</td>
<td>Advanced Game Theory</td>
<td>Puppe</td>
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**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
Basic knowledge of mathematics and statistics is assumed.

*Below you will find excerpts from events related to this course:*

**Advanced Game Theory**
2521533, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Learning Content**
This course offers an advanced and rigorous treatment of game theory.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
T 6.4 Course: Advanced Information Systems [T-WIWI-110373]

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101411 - Information Engineering

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<tr>
<td>WS 19/20</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
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Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation).

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-109918 - Foundations of Information Systems must not have been started.

Recommendation
None

Annotation
The course starts with a short summary of Information Systems I and II. The course is held in English.

Below you will find excerpts from events related to this course:

V Foundations of Information Systems
2540450, WS 19/20, 2 SWS, Language: German, Open in study portal

Description
Information plays a central role in today's society. The resulting structures and processes cannot be explained intuitively with traditional approaches of economic theory. Formerly, information has only been implicitly treated as a production factor; its role as a competitive factor used to be neglected. In order to deal with the central role of information we developed the concept of the 'information lifecycle' that systematizes all phases from information generation to information distribution. The state of the art of economic theory is presented across this information lifecycle within the lectures. The content of the lecture is deepened in accompanying lecture courses.

Learning Content
Information plays a central role in today's society. The resulting structures and processes cannot be explained intuitively with traditional approaches of economic theory. Formerly, information has only been implicitly treated as a production factor; its role as a competitive factor used to be neglected. In order to deal with the central role of information we developed the concept of the "information lifecycle" that systematizes all phases from information generation to information distribution. The single phases of that cycle,

- extraction/generation,
- storage,
- transformation,
- evaluation,
- marketing
- and usage of information

are analyzed from the business administration perspective and the microeconomic perspective. The state of the art of economic theory is presented across this information lifecycle within the lectures. The content of the lecture is deepened in accompanying lecture courses.
Workload
The total workload for this course is approximately 150 hours. For further information see German version.

Literature
### 6.5 Course: Advanced Lab Informatics (Master) [T-WIWI-110548]

**Responsible:** Professorenschaft des Fachbereichs Informatik

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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<td>WS 19/20</td>
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<td>Linked Data and the Semantic Web</td>
<td>Prüfung (PR)</td>
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<td>7900046</td>
<td>Sicherheit</td>
<td>Prüfung (PR)</td>
<td>Volkamer</td>
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<td>WS 19/20</td>
<td>7900047</td>
<td>Praktikum Betriebliche Informationssysteme: Realisierung innovativer Dienste für Studierende</td>
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<td>WS 19/20</td>
<td>7900102</td>
<td>Advanced Lab Information Service Engineering</td>
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<td>Sack</td>
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<td>WS 19/20</td>
<td>7900107</td>
<td>Advanced Lab Cognitive Automobile and Robots</td>
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<td>7900116</td>
<td>Advanced Lab Security, Usability and Society</td>
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<td>WS 19/20</td>
<td>7900187</td>
<td>Real-World Challenges in Data Science und Analytics</td>
<td>Prüfung (PR)</td>
<td>Sure-Vetter</td>
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</table>

**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**

None

**Annotation**

The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at https://portal.wiwi.kit.edu.
6.6 Course: Advanced Lab Security [T-WIWI-109786]

**Responsible:** Prof. Dr. Melanie Volkamer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

**Type:** Examination of another type

**Credits:** 4.5

**Recurrence:** Each winter term

**Version:** 2

### Events

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| WS 19/20 | 4 SWS   | Each winter term    | 2       |

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<td>Each winter term</td>
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</table>

**Competence Certificate**
The alternative exam assessment consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**
None

**Recommendation**
Knowledge from the lecture "Information Security" is recommended.

### Below you will find excerpts from events related to this course:

#### Security

2512100, WS 19/20, 4 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/goto_produttiv_crs_998421.html)

**Notes**
The lab deals with the IT security of everyday utensils. Implemented security mechanisms are first theoretically investigated and put to the test with practical attacks. Finally, countermeasures and suggestions for improvement are worked out. The lab is offered within the competence center for applied security technologies (KASTEL) and is supervised by several institutes.

The success control takes the form of a final presentation, a thesis and the handing over of the developed code.

More information on [https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html](https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html)
### 6.7 Course: Advanced Lab User Studies in Security [T-WIWI-109271]

**Responsible:** Prof. Dr. Melanie Volkamer  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101472 - Informatics  
- M-WIWI-101628 - Emphasis in Informatics  
- M-WIWI-101630 - Electives in Informatics  

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#### Exams

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<td>Advanced Lab User Studies in Security</td>
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<td>Volkamer</td>
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</table>

**Competence Certificate**  
The alternative exam assessment consists of:  
- a practical work  
- a presentation and possibly  
- a written seminar thesis  

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**  
None
### 6.8 Course: Advanced Machine Learning [T-WIWI-109921]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
Dr. Abdolreza Nazemi  

**Organisation:** KIT Department of Economics and Management  

**Part of:** M-WIWI-101470 - Data Science: Advanced CRM

#### Events

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<td>2540536</td>
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#### Exams

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<td>7900227</td>
<td>Advanced Machine Learning</td>
<td>Prüfung (PR)</td>
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</table>

#### Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

#### Prerequisites

None

Below you will find excerpts from events related to this course:

### Advanced Machine Learning

2540535, SS 2019, 2 SWS, Language: English, [Open in study portal](#)

#### Learning Content

**Tentative Course Outline:**

- Introduction
- Statistical Inference
- Shrinkage Methods
- Model Assessment and Selection
- Tree-based Machine Learning Algorithms
- Dimensionality Reduction
- Neural Networks and Deep Learning
- Natural Language Processing with Deep Learning
- Support Vector Machine

#### Workload

**Time of attendance**

- Attending the lecture: 13 x 90min = 19h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
Literature

**6.9 Course: Advanced Management Accounting [T-WIWI-102885]**

**Responsible:** Prof. Dr. Marcus Wouters

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101510 - Cross-Functional Management Accounting

<table>
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**Exam Details**

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<td>Advanced Management Accounting</td>
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**Competence Certificate**

The assessment consists of an oral exam (30 min) (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None.

**Recommendation**

The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

**Annotation**

This course is held in English. Lectures and tutorials are integrated. The course is compulsory and must be examined.

Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

**Below you will find excerpts from events related to this course:**

**Advanced Management Accounting**

2579907, WS 19/20, 4 SWS, Language: English, Open in study portal

**Notes**

see Module Handbook

This course is held in English. Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

**Learning Content**

The course addresses several topics where management accounting is strongly related to marketing, finance, or organization and strategy, such as customer value propositions, financial performance measures, managing new product development, and technology investment decisions.

**Annotation**

This course is held in English. Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Literature is mostly made available via ILIAS.
6.10 Course: Advanced Management Accounting 2 [T-WIWI-110179]

**Responsible:** Prof. Dr. Marcus Wouters

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101510 - Cross-Functional Management Accounting

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**Competence Certificate**
The assessment consists of an oral exam (30 min) (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None.

**Recommendation**
The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

**Annotation**
This course is held in English. Lectures and tutorials are integrated.

Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).
6.11 Course: Advanced Statistics [T-WIWI-103123]

**Responsible:** Prof. Dr. Oliver Grothe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101637 - Analytics and Statistics

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**Events**

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<tr>
<td>WS 19/20</td>
<td>2550552</td>
<td>Statistik für Fortgeschrittene</td>
<td>2 SWS</td>
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<td>WS 19/20</td>
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<td>Übung zu Statistik für Fortgeschrittene</td>
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**Exams**

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**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4). The exam is offered every semester. Re-examinations are offered only for repeaters.

**Prerequisites**

None

**Annotation**

New course starting winter term 2015/2016

*Below you will find excerpts from events related to this course:*

### Statistik für Fortgeschrittene

2550552, WS 19/20, 2 SWS, Open in study portal

**Lecture (V)**

**Learning Content**

Basic principles  
Types of convergence and limit theorems  
Multivariate Distributions  
Copulas  
Simulation techniques, Bootstrap  
Statistical Estimation  
Statistical Testing  
Simulation studies

**Literature**

Comprehensive lecture notes
6.12 Course: Advanced Stochastic Optimization [T-WIWI-106548]

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101473 - Mathematical Programming  
M-WIWI-103289 - Stochastic Optimization

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**Competence Certificate**  
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

**Prerequisites**  
None.
6.13 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101406 - Network Economics
- M-WIWI-101497 - Agglomeration and Innovation
- M-WIWI-101500 - Microeconomic Theory
- M-WIWI-101502 - Economic Theory and its Application in Finance

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<td>SS 2019 2520528 Übung zu Advanced Topics in Economic Theory 1 SWS Practice (Ü) Pegorari</td>
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**Exams**

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<td>SS 2019 7900291 Advanced Topics in Economic Theory Prüfung (PR) Mitusch, Scheffel</td>
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**Competence Certificate**
The course T-WIWI-102609 "Advanced Topics in Economic Theory" restarts in summer term 2019.
The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

**Prerequisites**
None

**Recommendation**
This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

Below you will find excerpts from events related to this course:

**Advanced Topics in Economic Theory**

2520527, SS 2019, 2 SWS, Language: English, Open in study portal

**Learning Content**
The course deals with basic elements of modern economic theory. It is divided into two parts. The first part introduces the microeconomic foundations of general equilibrium à la Debreu ("The Theory of Value", 1959) and Hildenbrand/Kirman ("Equilibrium Analysis", 1988). The second part deals with asymmetric information and introduces the basic techniques of contract theory.
The course is largely based on the textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A. Mas-Colell, M.D. Whinston, and J.R. Green.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**
The course is based on the excellent textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A. Mas-Colell, M.D. Whinston, and J.R. Green.
### 6.14 Course: Airport Logistics [T-MACH-105175]

<table>
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<tr>
<th>Responsible</th>
<th>Dr.-Ing. André Richter</th>
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<tbody>
<tr>
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<td>KIT Department of Mechanical Engineering</td>
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| Part of              | M-MACH-101263 - Introduction to Logistics  
M-MACH-101278 - Material Flow in Networked Logistic Systems  
M-MACH-101280 - Logistics in Value Chain Networks  
M-MACH-104888 - Advanced Module Logistics |

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<th>Airport logistics</th>
<th>2 SWS</th>
<th>Lecture (V)</th>
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</table>

**Competence Certificate**
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**
none

*Below you will find excerpts from events related to this course:

#### Airport logistics
2117056, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)  
**Lecture (V)**

**Description**
**Media:**
presentations
Notes
Media
Presentations

Learning content
- Introduction
- Airport installations
- Luggage transport
- Passenger transport
- Security on the airport
- Legal bases of the air traffic
- Freight on the airport

Learning goals
The students are able to:
- Describe material handling and informations technology activities on airports,
- Evaluate processes and systems on airports as the law stands, and
- Choose appropriate processes and material handling systems for airports.

Recommendations
None

Workload
Regular attendance: 21 hours
Self-study: 99 hours

Note
Limited number of participants: allocation of places in sequence of registration (first come first served). Registration via "ILIAS" mandatory.
Personal presence during lectures mandatory.

Learning Content
Introduction
airport installations
luggage transport
passenger transport
security on the airport
legal bases of the air traffic
freight on the airport

Annotation
Limited number of participants: allocation of places in sequence of application (first come first served)
Application via "ILIAS" mandatory
Personal presence during lectures mandatory

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
6.15 Course: Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines [T-MACH-105173]

**Responsible:** Dr.-Ing. Marcus Gohl  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101303 - Combustion Engines II

<table>
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**Competence Certificate**
Letter of attendance or oral exam (25 minutes, no auxiliary means)

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**V Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines**

2134150, SS 2019, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**
Lecture with Powerpoint slides

**Learning Content**
The students get involved in the application of different measurement techniques in the field of exhaust gas and lubricating oil analysis. The functional principles of the systems as well as the application areas of the latter are discussed. In addition to a general overview of standard applications, current specific development and research activities are introduced.

**Workload**
regular attendance: 24 hrs  
self study: 96 hrs

**Literature**
The lecture documents are distributed during the courses.
6.16 Course: Analysis Tools for Combustion Diagnostics [T-MACH-105167]

**Responsible:** Jürgen Pfeil  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101303 - Combustion Engines II

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**Exams**  
WS 19/20 76-T-MACH-105167 Analysis Tools for Combustion Diagnostics Prüfung (PR) Koch

**Competence Certificate**  
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Analysis tools for combustion diagnostics**  
2134134, SS 2019, 2 SWS, Language: German, Open in study portal

**Learning Content**  
- energy balance at the engine  
- energy conversion in the combustion chamber  
- thermodynamics of the combustion process  
- flow velocities  
- flame propagation  
- special measurement techniques

**Workload**  
regular attendance: 24 hours  
self-study: 96 hours

**Literature**  
Lecture notes available in the lectures

**Responsible:** Dr. Daniela Beyer

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101507 - Innovation Management

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</table>

**Competence Certificate**

Non exam assessment (following §4(2) 3 of the examination regulation).

Innovation plan (exposé) (20%), Guided interviews/ quantitative survey (20%), presentation of results (20%), seminar paper (about 5 pages per person) (40%).

**Prerequisites**

None

**Recommendation**

Prior attendance of the course Innovation Management is recommended.
6.18 Course: Application of Social Science Methods (WiWi) [T-GEISTSOZ-109052]

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** M-GEISTSOZ-101169 - Sociology

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**Events**

| SS 2019 | 5011006 | Methodenanwendung/ Projektseminar: Von Chatbots und Robojournalisten: Natural Language Processing mit Deep Learning | 2 SWS | Seminar (S) | Nollmann |

**Exams**

| SS 2019 | 7400368 | Application of Social Science Methods | Prüfung (PR) | Nollmann |
| SS 2019 | 7400453 | Application of Social Science Methods (WiWi) | Prüfung (PR) | Nollmann |
### 6.19 Course: Applied Econometrics [T-WIWI-103125]

**Responsible:** Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101638 - Econometrics and Statistics I

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**Competence Certificate**  
The assessment of this course is a written examination (90 min) according to §4(2), 1 of the examination regulation.

**Prerequisites**  
None

**Annotation**  
The course is not offered regularly.

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of:
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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<th>Applied Informatics II - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services</th>
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<td>SS 2019</td>
<td>2511033</td>
<td>Übungen zu Angewandte Informatik II – Internet Computing</td>
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<td>Practice (Ü)</td>
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Exams
- WS 19/20
  - 7900004
  - Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services
  - Prüfung (PR)
  - Sunyaev

Competence Certificate
The assessment consists of a written exam (120 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is recommended for the written exam, which is offered at the end of the winter semester and at the end of the summer semester.

By successful processing the exercises a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Annotation
Replaces from winter semester 2019/2020 T-WIWI-109445 "Applied Informatics - Internet Computing".

Below you will find excerpts from events related to this course:

**Applied Informatics II - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services**
- Lecture (V)
- 2511032, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

Learning Content
The lecture Applied Computer Science II provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g. design of architectures for distributed systems, internet architectures, web services, middleware).

In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others:
- Cloud Computing
- Edge & Fog Computing
- Internet of Things
- Blockchain
- Artificial Intelligence
Workload
The total workload for this course is approximately 150 hours. For further information see German version.

Literature
Tba in the lecture.
6.21 Course: Artificial Intelligence in Service Systems [T-WIWI-108715]

**Responsible:** Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101448 - Service Management
- M-WIWI-101506 - Service Analytics

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each winter term

**Version**
- 1

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</table>

**Competence Certificate**
The assessment consists of a written exam (60 min). Successful completion of the exercises is a prerequisite for admission to the written exam.

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Artificial Intelligence in Service Systems**
2595650, WS 19/20, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

**Learning Content**
Artificial Intelligence and the application of machine learning is becoming more and more popular to solve relevant business challenges. However, it is not only important to be familiar with precise algorithms, but rather a general understanding of the necessary steps with a holistic view—from real-world challenge to successful deployment of an AI. As part of this course, we teach the complete lifecycle of an AI project with a focus on supervised machine learning challenges. We do so by also teaching the use of Python and the required packages like scikit-learn and tensorflow with exemplary data. We then take this knowledge to the more complex case of service systems with different entities (e.g. companies) who interact with each other and show possibilities on how to derive holistic insights. Two possibilities to do so are the use of meta and transfer machine learning, where we teach insights in their theory, design and application.
6.22 Course: Asset Pricing [T-WIWI-102647]

**Responsible:** Prof. Dr. Martin Ruckes  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101480 - Finance 3  
M-WIWI-101482 - Finance 1  
M-WIWI-101483 - Finance 2  
M-WIWI-101502 - Economic Theory and its Application in Finance

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<td>Uhrig-Homburg</td>
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**Competence Certificate**

The success control takes place in form of a written examination (75 min) during the semester break (according to §4(2), 1 SPO). The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

Below you will find excerpts from events related to this course:

**Asset Pricing**

<table>
<thead>
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<th>Credits</th>
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**Description**

The lecture deals with the diverse issues arising in the context of measuring and controlling credit risk. At first, the theoretical and empirical relations between ratings, probabilities of default, and credit spreads are analysed. After that, the focus is on the valuation of credit risk. Finally, the management of credit risk, e.g. using credit derivatives and credit portfolio analysis, is examined, and the legal framework and its implications are discussed.

**Learning Content**

This lecture deals with the valuation of risky cash flows. A stochastic discount model and a central equation will be introduced, which form the basis of nearly every valuation model in finance. That includes the valuation of stocks, bonds and derivatives. The first part of the lecture will present the theory, the second part covers empirical questions related to this approach.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature

Basic literature


Elective literature

6.23 Course: Auction Theory [T-WIWI-102613]

Responsible: Prof. Dr. Karl-Martin Ehrhart
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101500 - Microeconomic Theory

<table>
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Exams

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Competence Certificate
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Prerequisites
None

Below you will find excerpts from events related to this course:

Auktionstheorie
2520408, WS 19/20, 2 SWS, Open in study portal

Learning Content
This course deals with the analysis and modeling of auctions which are based on game theory. This also includes aspects of applying and designing auctions as well as experiences with auctions. Main topics are:

- Single- and multi-unit auctions
- Selling and procurement auctions
- Electronic auctions (e.g. eBay, C2C, B2B)
- Multi-attributive auctions.

Annotation
We suggest to attend either Game Theory I or Decision Theory beforehand.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

- Ehrhart, K.-M. und S. Seifert: Auktionstheorie, Skript zur Vorlesung, KIT, 2011
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999
6.24 Course: Automated Manufacturing Systems [T-MACH-102162]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101298 - Automated Manufacturing Systems

Events

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Exams

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Competence Certificate
written exam (120 minutes)

Prerequisites
"T-MACH-108844 - Automatisierte Produktionsanlagen" must not be commenced.

Below you will find excerpts from events related to this course:

Automated Manufacturing Systems
2150904, SS 2019, 6 SWS, Language: German,
Lecture / Practice (VÜ)

Description
Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
The lecture provides an overview of the structure and functioning of automated manufacturing systems. In the introduction chapter the basic elements for the realization of automated manufacturing systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- Quality assurance in automated manufacturing
- automatic machines, cells, centers and systems for manufacturing and assembly
- structures of multi-machine systems
- planning of automated manufacturing systems

An interdisciplinary view of these subareas enables Industry 4.0 solutions.
In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components (chassis and drive technology). The analysis of automated manufacturing systems for manufacturing of defined components is also included.
In the field of vehicle power train both, the automated manufacturing process for the production of the conventional internal-combustion engine and the automated manufacturing process for the production of the prospective electric power train (electric motor and battery) are considered. In the field of car body, the focus is on the analysis of the process chain for the automated manufacturing of conventional sheet metal body parts, as well as for automated manufacturing of body components made out of fiber-reinforced plastics.
Within tutorials, the contents from the lecture are advanced and applied to specific problems and tasks.

Learning Outcomes:
The students ...

- are able to analyze implemented automated manufacturing systems and describe their components.
- are capable to assess the implemented examples of implemented automated manufacturing systems and apply them to new problems.
- are able to name automation tasks in manufacturing plants and name the components which are necessary for the implementation of each automation task.
- are capable with respect to a given task to plan the configuration of an automated manufacturing system and to determine the necessary components to its realization.
- are able to design and select components for a given use case of the categories: “Handling Technology”, “Industrial Robotics”, “Sensory” and “Controls”.
- are capable to compare different concepts for multi-machine systems and select a suitable concept for a given use case.

Workload:
MACH:
regular attendance: 63 hours
self-study: 177 hours

WING:
regular attendance: 63 hours
self-study: 207 hours
Learning Content
The lecture provides an overview of the structure and functioning of automated manufacturing systems. In the introduction chapter the basic elements for the realization of automated manufacturing systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- Quality assurance in automated manufacturing
- Automatic machines, cells, centers and systems for manufacturing and assembly
- Structures of multi-machine systems
- Planning of automated manufacturing systems

An interdisciplinary view of these subareas enables Industry 4.0 solutions.

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components (chassis and drive technology). The analysis of automated manufacturing systems for manufacturing of defined components is also included.

In the field of vehicle power train both, the automated manufacturing process for the production of the conventional internal-combustion engine and the automated manufacturing process for the production of the prospective electric power train (electric motor and battery) are considered. In the field of car body, the focus is on the analysis of the process chain for the automated manufacturing of conventional sheet metal body parts, as well as for automated manufacturing of body components made out of fiber-reinforced plastics.

Within tutorials, the contents from the lecture are advanced and applied to specific problems and tasks.

Annotation
None

Workload
MACH:
regular attendance: 63 hours
self-study: 177 hours

WING/TVWL:
regular attendance: 63 hours
self-study: 207 hours

Literature
Lecture Notes
### 6.25 Course: Automation of Discrete Event and Hybrid Systems [T-ETIT-100981]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101157 - Control Engineering II

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**Prerequisites**

none
6.26 Course: Automotive Logistics [T-MACH-105165]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101263 - Introduction to Logistics
- M-MACH-101280 - Logistics in Value Chain Networks
- M-MACH-101282 - Global Production and Logistics

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**Competence Certificate**
The assessment consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Automotive Logistics**

**Description**

**Media:**
presentations, black board

**Notes**
The event will be offered for the last time in the summer semester 2019.

**Learning Content**

- Logistic questions within the automobile industry
- basic model of automobile production and distribution
- relation with the suppliers
- Disposition and physical execution
- Vehicle production in the interaction of shell, paint shop and assembly
- Sequence planning
- Assembly supply
- vehicle distribution and linkage with selling processes
- Physical execution, planning and control

**Annotation**
none

**Workload**
regular attendance: 21 hours
self-study: 99 hours

**Literature**
None.
### 6.27 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]

**Responsible:** Gerd Gutekunst  
Prof. Dr. Berthold Wigger  

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101511 - Advanced Topics in Public Finance

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### Exams

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### Competence Certificate

The assessment consists of a written exam (90 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

### Prerequisites

None

### Recommendation

Knowledge of the collection of public revenues is assumed. Therefore, it is recommended to attend the course “Öffentliche Einnahmen” beforehand.
Course: Basics of Technical Logistics I [T-MACH-109919]

Responsibility: Dr.-Ing. Martin Mittwollen
Jan Oellerich

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101279 - Technical Logistics

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Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
none

Below you will find excerpts from events related to this course:

Basics of Technical Logistics
2117095, WS 19/20, 3 SWS, Language: German, Open in study portal

Description
Media:
supplementary sheets, presentations, blackboard

Learning Content
- effect model of conveyor machines
- elements for the change of position and orientation
- conveyor processes
- identification systems
- drives
- mechanical behaviour of conveyors
- structure and function of conveyor machines
- elements of intralogistics
- sample applications and calculations in addition to the lectures inside practical lectures

Annotation
Basics knowledge of technical mechanics is preconditioned

Workload
presence: 48h
rework: 132h

Literature
Recommendations during lessons
6.29 Course: Basics of Technical Logistics II [T-MACH-109920]

**Organisation:**  KIT Department of Mechanical Engineering

**Part of:**  M-MACH-101279 - Technical Logistics

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
none
Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I [T-MACH-100966]

- **Responsible:** Prof. Dr. Andreas Guber
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101290 - BioMEMS

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**Exams**

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**Competence Certificate**

Written exam (75 Min.)

**Prerequisites**

None

**Below you will find excerpts from events related to this course:**

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I**

2141864, WS 19/20, 2 SWS, Language: German, [Open in study portal]

**Description**

- **Media:**
  - Lecture script

**Learning Content**

- Introduction into various microtechnical manufacturing methods: LIGA, Micro milling, Silicon Micromachining, Laser Microstructuring, µEDM, Metal-Etching
- Biomaterials, Sterilisation.
- Examples of use in the life science sector: basic micro fluidic structures: micro channels, micro filters, micromixers, micropumps, microvalves, Micro and nanotiter plates, Microanalysis systems (µTAS), Lab-on-chip applications.

**Annotation**

The exam is held during the semester break. The date will be announced at the beginning of the semester.

**Workload**

- Literature: 20 h
- Lessons: 21 h
- Preparation and Review: 50 h
- Exam preparation: 30 h

**Literature**

- Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005
- M. Madou
  - Fundamentals of Microfabrication
  - Taylor & Francis Ltd.; Auflage: 3. Auflage, 2011
6.31 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II [T-MACH-100967]

**Responsible:** Prof. Dr. Andreas Guber

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101290 - BioMEMS
- M-MACH-101293 - Microsystem Technology

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**Competence Certificate**

Written exam (75 Min.)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II**

2142883, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**

Lecture script

**Learning Content**

Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
LabCD, Protein Cristallisation
Microarrys
Tissue Engineering
Cell Chip Systems
Drug Delivery Systems
Micro reaction technology
Microfluidic Cells for FTIR-Spectroscopy
Microsystem Technology for Anesthesia, Intensive Care and Infusion
Analysis Systems of Person’s Breath
Neurobionics and Neuroprosthesis
Nano Surgery

**Workload**

Literature: 20 h
Lessions: 21 h
Preparation and Review: 50 h
Exam preparation: 30 h
Literature
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005

Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II; Springer-Verlag, 1994

M. Madou
Fundamentals of Microfabrication
### Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]

**Responsible:** Prof. Dr. Andreas Guber  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- M-MACH-101290 - BioMEMS  
- M-MACH-101293 - Microsystem Technology

#### Events

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**Competence Certificate**  
Written exam (75 Min.)

**Prerequisites**  
none

Below you will find excerpts from events related to this course:

---

#### BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III  
2142879, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**  
Lecture script

**Learning Content**

- Examples of use in minimally invasive therapy  
- Minimally invasive surgery (MIS)  
- Endoscopic neurosurgery  
- Interventional cardiology  
- NOTES  
- OP-robots and Endosystems  
- License of Medical Products and Quality Management

**Workload**

- Literature: 20 h  
- Lessons: 21 h  
- Preparation and Review: 50 h  
- Exam preparation: 30 h

**Literature**

- Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005  
- Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II; Springer-Verlag, 1994  
- M. Madou  
- Fundamentals of Microfabrication
6.33 Course: Bionics for Engineers and Natural Scientists [T-MACH-102172]

**Responsible:** PD Dr. Hendrik Hölscher

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101290 - BioMEMS
- M-MACH-101293 - Microsystem Technology
- M-MACH-101294 - Nanotechnology

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**Competition Certificate**
written or oral exam

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Bionics for Engineers and Natural Scientists**

**Description**

**Media:**

- Slides of the lectures

**Notes**

Bionics focuses on the design of technical products following the example of nature. For this purpose we have to learn from nature and to understand its basic design rules. Therefore, the lecture focuses on the analysis of the fascinating effects used by many plants and animals. Possible implementations into technical products are discussed in the end.

The students should be able analyze, judge, plan and develop biomimetic strategies and products.

Basic knowledge in physics and chemistry

lectures 30 h

self study 30 h

preparation for examination 30 h

The successfull attendance of the lecture is controlled by a written examination.

**Learning Content**

Bionics focuses on the design of technical products following the example of nature. For this purpose we have to learn from nature and to understand its basic design rules. Therefore, the lecture focuses on the analysis of the fascinating effects used by many plants and animals. Possible implementations into technical products are discussed in the end.

**Workload**

- lectures 30 h
- self study 30 h
- preparation for examination 30 h
Literature
6.34 Course: Blockchains & Cryptofinance [T-WIWI-108880]

**Responsible:** Dr. Philipp Schuster  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101409 - Electronic Markets  
M-WIWI-101446 - Market Engineering  
M-WIWI-101480 - Finance 3  
M-WIWI-101483 - Finance 2  
M-WIWI-101511 - Advanced Topics in Public Finance

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**Competence Certificate**

The assessment consists of a written exam (75 min) (§4(2), 1 of the examination regulations). A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

None

**Annotation**


Below you will find excerpts from events related to this course:

**Blockchains & Cryptofinance**

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**Workload**

Gesamtaufwand bei 4,5 Leistungspunkten: ca. 135,0 Stunden
Preisenzzeit: 30 Stunden
Vor- und Nachbereitung der LV: 45,0 Stunden
Prüfung und Prüfungsvorbereitung: 60,0 Stunden
6.35 Course: Building Laws [T-BGU-103429]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
M-BGU-101884 - Lean Management in Construction  
M-BGU-101888 - Project Management in Construction

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**Events**

| SS 2019 | 6241803 | Baurecht | 2 SWS | Lecture (V) | Miernik, Kohlhammer |

**Exams**

| SS 2019 | 8240103429 | Building Laws | Prüfung (PR) | Haghsheno |

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
6.36 Course: Business Administration for Engineers and IT professionals [T-MACH-109933]

**Responsible:** Peter Sebregondi  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101281 - Virtual Engineering B  
- M-MACH-101283 - Virtual Engineering A

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**Events**

| SS 2019 | 2122303 | Business Administration for Engineers and IT professionals | 2 SWS | Seminar (S) | Sebregondi |
| WS 19/20 | 2122303 | Business Administration for Engineers and IT professionals | 2 SWS | Seminar (S) | Sebregondi |

**Exams**

| SS 2019 | 76-T-MACH-109933 | Business Administration for Engineers and IT professionals | Prüfung (PR) | Sebregondi |

**Competence Certificate**

Assessment of another type. Two presentations and six written compositions in team work. Grading: each composition 1/8 and each presentation 1/8.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Business Administration for Engineers and IT professionals**  
2122303, SS 2019, 2 SWS, Open in study portal

**Notes**

Number of participants limited to 30 people.

**Business Administration for Engineers and IT professionals**  
2122303, WS 19/20, 2 SWS, Language: German, Open in study portal

**Notes**

Number of participants limited to 30 people.
6.37 Course: Business Administration in Information Engineering and Management [T-WIWI-102886]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101409 - Electronic Markets

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<td>Business Administration in Information Engineering and Management</td>
<td>Prüfung (PR) Geyer-Schulz</td>
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Competence Certificate
The lecture is no longer offered.

Prerequisites
None

Recommendation
Basic knowledge from Operations Research (linear programming) and from decision theory are expected.

Below you will find excerpts from events related to this course:

V Business Administration in Information Engineering and Management
2540500, SS 2019, 2 SWS, Language: German, Open in study portal

Learning Content
In this lecture, classical Business Administration is applied to businesses in an information- and communication-technological environment. The process to extract relevant data for decision making from operational accounting systems receives special attention. In order to do so, topics such as activity-based costing and transaction costs models are addressed. The automation of the decision making process in businesses by data bases is another focus of the module. To solve such issues within a company, relevant methods such as decision theory and game theory are lectured. Finally, complex business relevant questions in a dynamically changing environment are addressed by presenting models and methods from system dynamics.

Workload
The total workload for this course is approximately 150 hours (5 credits):

Time of attendance
- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study
- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 40h 00m
- Preparation of the examination: 31h 00m

Sum: 150h 00m
Literature

6.38 Course: Business Data Analytics: Application and Tools [T-WIWI-109863]

**Responsibility:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-103117 - Data Science: Data-Driven Information Systems

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<td>Weinhardt, Dann, Staudt</td>
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<td>SS 2019 2540467</td>
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<td>Practice (Ü)</td>
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**Exams**

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<td>SS 2019 7900183</td>
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<td>Business Data Analytics: Application and Tools</td>
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<td>SS 2019 7900189</td>
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<td>Business Data Analytics: Application and Tools</td>
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**Competence Certificate**
The assessment is carried out by a written examination (60 minutes) and a written elaboration. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
Knowledge of object-oriented programming and statistics is helpful.

**Annotation**
Course name until winter semester 2018/2019 "Applied Analytics with Open Source Tools" (T-WIWI-108438)

**Below you will find excerpts from events related to this course:**

**Business Data Analytics: Application and Tools**

2540466, SS 2019, 2 SWS, Language: German, Open in study portal

**Description**
The ongoing digitalization and digitization of businesses, industries and societies is generating vast amounts of data. Hence, researchers and businesses are facing increasing pressure to build capabilities to cope with the data and generate value from the contained but yet to be discovered knowledge, insights and information. Researchers and practitioners tackling this task are referred to as data scientists and need skills at the intersection of programming, statistics and development operations. This course provides a hands-on perspective on these fields.

**Learning Content**
The aim of this course is to introduce practical foundations, concepts, tools and current practice of Analytics from a data scientist’s perspective. The lecture is complemented with an Analytics challenge that is based on real-world data from research projects. The students immediately apply their newly acquired knowledge and learn to use a range of open source tools to solve the challenge.

**Content:**
- Conceptual and theoretical Foundations
- Programming languages common in data science
- Data acquisition, pre-processing
- Basics of data organization and DevOps
- Tool chain selection and automation
- Open source analytics frameworks and data processing infrastructures
- Applied analytics challenge (based on a current research project or a cooperation with an industry partner)
Workload
The total workload for this course is approximately 135 hours.
6.39 Course: Business Data Strategy [T-WIWI-106187]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-103117 - Data Science: Data-Driven Information Systems

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation and an alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. The grade is determined by 2/3 through the written exam and by 1/3 through the alternative exam assessment (e.g., presentation).

**Prerequisites**
None

**Recommendation**
Students should be familiar with basic concepts of business organisations, information systems, and programming. However, all material will be introduced, so no formal pre-conditions are applied.

**Annotation**
Limited number of participants.

Below you will find excerpts from events related to this course:

**Business Data Strategy**
2540484, WS 19/20, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

**Notes**
With new methods for capturing and using different types of data and industry’s recognition that society’s use of data is less than optimal, the need for comprehensive strategies is more important than ever before. Advances in cybersecurity and information sharing and the use of data in its raw form for decision making all add to the complexity of integrated processes, ownership, stewardship, and sharing. The life cycle of data in its entirety spans the infrastructure, system design, development, integration, and implementation of information-enabling solutions. This lecture focuses on teaching about these dynamics and tools to comprehend and manage them in organisation contexts. Given the increasing size and complexity of data, methods for the transformation and structured preparation are an important tool in the process of sense-making. Modern software solutions and programming languages provide frameworks for such tasks that form another part of this course ranging from conceptual systems modelling to data manipulation to automated generation of HTML reports and web-applications.

**Learning Content**
With new methods for capturing and using different types of data and industry’s recognition that society’s use of data is less than optimal, the need for comprehensive strategies is more important than ever before. Advances in cybersecurity and information sharing and the use of data in its raw form for decision making all add to the complexity of integrated processes, ownership, stewardship, and sharing. The life cycle of data in its entirety spans the infrastructure, system design, development, integration, and implementation of information-enabling solutions. This lecture focuses on teaching about these dynamics and tools to comprehend and manage them in organisation contexts. Given the increasing size and complexity of data, methods for the transformation and structured preparation are an important tool in the process of sense-making. Modern software solutions and programming languages provide frameworks for such tasks that form another part of this course ranging from conceptual systems modelling to data manipulation to automated generation of HTML reports and web-applications.
Literature

- Fleckenstein & Fellows (2017) – Modern Data Strategy
- Leimeister (2015) – Einführung in die Wirtschaftsinformatik
- Urbach & Ahlemann (2016) – IT-Management im Zeitalter der Digitalisierung
6.40 Course: Business Dynamics [T-WIWI-102762]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101409 - Electronic Markets  
M-WIWI-101470 - Data Science: Advanced CRM

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**Exams**

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<td>Business Dynamics</td>
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**Competence Certificate**

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Business Dynamics**

2540531, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**

Corporate growth, the diffusion of new technologies, business processes, project management, product development, service quality management – all these are examples for application areas of business dynamics. They all are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics such systems can be modelled. Simulations of complex systems allow the analysis, the goal centered design, as well as the optimization of markets, business processes, policies, and organizations.

**Annotation**

The course is generally held as block course.
Workload
The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance
- Attending the lecture: $15 \times 90 \text{min} = 22\text{h} 30\text{m}$
- Attending the exercise classes: $7 \times 90 \text{min} = 10\text{h} 30\text{m}$
- Examination: $1\text{h} 00\text{m}$

Self-study
- Preparation and wrap-up of the lecture: $15 \times 180 \text{min} = 45\text{h} 00\text{m}$
- Preparing the exercises: $25\text{h} 00\text{m}$
- Preparation of the examination: $31\text{h} 00\text{m}$

Sum: $135\text{h} 00\text{m}$

Literature
6.41 Course: Business Intelligence Systems [T-WIWI-105777]

**Responsible:** Prof. Dr. Alexander Mädche
Mario Nadj
Peyman Toreini

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101506 - Service Analytics
- M-WIWI-101510 - Cross-Functional Management Accounting
- M-WIWI-103117 - Data Science: Data-Driven Information Systems
- M-WIWI-104068 - Information Systems in Organizations

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**Competence Certificate**
Assessment consists of a written exam of 1 hour length and by submitting written papers as part of the exercise. Details will be announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
Basic knowledge on database systems is helpful.

*Below you will find excerpts from events related to this course:*

**Business Intelligence Systems**

**Description**
In most modern enterprises, Business Intelligence Systems represent a core enabler of managerial decision making in that they are supplying up-to-date and accurate information about all relevant aspects of a company’s planning and operations: from stock levels to sales volumes, from process cycle times to key indicators of corporate performance.

The aim of this course is to introduce theoretical foundations, concepts, tools, and current practice of Business Intelligence Systems from a managerial and technical perspective. The lecture is complemented with a Business Intelligence System challenge, where students work with real-world data and enable system-based decision making using commercial Business Intelligence software packages.

**Learning Content**
- Conceptual Foundations
- Provisioning: ETL Process, Metadata, Data Warehouse & Data Marts and Big Data Technologies
- Consumption: Reporting, Dashboards and its relation to (Big Data) Analytics
- BI Strategy & Governance
- BI Implementation & Post-Implementation Management
- Business Intelligence System Challenge (in cooperation with industry partner)
Literature
Economist Intelligence Unit. 2015 "Big data evolution: Forging new corporate capabilities for the long term"
### Course: Business Models in the Internet: Planning and Implementation [T-WIWI-102639]

**Responsible:** Prof. Dr. Christof Weinhardt  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101488 - Entrepreneurship (EnTechnon)  
- M-WIWI-102806 - Service Innovation, Design & Engineering

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#### Competence Certificate
Success is monitored through ongoing elaborations and presentations of tasks and a written exam (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

Successful participation in the exercises is a prerequisite for admission to the written examination.

#### Prerequisites
None

#### Recommendation
None

Below you will find excerpts from events related to this course:

### Internet Business Models
2540456, SS 2019, 2 SWS, Language: German, Open in study portal

#### Description
The emergence of internet economy has resulted in an accelerated evolution of commerce models in eBusiness. Early adopters have experimented with a variety of new business models, technologies and application designs. At the same time, there has been a growing demand for new standards to facilitate the exchange of information, catalogue content and transactions between buyers and sellers. But the true understanding of how to bring buyers and sellers together is still widely missing, leading to multiple cases of costly missed investments. This course focuses on the design and implementation of successful business models for eBusiness applications for the World Wide Web (WWW), imparting the basic knowledge for building successful eBusiness applications. We consider not only technical foundations of eBusiness applications but also economical aspects. In small groups, students develop and implement an eBusiness model that is eventually discussed with a representative from the venture capitalist industry.

#### Learning Content
The emergence of internet economy has resulted in an accelerated evolution of commerce models in eBusiness. Early adopters have experimented with a variety of new business models, technologies and application designs. At the same time, there has been a growing demand for new standards to facilitate the exchange of information, catalogue content and transactions between buyers and sellers. But the true understanding of how to bring buyers and sellers together is still widely missing, leading to multiple cases of costly missed investments. This course focuses on the design and implementation of successful business models for eBusiness applications for the World Wide Web (WWW), imparting the basic knowledge for building successful eBusiness applications. We consider not only technical foundations of eBusiness applications but also economical aspects. In small groups, students develop and implement an eBusiness model that is eventually discussed with a representative from the venture capitalist industry.
Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
Will be announced within the course.
6.43 Course: Business Planning [T-WIWI-102865]

**Responsible:** Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101488 - Entrepreneurship (EnTechnon)

**Type**
Examination of another type

**Credits**
3

**Recurrence**
Each term

**Version**
1

### Events

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### Exams

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**Competence Certificate**
Alternative exam assessment.

**Prerequisites**
None

**Recommendation**
None

Below you will find excerpts from events related to this course:

**Geschäftsplanung für Gründer (Track 1)**
2545005, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Description**
This seminar introduces basic concepts of business planning for entrepreneurs to the participants. It focuses on practical concepts and hands-on-methods on how to turn business ideas into solid businesses (e.g. Business Modelling, Market Potential, Planning of Ressources, and further more) and on the creation of a realistic and viable Business Plan (with or without Venture Capital).

**Annotation**
Please register on the seminar website.

WARNING: creditability in Seminar Module

The EnTechnon seminars are NOT accepted in the seminar module! The credit is only possible in MODULE ENTREPRENEURSHIP. OneException is the seminar “Entrepreneurship Research”.

**Business Planning for Founders (EUCOR Edition)**
2545020, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Description**
This seminar introduces basic concepts of business planning for entrepreneurs to the participants. It focuses on practical concepts and hands-on-methods on how to turn business ideas into solid businesses (e.g. Business Modelling, Market Potential, Planning of Ressources, and further more) and on the creation of a realistic and viable Business Plan (with or without Venture Capital).

**Annotation**
Please register on the seminar website.
6.44 Course: Business Planning for Founders - EUCOR [T-WIWI-110389]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101487 - Sales Management
M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101488 - Entrepreneurship (EnTechnon)

<table>
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<th>Recurrence</th>
<th>Version</th>
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**Type**: Examination of another type

**Credits**: 3

**Recurrence**: Irregular

**Version**: 1

Competence Certificate
Alternative exam assessment.

**Prerequisites**
The course can only be combined with the course "International Selling - EUCOR" to be completed. The course is a combination of 6 ECTS, 3 ECTS per part. The combination can be credited either in the Entrepreneurship module or in the Sales Management module.

*Below you will find excerpts from events related to this course:*

Business Planning for Founders (EUCOR Edition)
2545020, WS 19/20, 2 SWS, Language: English, Open in study portal

**Description**
This seminar introduces basic concepts of business planning for entrepreneurs to the participants. It focuses on practical concepts and hands-on-methods on how to turn business ideas into solid businesses (e.g. Business Modelling, Market Potential, Planning of Resources, and further more) and on the creation of a realistic and viable Business Plan (with or without Venture Capital)

**Annotation**
Please register on the seminar website.

WARNING: creditability in Seminar Module

The EnTechnon seminars are NOT accepted in the seminar module! The credit is only possible in MODULE ENTREPRENEURSHIP. One Exception is the seminar "Entrepreneurship Research".
6.45 Course: Business Process Modelling [T-WIWI-102697]

**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Exams**

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

*Below you will find excerpts from events related to this course:*

### Business Process Modelling

**2511210, WS 19/20, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**

**Notes**
The proper modeling of relevant aspects of business processes is essential for an efficient and effective design and implementation of processes. This lecture presents different classes of modeling languages and discusses the respective advantages and disadvantages of using actual application scenarios. For that simulative and analytical methods for process analysis are introduced. In the accompanying exercise the use of process modeling tools is practiced.

**Learning objectives:**
Students

- describe goals of business process modeling and apply different modeling languages,
- choose the appropriate modeling language according to a given context,
- use suitable tools for modeling business processes,
- apply methods for analysing and assessing process models to evaluate specific quality characteristics of the process model.

**Recommendations:**
Knowledge of course Applied Informatics I - Modelling is expected.

**Workload:**

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h
Below you will find excerpts from events related to this course:

### Description

The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank’s corporate policy.

### Learning Content

The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank’s corporate policy.

### Workload

The total workload for this course is approximately 90 hours. For further information see German version.
Literature
Elective literature:

- A script is disseminated chapter by chapter during the course of the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 6th edition, Springer
6.47 Course: Case Studies Seminar: Innovation Management [T-WIWI-102852]

**Responsible:** Prof. Dr. Marion Weissenberger-Eibl

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

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**Competence Certificate**

Alternative exam assessments (§4(2), 3 SPO).

**Prerequisites**

None

**Recommendation**

Prior attendance of the course Innovation Management is recommended.

**Below you will find excerpts from events related to this course:**

**Learning Content**

The objective of the seminar is to master selected concepts and methods of innovation management and then to apply these practically. Working in groups, the students apply the described concepts and methods of innovation management to a case study from the automotive industry to answer specific questions. Accordingly, the block seminar involves a switch from input to the application of this input. At the end, the results of the group work are presented in the form of a seminar paper and discussed by the whole course.

A short introduction to presentation techniques is planned to help students prepare the seminar papers.

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.
6.48 Course: CATIA Advanced [T-MACH-105312]

Responsibility: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B
M-MACH-101283 - Virtual Engineering A

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| SS 2019| CATIA advanced  | 3 SWS      | Project (PRO) | Ovtcharova, Mitarbeiter
| WS 19/20| Advanced CATIA | 3 SWS      | Project (PRO) | Ovtcharova, Mitarbeiter

Competence Certificate
Assessment of another type. Design project and written documentation in team work and final presentation. Grading: Project work 3/5, documentation 1/5 and presentation 1/5.

Prerequisites
none

Below you will find excerpts from events related to this course:

CATIA advanced
2123380, SS 2019, 3 SWS, Language: German, Open in study portal

Project (PRO)

Learning Content
- Use of advanced CAD techniques and CATIA functionalities
- Management of data using the PLM system SmarTeam
- Design engineering with CAD
- Integration of partial solutions into the overall solution
- Ensuring the reusability of CAD models through parameterization and cataloging
- Validation, strength tests (FEM analysis)
- Kinematic simulation with the digital mockup (DMU Kinematics)
- Production with integrated CAM tool
- Animations
- Presentation of results at the end of the semester

Annotation
For the workshop compulsory attendance exists.

Workload
regular attendance: 21 hours, self-study: 35 hours
Course: CATIA CAD Training Course [T-MACH-102185]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101281 - Virtual Engineering B
- M-MACH-101283 - Virtual Engineering A

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**Exams**

| SS 2019 | 76-T-MACH-102185 CATIA CAD Training Course | Prüfung (PR) | Ovtcharova |

**Competence Certificate**
Practical examination on CAD computer, duration: 60 min.

**Prerequisites**
None

**Recommendation**
Dealing with technical drawings is required.

**Annotation**
For the practical course attendance is compulsory.

Below you will find excerpts from events related to this course:

**CATIA CAD training course**
2123358, SS 2019, 3 SWS, Language: German, Open in study portal

**Practical course (P)**

**Learning Content**
The participant will learn the following knowledge:

- Basics of CATIA such as user interface, handling etc.
- Production and processing of different model types
- Production of basic geometries and parts
- Generation of detailed drawings
- Integration of partial solutions in modules
- Working with constraints
- Strength analysis with FEM
- Kinematic simulation with DMU
- Dealing with CATIA Knowledgeware

**Annotation**
For the practical course attendance is compulsory.

**Workload**
Regular attendance: 35 hours, self-study: 12 hours

**Literature**
practical course skript

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019
CATIA CAD training course
2123358, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content
The participant will learn the following knowledge:

- Basics of CATIA such as user interface, handling etc.
- Production and processing of different model types
- Production of basic geometries and parts
- Generation of detailed drawings
- Integration of partial solutions in modules
- Working with constrains
- Strength analysis with FEM
- Kinematic simulation with DMU
- Dealing with CATIA Knowledgeware

Annotation
For the practical course attendance is compulsory.

Workload
Regular attendance: 35 hours,
self-study: 12 hours

Literature
practical course skript
6.50 Course: Challenges in Supply Chain Management [T-WIWI-102872]

**Responsible:** Esther Mohr

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-102805 - Service Operations
- M-WIWI-102808 - Digital Service Systems in Industry

**Type** | **Credits** | **Recurrence** | **Version**
---|---|---|---
Examination of another type | 4.5 | Each summer term | 2

**Events**

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**Competence Certificate**
The assessment consists of a written paper and an oral exam of ca. 30-40 min.

**Prerequisites**
None

**Recommendation**
Basic knowledge as conveyed in the module “Introduction to Operations Research” is assumed.

**Annotation**
The number of course participants is limited to 12 participants due to joint work in BASF project teams. Due to these capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is offered irregularly. The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

**Challenges in Supply Chain Management**
2550494, SS 2019, 3 SWS, Language: English, Open in study portal

**Learning Content**
The course consists of case studies of BASF which cover future challenges of supply chain management. Thus, the course aims at a case-study based presentation, critical evaluation and exemplary discussion of recent questions in supply chain management. The focus lies on future challenges and trends, also with regard to their applicability in practical cases (especially in the chemical industry).

The main part of the course is working on a project together with BASF in Ludwigshafen. The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the project topic.

This course will include working on cutting edge supply chain topics like Industry 4.0 / "Internet of Everything in production", supply chain analytics, risk management, procurement and production in SCM. The team essays / project reports will be linked to industry-related challenges as well as to upcoming theoretical concepts. The topics of the seminar will be announced at the beginning of the term in a preliminary meeting.

**Annotation**
The number of course participants is limited to 12 participants due to joint work in BASF project teams. Due to these capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is offered irregularly. The planned lectures and courses for the next three years are announced online.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
To be defined depending on the topic.
6 COURSES

Course: Characteristics of Transportation Systems [T-BGU-106609]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101064 - Fundamentals of Transportation

<table>
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**Events**

| SS 2019 | 6232806 | Eigenschaften von Verkehrsmitteln | 2 SWS | Lecture (V) | Vortisch |

**Exams**

| SS 2019 | 8240106609 | Characteristics of Transportation Systems | Prüfung (PR) | Vortisch |

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 6.52 Course: Combustion Engines I [T-MACH-102194]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101275 - Combustion Engines I  

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**Competence Certificate**

oral examination, Duration: 25 min., no auxiliary means  

**Prerequisites**

none  

*Below you will find excerpts from events related to this course:*

**Combustion Engines I**

2133113, WS 19/20, 4 SWS, Language: German, [Open in study portal](#)

**Lecture / Practice (VÜ)**

**Notes**

Introduction, History, Concepts  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Fuels  
Gasoline Engines  
Diesel Engines  
Exhaust Gas Aftertreatment  

**Learning Content**

Introduction, History, Concepts  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Fuels  
Gasoline Engines  
Diesel Engines  
Exhaust Gas Aftertreatment
Workload
regular attendance: 32 hours
self-study: 88 hours
6.53 Course: Combustion Engines II [T-MACH-104609]

Responsible: Dr.-Ing. Rainer Koch
Dr.-Ing. Heiko Kubach

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

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Competence Certificate
oral examination, duration: 25 minutes, no auxiliary means

Prerequisites
none

Recommendation
Fundamentals of Combustion Engines I helpful

Below you will find excerpts from events related to this course:

Combustion Engines II
2134151, SS 2019, 3 SWS, Language: German, Open in study portal

Learning Content
Emissions
Fuels
Drive Train Dynamics
Engine Parts
Boosting
Alternative Powertrain Concepts
Special Engine Concepts
Power Transmission

Workload
regular attendance: 31.5 hours
self-study: 90 hours
### Course: Communication Systems and Protocols [T-ETIT-101938]

**Responsible:** Prof. Dr.-Ing. Jürgen Becker  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-MACH-101295 - Optoelectronics and Optical Communication

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**Prerequisites**

none
6.55 Course: Competition in Networks [T-WIWI-100005]

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101406 - Network Economics

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<td>2561205</td>
<td>Übung zu Wettbewerb in Netzen</td>
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**Exams**

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<tr>
<td>SS 2019</td>
<td>7900274</td>
<td>Competition in Networks</td>
<td>Prüfung</td>
<td>Mitusch</td>
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</table>

**Competence Certificate**

Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

**Prerequisites**

None.

**Recommendation**

Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

*Below you will find excerpts from events related to this course:

### Competition in Networks

**Code:** 2561204, **Language:** German, [Open in study portal]

**Description**

Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Will be announced in the lecture.
6.56 Course: Computational Economics [T-WIWI-102680]

**Responsible:** Dr. rer. nat. Pradyumn Kumar Shukla

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each winter term

**Version**
- 3

**Events**

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**Competence Certificate**
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4). The bonus only applies to the first and second exam of the semester in which it was obtained.

**Prerequisites**
None

**Annotation**
The credits have been changed to 5 starting summer term 2016.

Below you will find excerpts from events related to this course:

**Computational Economics**

- 2590458, WS 19/20, 2 SWS, Language: English, [Open in study portal]
- Lecture (V)

**Notes**
Examining complex economic problems with classic analytical methods usually requires making numerous simplifying assumptions, for example that agents behave rationally or homogeneously. Recently, widespread availability of computing power gave rise to a new field in economic research that allows the modeling of heterogeneity and forms of bounded rationality: Computational Economics. Within this new discipline, computer based simulation models are used for analyzing complex economic systems. In short, an artificial world is created which captures all relevant aspects of the problem under consideration. Given all exogenous and endogenous factors, the modelled economy evolves over time and different scenarios can be analyzed. Thus, the model can serve as a virtual testbed for hypothesis verification and falsification.

**Learning objectives:**
The student

- understands the methods of Computational Economics and applies them on practical issues,
- evaluates agent models considering bounded rational behaviour and learning algorithms,
- analyses agent models based on mathematical basics,
- knows the benefits and disadvantages of the different models and how to use them,
- examines and argues the results of a simulation with adequate statistical methods,
- is able to support the chosen solutions with arguments and can explain them.
6.57 Course: Computational Risk and Asset Management [T-WIWI-102878]

**Responsible:** Prof. Dr Maxim Ulrich

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105032 - Data Science for Finance

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**Competence Certificate**
The assessment consists of a written exam (90 minutes) according to §4(2) of the examination regulation.

**Recommendation**
Good knowledge of statistics and first programming experience with Python is recommended.

*Below you will find excerpts from events related to this course:*

**Computational Risk and Asset Management**

*2500015, WS 19/20, 4 SWS, Language: English, [Open in study portal](#)*

**Description**
The aim of this course is to master real-world challenges of computational risk and asset management and provide students with a skill set to incorporate different portfolio objectives into the investment process. It enables students to solve such challenges independently in Python.

**Learning Content**
The course covers several topics, among them:

- Quantitative Portfolio Strategies: Extensions to Mean-Variance Portfolio Optimization
- Return Densities: Forecasting with Traditional and Machine Learning Approaches, Monte Carlo Simulation
- Financial Economics: Rationalizing Risk Premiums via Stochastic Discount Factor
- Multi-Asset Valuation: DCF Approach, No-Arbitrage and Ito Calculus

**Workload**
The total workload for this course is approximately 180 hours.
6.58 Course: Computer Aided Data Analysis [T-GEISTSOZ-104565]

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** M-GEISTSOZ-101169 - Sociology

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6.59 Course: Computer Contract Law [T-INFO-102036]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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Below you will find excerpts from events related to this course:

**Description**

The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldbrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

**Learning Content**

It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

**Literature**

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

**Elective Literature**

tba in the transparencies
6.0 Course: Construction Equipment [T-BGU-101845]

**Responsible:** Prof. Dr.-Ing. Sascha Gentes

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101110 - Process Engineering in Construction

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
6.61 Course: Control of Linear Multivariable Systems [T-ETIT-100666]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101157 - Control Engineering II

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Prerequisites

none
6.62 Course: Control Technology [T-MACH-105185]

Responsible: Christoph Gönnheimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101284 - Specialization in Production Engineering

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Competence Certificate
Written Exam (60 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

Control Technology
2150683, SS 2019, 2 SWS, Language: German, Open in study portal

Description

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
Notes
The lecture control technology gives an integral overview of available control components within the field of industrial production systems. The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states. The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems. The lecture is very practice-oriented and illustrated with numerous examples from different branches.

The following topics will be covered:

- Signal processing
- Control peripherals
- Programmable logic controls
- Numerical controls
- Controls for industrial robots
- Distributed control systems
- Field bus
- Trends in the area of control technology

Learning Outcomes:
The students ...

- are able to name the electrical controls which occur in the industrial environment and explain their function.
- can explain fundamental methods of signal processing. This involves in particular several coding methods, error protection methods and analog to digital conversion.
- are able to choose and to dimension control components, including sensors and actors, for an industrial application, particularly in the field of plant engineering and machine tools. Thereby, they can consider both, technical and economical issues.
- can describe the approach for projecting and writing software programs for a programmable logic control named Simatic S7 from Siemens. Thereby they can name several programming languages of the IEC 1131.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
The lecture control technology gives an integral overview of available control components within the field of industrial production systems. The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states. The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems. The lecture is very practice-oriented and illustrated with numerous examples from different branches.

The following topics will be covered:

- Signal processing
- Control peripherals
- Programmable logic controls
- Numerical controls
- Controls for industrial robots
- Distributed control systems
- Field bus
- Trends in the area of control technology

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
**6.63 Course: Convex Analysis [T-WIWI-102856]**

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101473 - Mathematical Programming

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**Exams**

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**Competence Certificate**

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The examination is held in the semester of the lecture and in the following semester. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

**Prerequisites**

None

**Recommendation**

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

**Annotation**

The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

*Below you will find excerpts from events related to this course:*

**Konvexe Analysis**

2550120, SS 2019, SWS, Open in study portal

**Learning Content**

Convex Analysis deals with properties of convex functions and convex sets, in particular with respect to the minimization of convex functions over convex sets. That the involved functions are not necessarily assumed to be differentiable allows a number a applications which are not covered by techniques from smooth optimization, e.g. approximation problems with respect to the Manhattan or maximum norms, classification problems or the theory of statistical estimates. The lecture develops along another, geometrically simple example, where a nonsmooth obstacle set is to be described by a single smooth convex constraint such that minimal and maximal distances to the obstacle can be computed. The lecture is structured as follows:

- Introductory examples and terminology
- Convex subdifferential, Lipschitz continuity and the safety margin
- Normal cones, error bounds and the maximal distance

**Literature**

**Elective literature:**

### 6.64 Course: Conveying Technology and Logistics [T-MACH-102135]

**Responsible:** Prof. Dr.-Ing. Kai Furmans  
Paolo Pagani

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101808 - Seminar Module

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**Competence Certificate**  
alternative test achievement (graded):
- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**  
none
# 6.65 Course: Copyright [T-INFO-101308]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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### Course: Corporate Compliance [T-INFO-101288]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101242 - Governance, Risk & Compliance

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<td>Dreier, Matz</td>
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</table>
### 6.67 Course: Corporate Financial Policy [T-WIWI-102622]

**Responsible:** Prof. Dr. Martin Ruckes

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101453 - Applied Strategic Decisions
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2
- M-WIWI-101502 - Economic Theory and its Application in Finance

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**Exams**

| SS 2019 | 7900073 | Corporate Financial Policy | Prüfung (PR) | Ruckes |

**Competence Certificate**
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

**Prerequisites**
None

**Annotation**
The course will exceptionally be held in the winter semester 2019/2020. Usually, however, the event takes place in the summer semester.
Course: Corporate Risk Management [T-WIWI-109050]

**Responsible:** Prof. Dr. Martin Ruckes

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2
- M-WIWI-101502 - Economic Theory and its Application in Finance

**Type:** Written examination

**Credits:** 4.5

**Recurrence:** Each summer term

**Version:** 2

### Events

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#### Corporate Risk Management

**2530218, SS 2019, SWS, Language: English, Open in study portal**

**Learning Content**

- Stochastic basics
- Firm decisions under risk - expected utility theory
- The value motive for corporate risk management
- Common risk measures from practice (e.g. Cash-flow at Risk)
- Operational and financial risk management instruments
- The risk management organization (central vs. decentral)
- External risk reporting (e.g. obligations and incentives)

**Workload**

The total workload of this course is approximately 135.0 hours. For further information, see German version.
Literature


Übung zu Corporate Risk Management

**2530219, SS 2019, SWS, Language: English, Open in study portal**

Learning Content

- Stochastic basics
- Firm decisions under risk - expected utility theory
- The value motive for corporate risk management
- Common risk measures from practice (e.g. Cash-flow at Risk)
- Operational and financial risk management instruments
- The risk management organization (central vs. decentral)
- External risk reporting (e.g. obligations and incentives)

Workload
The total workload of this course is approximately 135.0 hours. For further information, see German version.

Literature


Übung zu Corporate Risk Management

**2530220, WS 19/20, SWS, Language: English, Open in study portal**

Learning Content

- Stochastic basics
- Firm decisions under risk - expected utility theory
- The value motive for corporate risk management
- Common risk measures from practice (e.g. Cash-flow at Risk)
- Operational and financial risk management instruments
- The risk management organization (central vs. decentral)
- External risk reporting (e.g. obligations and incentives)

Workload
The total workload of this course is approximately 135.0 hours. For further information, see German version.

Literature

**Course: Country Manager Simulation [T-WIWI-106137]**

**Responsible:** Dr. Sven Feurer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101487 - Sales Management
- M-WIWI-101490 - Marketing Management

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**Events**

| WS 19/20 | 2572172 | Country Manager | 1 SWS | Block (B) | Feurer |

**Competence Certificate**
Alternative exam assessment (30 minutes presentation).

**Prerequisites**
If the course is selected within the module "Sales Management", the following courses may not be started in this module: price negotiations and sales presentations, case studies in sales and pricing.

**Annotation**
The course language is English. In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in winter term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in winter term starts.

Please note that only one of the 1.5 ECTS courses can be chosen in this Module.

Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS in the respective module to all students. Participation in a specific course cannot be guaranteed.

Below you will find excerpts from events related to this course:

**Country Manager**
2572172, WS 19/20, 1 SWS, Language: English, Open in study portal

**Learning Content**
- Understanding Culture
- Understanding International Buyer Behavior
- Market Entry Decisions
- International Marketing and Sales Management (adaptation vs. differentiation)

**Annotation**
- The course language is English.
- In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in winter term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in winter term starts.
- Please note that only one of the 1.5 ECTS courses can be chosen in the module.
- Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS in the respective module to all students. Participation in a specific course cannot be guaranteed.

**Workload**
Total workload for 1.5 ECTS: ca. 45 hours

**Literature**
6.70 Course: Credit Risk [T-WIWI-102645]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

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**Competence Certificate**
The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation and may be supplemented by a non exam assessment according to § 4 paragraph 2 Nr. 3. The examination is offered every semester and can be repeated at every regular examination date.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**
None

**Recommendation**
Knowledge from the course "Derivatives" is very helpful.

**Annotation**
See German version.

_Below you will find excerpts from events related to this course:_

**Credit Risk**
2530565, WS 19/20, 3 SWS, Language: German, [Open in study portal]

**Description**
The lecture deals with the diverse issues arising in the context of measuring and controlling credit risk. At first, the theoretical and empirical relations between ratings, probabilities of default, and credit spreads are analysed. After that, the focus is on the valuation of credit risk. Finally, the management of credit risk, e.g. using credit derivatives and credit portfolio analysis, is examined, and the legal framework and its implications are discussed.

**Learning Content**
The lecture deals with the diverse issues arising in the context of measuring and controlling credit risk. At first, the theoretical and empirical relations between ratings, probabilities of default, and credit spreads are analysed. After that, the focus is on the valuation of credit risk. Finally, the management of credit risk, e.g. using credit derivatives and credit portfolio analysis, is examined, and the legal framework and its implications are discussed.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature


Elective literature:

6.71 Course: Critical Information Infrastructures [T-WIWI-109248]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type: Examination of another type
Credits: 4.5
Recurrence: Each winter term
Version: 4

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<td>1 SWS Practice (Ü) Sunyaev, Dehling, Lins</td>
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Exams
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<tr>
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<td>Prüfung (PR) Sunyaev</td>
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</table>

Competence Certificate
The alternative exam assessment consists of

- the preparation of a written elaboration as well as
- an oral examination as part of a presentation of the work.

Details of the grades will be announced at the beginning of the course.

Prerequisites
None.

Annotation

Below you will find excerpts from events related to this course:

Critical Information Infrastructures
2511400, WS 19/20, 2 SWS, Language: English, Open in study portal Lecture (V)
Course: Critical Information Infrastructures [T-WIWI-109248]

Notes
The course critical information infrastructures introduces students to the world of these complex sociotechnical systems that permeate societies on a global scale. Students will learn to handle the complexities involved in the design, development, operation and evaluation of critical information infrastructures. In the beginning of the lecture, critical information infrastructures will be introduced on a general level.

The following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group) on a selected case and have to write a seminar paper.

There will be a short introduction to the topics for the course paper on the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Blockchain
- Cloud Computing
- Digital Health
- Fog Computing
- Information Privacy
- Certification of critical IT-Services

In addition to introductions to the topics, an online course is also offered to introduce students to scientific writing. This means to learn how to quote, how a scientific work is structured, and in which form the results of one’s research are presented. Since we offer topics in this course that also correspond to the research interests in our research group, there may also be the opportunity to work on the topics in more depth in the course of a final thesis. Students can choose a topic from a variety of topics of the topics presented, and write a course paper in a group of four students.

Learning objectives:
Students know concepts and technologies relevant for the design and reliable operation of critical information infrastructures and can leverage them to develop solutions for real-world challenges.

Notes:
Please note the changed course structure. The course will be held as a block course.

The number of participants is limited. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/3073

Please make sure that your are available at the following dates if you would like to attend the course:

- Introduction: 4 dates on which you have to participate
  - 17.10.2019, 11.30 to 13.00: Foundations of Critical Information Infrastructures. (Geb. 05.20, R1C-02)
  - 24.10.2019, 11.30 to 13.00: Introduction to topics (Geb. 05.20, R1C-02)
  - 31.10.2019, 11.30 - 13.00: Socio-Technical/Socio-Material Information Systems & Design Science Research (Geb. 05.20, R1C-02)
  - 07.11.2019, 11.30 to 13.00: The Critical Information Infrastructures Landscape (Geb. 05.20, R1C-02)
- Intermediate presentations with compulsory attendance: 13.12.2019, 10am to 4pm (Geb. 05.20, R1C-02). Exact times will be announced later.
- Final presentations with compulsory attendance: 07.02.2020, 10am to 4pm (Geb. 05.20, R1C-02). Exact times will be announced later.
- Submission of the course paper: Expected on 02.02.2019. Final date will be announced in the course.

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place at the Institute AIFB, KIT Campus South, Kollegiengebäude am Kronenplatz (Geb. 05.20) in Kaiserstr. 89.

The number of participants is limited to 24 students. The registration period is from 31.08.2019 to 29.09.2019. Participation slots are expected to be allocated on 01.10.2019 and must be accepted by the student by 06.10.2019. If the slot is not accepted, the free places will be offered to the students in the waiting list.

If you have any questions regarding this registration, please contact sebastian.lins@kit.edu or dehling@kit.edu.
### 6.72 Course: Current Issues in Innovation Management [T-WIWI-102873]

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**Responsible:** Prof. Dr. Marion Weissenberger-Eibl  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101507 - Innovation Management  
M-WIWI-101507 - Innovation Management

**Competence Certificate**  
Non exam assessment (following §4(2) 3 of the examination regulation).

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
Please note that the seminars we offer vary from semester to semester. Information about the currently offered seminars can be found in the Wiwi-Portal and on the iTM Website.
6.73 Course: Current Topics on BioMEMS [T-MACH-102176]

**Responsible:** Prof. Dr. Andreas Guber

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101290 - BioMEMS

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**Exams**

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<td>2 SWS</td>
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**Competence Certificate**
active participation and own presentation (30 Min.)

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

### Actual topics of BioMEMS

#### SS 2019

2143873, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**
Written preparations from the participants.

**Workload**

Active participation on the seminar and preparation of an own presentation of a topic in BioMEMS.

Lecture time: 21 h
Preparation: 40 h
Preparation of own preparation: 60 h

### Actual topics of BioMEMS

#### WS 19/20

2143873, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**
Written preparations from the participants.

**Workload**

Active participation on the seminar and preparation of an own presentation of a topic in BioMEMS.

Lecture time: 21 h
Preparation: 40 h
Preparation of own preparation: 60 h
### 6.74 Course: Data Mining and Applications [T-WIWI-103066]

**Responsible:** Rheza Nakhaeizadeh  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101638 - Econometrics and Statistics I  
M-WIWI-101639 - Econometrics and Statistics II

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**Exams**

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<th>Nakhaeizadeh</th>
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**Competence Certificate**
- Conduction of a larger empirical study in groups
- Reporting of milestones
- Final presentation (app. 45 minutes)

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Data Mining and Applications**  
2520375, SS 2019, 2/4 SWS, Language: German, Open in study portal

**Learning Content**

**Part one: Data Mining**

**Why Data Mining?**
- What is Data Mining?
- History of Data Mining
- Conferences and Journals on Data Mining
- Potential Applications
- Data Mining Process:
  - Business Understanding
  - Data Understanding
  - Data Preparation
  - Modeling
  - Evaluation
  - Deployment
  - Interdisciplinary aspects of Data Mining
  - Data Mining tasks
  - Data Mining Algorithms (Decision Trees, Association Rules, Regression, Clustering, Neural Networks)
  - Fuzzy Mining
  - OLAP and Data Warehouse
  - Data Mining Tools
  - Trends in Data Mining

**Part two: Examples of application of Data Mining**
- Success parameters of Data Mining Projects
- Application in industry
- Application in Commerce
Workload
The total workload for this course is approximately 135 hours. For further information see German version.

Literature

- Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016, 2006.
# 6.75 Course: Data Protection by Design [T-INFO-108405]

**Responsible:** PD Dr. Oliver Raabe  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101242 - Governance, Risk & Compliance

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  - Type: Data protection by design  
  - Credits: 2 SWS  
  - Recurrence: Lecture (V)  
  - Instructor: Raabe, Werner

**Exams**
- **SS 2019**  
  - Code: 7500223  
  - Type: Data protection by design  
  - Exam Type: Prüfung (PR)  
  - Instructor: Raabe
### 6.76 Course: Data Protection Law [T-INFO-101303]

**Responsible:** Prof. Dr. Nikolaus Marsch  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

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6.77 Course: Database Systems and XML [T-WIWI-102661]

**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Exams**

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

*Below you will find excerpts from events related to this course:*

**Database Systems and XML**

2511202, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Notes**

Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly more important with the emergence of the extensible Markup Language XML. XML is a data format for structured, semi-structured, and unstructured data. In order to store XML documents consistently and reliably, databases or extensions of existing database systems are required. Among other things, this lecture covers the data model of XML, concepts of XML query languages, aspects of storage of XML documents, and XML-oriented database systems.

**Learning objectives:**

Students
- know the basics of XML and generate XML documents,
- are able to use XML database systems and to formulate queries to XML documents,
- know to assess the use of XML in operational practice in different application contexts.

**Workload:**

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h
6.78 Course: Decentrally Controlled Intralogistic Systems [T-MACH-105230]

**Responsible:** Prof. Dr.-Ing. Kai Furmans
Maximilian Hochstein

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-104888 - Advanced Module Logistics

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<td>Furmans</td>
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**Competence Certificate**
Certificate by colloquium with presentation

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Decentrally controlled intralogistic systems**
2117084, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Description**

**Media:**
Lego Mindstorms, PC

**Learning Content**

- Introduction to material handling systems
- Construction of a model for decentralized logistic systems
- Object-oriented programming with LabView
- Implementation of the model with Mindstorms

**Presentation of the results**

**Annotation**
number of participants limited
participants will be selected
One course during summer semester in English

**Workload**

regular attendance: 10 hours
self-study: 80 hours (workplace is provided)

**Literature**
none
Decentrally controlled intralogistic systems
2117084, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
Proof:
- Certificate by colloquium with presentation

Note:
- Number of participants limited
- Participants will be selected
- One course during summer semester in English
- Compulsory attendance

Media:
- Lego Mindstorms, PC

Teaching content:
- Introduction to material handling systems
- Construction of a model for decentralized logistic systems
- Object-oriented programming with LabView
- Implementation of the model with Mindstorms
- Presentation of the results

Learning objectives:
Students are able to:
- Model complex cinematic systems and use object-oriented programming for this purpose,
- Build experimental setups in a team for decentralized controlled intralogistic systems, choose appropriate system components and models and finally proof the function by using experiments.

Effort:
- Regular attendance: 10 hours
- Self-study: 80 hours (workplace is provided)

Dates and further information see homepage
**6.79 Course: Derivatives [T-WIWI-102643]**

- **Responsible:** Prof. Dr. Marliese Uhrig-Homburg
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101480 - Finance 3
  - M-WIWI-101482 - Finance 1
  - M-WIWI-101483 - Finance 2

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**Exams**

| SS 2019 | 7900111 | Derivatives        |         |

**Competence Certificate**

The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

None

**Below you will find excerpts from events related to this course:**

**Derivatives**

2530550, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Description**

The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

**Learning Content**

The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**


**Elective literature:**

### 6.80 Course: Design Thinking [T-WIWI-102866]

**Responsible:** Prof. Dr. Orestis Terzidis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechnon)  
M-WIWI-101488 - Entrepreneurship (EnTechnon)  
M-WIWI-101507 - Innovation Management

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**Competence Certificate**  
Alternative exam assessments (§4(2), 3 SPO).

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
The seminar content will be published on the website of the institute.
6.81 Course: Developing Business Models for the Semantic Web [T-WIWI-102851]

**Responsible:** Prof. Dr. York Sure-Vetter

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechnon)

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**Competence Certificate**
Alternative exam assessments.

**Prerequisites**
None

**Recommendation**
As a recommendation to attending the seminar, basic knowledge about semantic technologies and concepts should be available. This may be acquired by attending one of the following lectures – Wissensmanagement, Semantic Web Technologies 1, Semantic Web Technologies 2 or by studying related literature. Furthermore the topic entrepreneurship should be of interest.
6.82 Course: Digital Health [T-WIWI-109246]

Responsibility: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
       M-WIWI-101628 - Emphasis in Informatics
       M-WIWI-101630 - Electives in Informatics

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Competence Certificate

Alternative exam assessment (written elaboration, presentation, peer review, oral participation) according to §42 of the examination regulation. Details of the grading will be announced at the beginning of the course.

Prerequisites

None.

Below you will find excerpts from events related to this course:

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Notes
The course Digital Health offers students a possibility to gain insight into current developments in the digitalization of the health care system. Students will first be introduced to the basics and challenges of the digitalization of the health care system. After the introduction lecture, the course aims to give insights into current topics in the field of digital health and offers students an opportunity to prepare a scientific paper in a group of up to three students.

There will be a short introduction lecture on all topics with regard to the written assignments. It is possible for students to write their paper in one of the following topics. Furthermore, groups of students have the possibility to propose their own topics.

- Artificial Intelligence
- Blockchain
- Cloud Computing
- Gamification
- Genomics
- Information Privacy

In addition to introduction lectures on the topics, an online course is offered to introduce students to scientific writing. This includes learning how to quote, how a scientific paper is structured and in which form the results of one’s research are presented. Since we offer topics that also correspond to the research interests of our research associates, there may also be the opportunity to investigate these topics more deeply in a master thesis. Students can give their preferences for the topics offered and are afterwards assigned to groups of up to three students based on their preferences.

Learning objectives:
Students are familiar with the current developments and challenges of digitization in the health care sector, can independently develop corresponding solutions, and discuss their developed solutions in groups.

Workload:
4.5 ECTS = approx. 135 hours.

Comments:
The number of participants is limited. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/3107

Please keep the following dates available if you are planning to attend the course:

- **Introduction:** 3 dates you have to attend
  - 10.2019, 15.45 to 17.15: Foundations of Digital Health. (Geb. 05.20, R1C-03)
  - 10.2019, 15.45 to 17.15: Cloud Computing, Genomics, Information Privacy (Geb. 05.20, R1C-03)
  - 11.2019, 15.45 to 17.15: Blockchain, Artificial Intelligence, Gamification (Geb. 05.20, R1C-03)
- **Intermediate presentation** to be attended: 04.12.2019, 10:00 to 16:00 (Building 05.20, R1A-11). Exact times will be announced soon.
- **Final presentation to be attended:** 02.2020 and 27.02.2020, 09:00 to 19:00 (Building 05.20, R1C-03). Exact times will be announced soon.
- **Submission of the written assignment:** Estimated on 12.02.2019. Final date will be announced in the event.

Further information on the procedure will be announced in the first lecture. Depending on the number of participants, each session may have a shorter duration.

The meetings will take place at the Institute AIFB, KIT-Campus Süd, Kollegiengebäude am Kronenplatz (building 05.20), Kaiserstr. 89.

The number of participants is limited to 30 students. The registration period is from 31.08.2019 to 17.10.2019. The places are expected to be allocated on 18.10.2019 and must be accepted by the students by 22.10.2019. If the allocation is not accepted, the free places will be offered to the students in the waiting list.

If you have any questions regarding this registration, please contact scott.thiebes@kit.edu or manuel.schmidt-kraepelin@kit.edu.

Responsible: Anja Konhäuser
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101487 - Sales Management

<table>
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Competence Certificate
Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. (team presentation of a case study with subsequent discussion totalling 30 minutes).

Prerequisites
None.

Annotation
Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing and Sales (marketing.iism.kit.edu).
Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance cannot be guaranteed.
For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu).
Please note that only one of the 1.5-ECTS courses can be attended in this module.

Below you will find excerpts from events related to this course:

Digital Marketing and Sales in B2B
2572176, WS 19/20, 1 SWS, Language: English, Open in study portal

Learning Content
Learning Sessions:
The class gives insights into digital marketing strategies as well as the effects and potential of different channels (e.g., SEO, SEA, Social Media). After an overview of possible activities and leverages in the digital marketing field, including their advantages and limits, the focus will turn to the B2B markets. There are certain requirements in digital strategy specific to the B2B market, particularly in relation to the value chain, sales management and customer support. Therefore, certain digital channels are more relevant for B2B marketing than for B2C marketing.
Once the digital marketing and tactics for the B2B markets are defined, further insights will be given regarding core elements of a digital strategy: device relevance (mobile, tablet), usability concepts, website appearance, app decision, market research and content management. A major advantage of digital marketing is the possibility of being able to track many aspects of of user reactions and user behaviour. Therefore, an overview of key performance indicators (KPIs) will be discussed and relationships between these KPIs will be explained. To measure the effectiveness of digital activities, a digital report should be set up and connected to the performance numbers of the company (e.g. product sales) – within the course the setup of the KPI dashboard and combination of digital and non-digital measures will be shown to calculate the Return on Investment (RoI).

Presentation Sessions:
After the learning sessions, the students will form groups and work on digital strategies within a case study format. The presentation of the digital strategy will be in front of the class whereas the presentation will take 20 minutes followed by 10 minutes questions and answers.

Workload
time of presentness = 15 hrs.
private study = 30 hrs.
Literature

-
**6.84 Course: Digital Service Design [T-WIWI-105773]**

**Responsible:** Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:**
M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-104080 - Designing Interactive Information Systems

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<td>Digital Service Design</td>
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**Exams**

| SS 2019 | 7900190 | Digital Service Design | Prüfung (PR) | Mädche |

**Competence Certificate**
Assessment consists of a written exam of 1 hour length and by submitting written papers as part of the exercise. Details are announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The course is held in English.

Below you will find excerpts from events related to this course:

**Digital Service Design**

2540420, WS 19/20, 2 SWS, Language: English, Open in study portal

**Description**
Designing services is different from designing products. In contrast to products being discrete and tangible objects, services are co-produced by people and only provide value when they are actually used. Digital services represent a specific category of services and specifically leverage and integrate information technology in the service delivery process.

The aim of this course is to introduce key concepts and theoretical foundations of digital service design. Furthermore, a management perspective looking at the entire service lifecycle, covering the organizational and team level, as well as state-of-the-art digital service design processes (e.g., agile, lean, continuous delivery) is provided. Finally, an introduction of important digital service design practices and tools supporting user research, conceptualization & prototyping, as well as evaluation is given.

The course is complemented with a Digital Service Design challenge, where students leverage practices and tools from the lecture to suggest improvements for an existing digital service. The challenge is carried out in cooperation with practice partners (e.g., Commerzbank).

**Learning Content**
- Definition and key concepts of digital service design and related terms
- Introduction to the business and design perspective of a service design project
- The digital service design process from strategy through planning and prototyping to launching the digital service
- Practice-oriented capstone project focusing on the design of a real-world digital service
Literature


6.85 Course: Digital Services: Business Models and Transformation [T-WIWI-110280]

**Responsible:** Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101448 - Service Management
- M-WIWI-102754 - Service Economics and Management

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<td>Digital Services: Business Models and Transformation</td>
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<td>Satzger, Schüritz</td>
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<td>Practice (Ü)</td>
<td>Enders, Schüritz</td>
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</table>

**Competence Certificate**
The assessment of this course is a written examination (60 min.) (following §4(2), 1 SPOs) and by submitting written papers as part of the exercise.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
former name until winter semester 2019/2020: "Business and IT Service Management" (T-WIWI-102881)

Below you will find excerpts from events related to this course:

**Notes**
Formerly "Business and IT Service Management"

**Learning Content**
While the digitalization creates new opportunities for organizations, it also comes with its challenges: formerly proven business models become obsolete and need to be refined, internal processes cannot keep up with the requirements of the market and need to reassessed in any way.

The shift towards a service-based economy enables and requires companies to leverage advances in information technology to create added value for their customers. In particular, the emergence of big data and analytics enables better decision-making. The lecture teaches approaches that enable organizations to adapt their business models to new market requirements and showcases how to plan and execute a successful transformation to the desired organizational setup.

The lecture links academic content with practical examples and exercises. Students are asked to actively engage in the discussion and contribute their knowledge. Invited guest speakers from industry and case studies emphasize the practical character of this lecture.

**Workload**
The total workload for this course is approximately 135 hours. For further information see German version.
Literature
Cardoso et al. (Hrsg.) (2015), Fundamentals on Service Systems
Hartmann/ Zaki/ Feldmann/ Neely (2016), Capturing value from big data - a taxonomy of data-driven business models used by start-up firms, IJORF, 36 (10), 1382-1406.
## 6.86 Course: Digital Transformation and Business Models [T-WIWI-108875]

**Responsible:** Dr. Daniel Jeffrey Koch  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101507 - Innovation Management

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<td>Digitale Transformation und Geschäftsmodelle</td>
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<td>SS 2019</td>
<td>7900284</td>
<td>Digital Transformation and Business Models</td>
<td>Weissenberger-Eibl</td>
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### Competence Certificate
Non exam assessment (following §4(2) 3 of the examination regulation). The final grade is composed 75% of the grade of the written paper and 25% of the presentation.

### Prerequisites
None

### Recommendation
Prior attendance of the course Innovation Management is recommended.
6.87 Course: Digital Transformation of Organizations [T-WIWI-106201]

**Responsible:** Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101410 - Business & Service Engineering
- M-WIWI-101448 - Service Management
- M-WIWI-102754 - Service Economics and Management
- M-WIWI-102808 - Digital Service Systems in Industry
- M-WIWI-104068 - Information Systems in Organizations

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**Events**

| SS 2019 | 2540556 | Digital Transformation of Organizations | 3 SWS | Lecture (V) | Mädche |

**Exams**

| SS 2019 | 791000001 | Digital Transformation of Organizations | Prüfung (PR) | Mädche |

**Competence Certificate**
The assessment consists of a written exam of 1 hour length and by submitting written papers as part of the exercise. Details will be announced at the beginning of the course.

**Prerequisites**
None

**Annotation**
The course will be held in English.

Below you will find excerpts from events related to this course:

**Description**
During the last decades we witnessed a growing importance of Information Technology (IT) in the business world along with faster and faster innovation cycles. IT has become core for businesses from an operational company-internal and external customer perspective. Today, IT is considered as key enabler of operational excellence ranging from the enrichment of routine working tasks (e.g., enterprise resource planning systems) to e-enabled integration of entire business eco-systems (e.g., e-supply chains). Complementing this primarily company-internal perspective on IT, we have recently have seen a massive growth of digital extensions of existing products and services across all industries. The disruptive potential of IT has already transformed selected key industries, e.g. media or retail, and its impact is continuously growing in all areas of business and society.

Large-scale information systems (IS) in organizations strongly interplay with work practices of individual employees as well as organizational structures shaping and being shaped by individuals’ behavior. Thus, successful implementation of IS requires dealing with transformation beyond technology. The ability to implement and use IS in a way supporting its overall value proposition has become a central success determinant. Accordingly, the course “Management of Information Systems” course is designed to provide a comprehensive insight into theoretical foundations, concepts, tools, and current practice of IS. The lecture is complemented with a case study. Students get the opportunity to analyze and propose solutions for a selected real-world IS implementation.
Learning Content

- Definition and key concepts of Information Systems
- Introduction of different types of application systems (organizational process & information-centric systems, customer-centric systems, supplier-centric systems and people-centric systems) and their characteristics
- The digital transformation process: The pre-implementation, implementation and post-implementation phase covering facets such as business/IT alignment, packaged software selection, IS implementation projects, as well as adoption & use of IS
- Practice-oriented case study focusing on real-world IS scenarios

Literature
Course: Digitalization from Production to the Customer in the Optical Industry [T-MACH-110176]

**Responsible:** Dr. Marc Wawerla

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101282 - Global Production and Logistics
- M-MACH-101284 - Specialization in Production Engineering

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<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>2</td>
<td>Lecture (V)</td>
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**Competence Certificate**

Alternative test achievement (graded):
- Processing and presentation (ca. 15 min) of a case study with weighting 20%
- Oral exam (ca. 20 min) with weighting 80%

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Digitalization from Production to the Customer in the Optical Industry**

2149701, WS 19/20, 2 SWS, Language: English, [Open in study portal]

**Description**

The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.

**Main topics of the lecture:**

- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS
Notes
The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.

Main topics of the lecture:

- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS

Learning Outcomes:
The students ...

- are capable to comment on the content covered by the lecture.
- are able to analyze and evaluate the suitability of digitalization technologies in the optical industry.
- are able to assess the applicability of methods such as disruptive innovation and agile project management.
- are able to appreciate the practical challenges to digitalization in industry.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Workload
regular attendance: 21 hours
self-study: 99 hours
Course: Digitalization of Products, Services & Production [T-MACH-108491]

**Responsible:** Dr.-Ing. Bernd Pätzold

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101281 - Virtual Engineering B
M-MACH-101283 - Virtual Engineering A

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**Competence Certificate**
Assessment of another type. Two presentations in team work and two written compositions. Grading: each composition 1/6 and each presentation 2/3.

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Digitalization of Products, Services & Production**
2122310, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**
- Digitalization of products, services and production in the context of Industry 4.0.
- Key drivers for ongoing digitalization and their impact on future product development and manufacturing.
- Methods and procedures to design the according transformation process.
- Intensive group discussions of use-case scenarios using practical examples from the industry.

**Digitalization of Products, Services & Production**
2122310, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**
- Digitalization of products, services and production in the context of Industry 4.0.
- Key drivers for ongoing digitalization and their impact on future product development and manufacturing.
- Methods and procedures to design the according transformation process.
- Intensive group discussions of use-case scenarios using practical examples from the industry.
### 6.90 Course: Disassembly Process Engineering [T-BGU-101850]

**Responsible:** Prof. Dr.-Ing. Sascha Gentes  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101110 - Process Engineering in Construction

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<td>Verfahrenstechniken der Demontage</td>
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<td>8240101850</td>
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<td>Prüfung (PR)</td>
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<td>WS 19/20</td>
<td>8240101850</td>
<td>Disassembly Process Engineering</td>
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**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
6.91 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations
M-WIWI-102832 - Operations Research in Supply Chain Management

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<td>Each summer term</td>
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Events
- SS 2019 2550488 Ereignisdiskrete Simulation in Produktion und Logistik 3 SWS Lecture (V) Spieckermann

Exams
- SS 2019 7900136 Discrete-Event Simulation in Production and Logistics Prüfung (PR) Nickel

Competence Certificate
The assessment consists of a written paper and an oral exam of about 30-40 min (alternative exam assessment).

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.
The course is planned to be held every summer term.
The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

Ereignisdiskrete Simulation in Produktion und Logistik
2550488, SS 2019, 3 SWS, Language: German, Open in study portal

Learning Content
Simulation of production and logistics systems is an interdisciplinary subject connecting expert knowledge from production management and operations research with mathematics/statistics as well as computer science and software engineering. With completion of this course, students know statistical foundations of discrete simulation, are able to classify and apply related software applications, and know the relation between simulation and optimization as well as a number of application examples. Furthermore, students are enabled to structure simulation studies and are aware of specific project scheduling issues.

Annotation
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Besides knowledge of Operations Research students are assumed to be familiar with the following topics:

- Introduction in Statistics
- Programming basics (algorithms and data structures)
- Basic knowledge in production and logistics

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature

6.92 Course: Dynamic Macroeconomics [T-WIWI-109194]

**Responsible:** Prof. Dr. Johannes Brumm

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101478 - Innovation and Growth
- M-WIWI-101496 - Growth and Agglomeration
- M-WIWI-101497 - Agglomeration and Innovation

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**Events**

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<td>2560402 Dynamic Macroeconomics</td>
<td>2 SWS Lecture (V)</td>
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<td>2560403 Übung zu Dynamic Macroeconomics</td>
<td>1 SWS Practice (Ü)</td>
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**Exams**

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<td>7900231</td>
<td>Dynamic Macroeconomics Prüfung (PR)</td>
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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None.

**Below you will find excerpts from events related to this course:**

**Dynamic Macroeconomics**
2560402, WS 19/20, 2 SWS, Language: English, [Open in study portal]

**Description**
The course Dynamic Macroeconomics addresses macroeconomic questions on an advanced level. The main focus of this course is on dynamic programming and its fundamental role in modern macroeconomics. After starting with the necessary mathematical tools, several applications in labor economics, economic growth, and asset pricing are introduced. The course pursues a hands-on approach so that students not only gain theoretical insights but also learn numerical tools to solve dynamic economic models using the modern programming language Python.

**Workload**
The total workload for this course is approximately 135 hours. For further information see German version.

**Literature**
Literature and lecture notes are provided during the course.
**6.93 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]**

**Responsible:** PD Dr. Patrick Jochem  
Prof. Dr. Russell McKenna  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101452 - Energy Economics and Technology

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<td>Efficient Energy Systems and Electric Mobility</td>
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**Exams**

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<td>7981006</td>
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**Competence Certificate**
See German version.

**Prerequisites**
None

**Recommendation**
None

*Below you will find excerpts from events related to this course:*

**Efficient Energy Systems and Electric Mobility**  
2581006, SS 2019, 2 SWS, Language: English, [Open in study portal](#)

**Learning Content**

This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.

The energy efficiency part of the lecture provides an introduction to the concept of energy efficiency, the means of affecting it and the relevant framework conditions. Further insights into economy-wide measurements of energy efficiency, and associated difficulties, are given with recourse to several practical examples. The problems associated with market failures in this area are also highlighted, including the Rebound Effect. Finally and by way of an outlook, perspectives for energy efficiency in diverse economic sectors are examined.

The electric mobility part of the lecture examines all relevant issues associated with an increased penetration of electric vehicles including their technology, their impact on the electricity system (power plants and grid), their environmental impact as well as their optimal integration in the future private electricity demand (i.e. smart grids and V2G). Besides technical aspects the user acceptance and behavioral aspects are also discussed.

**Workload**

The total workload for this course is approximately 105.0 hours. For further information see German version.

**Literature**

Will be announced in the lecture.
Course: eFinance: Information Systems for Securities Trading [T-WIWI-109941]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

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Events

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<td>2540454</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Weinhardt, Notheisen</td>
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<td>WS 19/20</td>
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<td>Übungen zu eFinance: Wirtschaftsinformatik für den Wertpapierhandel</td>
<td>1</td>
<td>Practice (Ü)</td>
<td>Jaquart, Soufi</td>
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Competence Certificate
Success is monitored by means of ongoing elaborations and presentations of tasks and an examination (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

Prerequisites
see below

Recommendation
None

Below you will find excerpts from events related to this course:

eFinance: Information Systems for Securities Trading
2540454, WS 19/20, 2 SWS, Language: English, Open in study portal

Description
The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

Learning Content
The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature


Elective literature:

6.95 Course: Elements and Systems of Technical Logistics [T-MACH-102159]

**Responsible:** Georg Fischer  
Dr.-Ing. Martin Mittwollen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101263 - Introduction to Logistics  
M-MACH-104888 - Advanced Module Logistics

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**Competence Certificate**  
The assessment consists of an oral exam (20min) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**  
none

**Recommendation**  
Knowledge out of Basics of Technical Logistics (T-MACH-102163) preconditioned

Below you will find excerpts from events related to this course:

**Elements and systems of Technical Logistics**  
2117096, WS 19/20, 3 SWS, Language: German, Open in study portal

**Learning Content**
- material flow systems and their (conveying) technical components
- mechanical behaviour of conveyors;
- structure and function of conveyor machines; elements of intralogistics (belt conveyor, racks, automatic guided vehicles, fan-in, bifurcation, and etc.)
- sample applications and calculations in addition to the lectures inside practical lectures

**Annotation**  
Knowledge out of Basics of Technical Logistics preconditioned

**Workload**  
presence: 36h  
rework: 84h

**Literature**  
recommendations during lectures
6.96 Course: Emerging Trends in Digital Health [T-WIWI-110144]

**Responsible:** Prof. Dr. Ali Sunyaev

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Competence Certificate**
The alternative exam assessment consists of a final thesis.

**Prerequisites**
None.

**Annotation**
The course is usually held as a block course.
6.97 Course: Emerging Trends in Internet Technologies [T-WIWI-110143]

**Responsible:** Prof. Dr. Ali Sunyaev

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Competence Certificate**
The alternative exam assessment consists of a final thesis.

**Prerequisites**
None.

**Annotation**
The course is usually held as a block course.
6.98 Course: Emissions into the Environment [T-WIWI-102634]

**Responsible:** Ute Karl  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101412 - Industrial Production III  
M-WIWI-101471 - Industrial Production II

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**Competence Certificate**
The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Recommendation**
None

Below you will find excerpts from events related to this course:

**Emissions into the Environment**  
2581962, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**
The course will provide an overview of sources of air pollution, waste and municipal waste; methods to monitor and to reduce/ manage pollutant flows; regulatory framework on national and international level.

A Air pollution control
- Introduction and definitions
- Sources and pollutants
- Regulatory framework
- Emission monitoring
- Air pollution control measures

B Waste management and Recycling
- Introduction and regulatory framework
- Statistics and logistics
- Recycling and disposal
- Waste treatment

C Waste water treatment
- Municipal waste water treatment systems
- Sewage sludge disposal

**Workload**
The total workload for this course is approximately 105 hours. For further information see German version.

**Literature**
Will be announced in the course.
## 6.99 Course: Employment Law I [T-INFO-101329]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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### 6.100 Course: Employment Law II [T-INFO-101330]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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6.101 Course: Energy and Environment [T-WIWI-102650]

**Responsible:** Ute Karl  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101452 - Energy Economics and Technology  
- M-WIWI-101468 - Environmental Economics

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**Competence Certificate**  
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**  
None.

Below you will find excerpts from events related to this course:

**Learning Content**  
The focus of the lecture is put on environmental impacts of fossil fuel conversion and related assessment methods. The list of topics is given below.

- Fundamentals of energy conversion  
- Air pollutant formation from fossil fuel combustion  
- Control of air pollutant emissions from fossil-fuelled power plants.  
- Measures to improve conversion efficiency of fossil fuelled power plants.  
- External effects of energy supply (Life Cycle Assessment of selected energy systems)  
- Integrated Assessment models supporting the European Thematic Strategy on Air  
- Cost-effectiveness analyses and cost-benefit analyses of air pollution control measures  
- Monetary evaluation of external effects of energy supply (external costs)

**Workload**  
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**  
The references for further reading are included in the lecture documents (see ILIAS)
# 6.102 Course: Energy and Process Technology I [T-MACH-102211]

**Responsible:** Prof. Dr.-Ing. Hans-Jörg Bauer  
Dr.-Ing. Corina Schwitzke  
Dr. Amin Velji  
Heiner Wirbser  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101296 - Energy and Process Technology I

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**Competence Certificate**

The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

**Energy and Process Technology I**

2157961, WS 19/20, 6 SWS, Language: German, Open in study portal  

**Lecture / Practice (VÜ)**

**Notes**

The last third of the lecture deals with the topic **Thermal Turbomachinery**. The basic principles, the functionality and the scope of application of gas and steam turbines for the generation of electrical power and propulsion technology are addressed.

**Learning Content**

The last third of the lecture deals with the topic **Thermal Turbomachinery**. The basic principles, the functionality and the scope of application of gas and steam turbines for the generation of electrical power and propulsion technology are addressed.
6.103 Course: Energy and Process Technology II [T-MACH-102212]

Responsible: Dr.-Ing. Corina Schwitzke
Heiner Wirbser

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101297 - Energy and Process Technology II

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Competence Certificate
The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
none

Below you will find excerpts from events related to this course:

Energy and Process Technology II
2170832, SS 2019, 6 SWS, Language: German, Open in study portal

Learning Content
Thermal Turbomachinery - In the first part of the lecture deals with energy systems. Questions regarding global energy resources and their use, especially for the generation and provision of electrical energy, are addressed. Common fossil and nuclear power plants for the centralized supply with electrical power as well as concepts of power-heat cogeneration for the decentralized electrical power supply by means of block-unit heat and power plants, etc. are discussed. Moreover, the characteristics and the potential of renewable energy conversion concepts, such as wind and hydro-power, photovoltaics, solar heat, geothermal energy and fuel cells are compare and evaluated. The focus is on the description of the potentials, the risks and the economic feasibility of the different strategies aimed to protect resources and reduce CO2 emissions.
6 COURSES

Course: Energy Conversion and Increased Efficiency in Internal Combustion Engines [T-MACH-105564]

6.104 Course: Energy Conversion and Increased Efficiency in Internal Combustion Engines [T-MACH-105564]

Responsible: Prof. Dr. Thomas Koch
Dr.-Ing. Heiko Kubach

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101275 - Combustion Engines I

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Competence Certificate
oral exam, 25 minutes, no auxillary means

Prerequisites
none

Below you will find excerpts from events related to this course:

Energy Conversion and Increased Efficiency in Internal Combustion Engines
2133121, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
1. Introduction
2. Thermodynamics of combustion engines
3. Fundamentals
4. Gas exchange
5. Flow field
6. Wall heat losses
7. Combustion in gasoline engines
8. Pressure Trace Analysis
9. Combustion in Diesel engines
10. Waste heat recovery
Learning Content
1. Introduction
2. Thermodynamics of combustion engines
3. Fundamentals
4. Gas exchange
5. Flow field
6. Wall heat losses
7. Combustion in gasoline engines
8. Pressure Trace Analysis
9. Combustion in Diesel engines
10. Waste heat recovery

Workload
regular attendance: 24 hours, self-study: 96 hours
6.105 Course: Energy Efficient Intralogistic Systems [T-MACH-105151]

Responsible: Dr.-Ing. Meike Braun
Dr.-Ing. Frank Schönung

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101263 - Introduction to Logistics
M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics

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Competence Certificate

Oral, 30 min. examination dates after the end of each lesson period.

Prerequisites

none

Recommendation

The content of course "Basics of Technical Logistics" should be known.

Annotation

Visit the IFL homepage of the course for the course dates and/or possible limitations of course participation.

Below you will find excerpts from events related to this course:

Energy efficient intralogistic systems

2117500, WS 19/20, 2 SWS, Language: German, Open in study portal

Description

Media:
presentations, black board

Notes

The content of course “Basics of Technical Logistics” should be known.

Learning Content

The main focuses of the course are:

- green supply chain
- processes in Intralogistic systems
- evaluation of energy consumption of conveyors
- modeling of conveying systems
- methods for energy savings
- approaches for energy efficiency increasing of continuous and discontinuous conveyors
- dimensioning energy efficient drives
- new approaches for resource efficient conveying systems.

Annotation

Visit the IFL homepage of the course for the course dates and/or possible limitations of course participation.
Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
None.

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101411 - Information Engineering
M-WIWI-101446 - Market Engineering
M-WIWI-103720 - eEnergy: Markets, Services and Systems

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Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites

None

Recommendation

None

Annotation

Former course title until summer term 2017: T-WIWI-102794 "eEnergy: Markets, Services, Systems".
The lecture has also been added in the IIP Module Basics of Liberalised Energy Markets.

Below you will find excerpts from events related to this course:

Energy Market Engineering

2540464, SS 2019, 2 SWS, Language: German, Open in study portal

Learning Content

This lecture discusses different design options for electricity markets. We will focus on different approaches of nodal and zonal pricing as well as single price mechanisms and capacity markets. After a short recap of German and European market designs, the different design options will be discussed scientifically and with the help of examples. Furthermore, we will evaluate alternative market design options like microgrids. Besides the fundamental functioning of those markets, we will introduce and discuss methodological knowledge to evaluate market design options.

Annotation

The lecture has also been added in the IIP Module Basics of Liberalised Energy Markets.

Workload

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature

6.107 Course: Energy Networks and Regulation [T-WIWI-107503]

- **Responsible:** Prof. Dr. Christof Weinhardt
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101446 - Market Engineering
  - M-WIWI-103720 - eEnergy: Markets, Services and Systems

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**Competence Certificate**
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered on every ordinary examination date.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Former course title until summer term 2017: T-WIWI-103131 "Regulatory Management and Grid Management - Economic Efficiency of Network Operation"

**Below you will find excerpts from events related to this course:**

**Energy Networks and Regulation**
2540494, WS 19/20, 2 SWS, Open in study portal

- **Lecture (V)**

**Learning Content**
The lecture "Energy Networks and Regulation" provides insights into the regulatory framework of electricity and gas. It touches upon the way the grids are operated and how regulation affects almost all grid activities. The lecture also addresses approaches of grid companies to cope with regulation on a managerial level. We analyze how the system influences managerial decisions and strategies such as investment or maintenance. Furthermore, we discuss how the system affects the operator’s abilities to deal with the massive challenges lying ahead ("Energiewende", redispach, European grid integration, electric vehicles etc.). Finally, we look at current developments and major upcoming challenges, e.g., the smart meter rollout. Covered topics include:

- Grid operation as a heterogeneous landscape: big vs. small, urban vs. rural, TSO vs. DSO.
- Objectives of regulation: Fair price calculation and high standard access conditions.
- The functioning of incentive regulation
- Amendment to the incentive regulation: its merits, its flaws
- The revenue cap and how it is adjusted according to certain exogenous factors
- Grid tariffs: How are they calculated, what is the underlying rationale, do we need a reform (and which)?
- Exogenous costs shifted (arbitrarily) into the grid, e.g. feed-in tariffs for renewable energy or decentralized supply.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature


**Responsible:** Prof. Dr. Martin Wietschel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101451 - Energy Economics and Energy Markets

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**Events**  
SS 2019 2581959 Energy Policy 2 SWS Lecture (V) Wietschel  
Exams  
SS 2019 7981959 Energy Policy Prüfung (PR) Fichtner

**Competence Certificate**  
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation.

**Prerequisites**  
None.

Below you will find excerpts from events related to this course:

**Energy Policy**  
2581959, SS 2019, 2 SWS, Language: German, [Open in study portal](#)  
**Description**  
The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

**Learning Content**  
The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

**Workload**  
The total workload for this course is approximately 105.0 hours. For further information see German version.

**Literature**  
Will be announced in the lecture.

**Responsible:**
- Dr. Armin Ardone
- Prof. Dr. Wolf Fichtner

**Organisation:**
KIT Department of Economics and Management

**Part of:**
M-WIWI-101452 - Energy Economics and Technology

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**Exams**

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<td>Energy Systems Analysis</td>
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**Competence Certificate**

The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

Below you will find excerpts from events related to this course:

**Energy Systems Analysis**

2581002, WS 19/20, 2 SWS, Language: English, Open in study portal

**Learning Content**

1. Overview and classification of energy systems modelling approaches
2. Usage of scenario techniques for energy systems analysis
3. Unit commitment of power plants
4. Interdependencies in energy economics
5. Scenario-based decision making in the energy sector
6. Visualisation and GIS techniques for decision support in the energy sector

**Annotation**

Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.
6.1 Course: Energy Trade and Risk Management [T-WIWI-102691]

**Responsible:** Dr. Clemens Cremer  
Dr. Dogan Keles

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101451 - Energy Economics and Energy Markets

**Type**  
Written examination

**Credits**  
4

**Recurrence**  
Each summer term

**Version**  
1

### Events

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### Exams

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<td>SS 2019</td>
<td>Prüfung (PR)</td>
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</table>

### Competence Certificate

The assessment consists of a written exam (60 minutes).

### Prerequisites

None

### Recommendation

None

Below you will find excerpts from events related to this course:

### Learning Content

1. Introduction to Markets, Mechanisms, Interactions
2. Basics of Risk Management
3. Oil Markets
4. Gas Markets
5. Coal Markets
6. Emission Markets
7. Simulation Game
8. Power Markets
9. Risk Management in Utilities

### Annotation

The credits have been changed from 3.5 to 4.

### Workload

The total workload for this course is approximately 120.0 hours. For further information see German version.
Literature

Elective literature:


www.riskglossary.com
6 COURSES

Course: Engine Measurement Techniques [T-MACH-105169]

**6.111 Course: Engine Measurement Techniques [T-MACH-105169]**

**Responsible:** Dr.-Ing. Sören Bernhardt

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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**Exams**

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**Competence Certificate**
oral examination, Duration: 0,5 hours, no auxiliary means

**Prerequisites**
none

**Recommendation**
T-MACH-102194 Combustion Engines I

*Below you will find excerpts from events related to this course:*

**V Engine measurement techniques**

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</table>

**Learning Content**
Students get to know state-of-the-art measurement techniques for combustion engines. In particular basic techniques for measuring engine operating parameters such as torque, speed, power and temperature.

Furthermore measurement errors and aberrations are discussed.

Possible techniques for measuring exhaust emissions, air/fuel ratio, fuel consumption as well as pressure indication for thermodynamic analysis are covered.

**Workload**
regular attendance: 21 hours
self-study: 100 hours

**Literature**

1. Grohe, H.: Messen an Verbrennungsmotoren
2. Bosch: Handbuch Kraftfahrzeugtechnik
3. Veröffentlichungen von Firmen aus der Meßtechnik
4. Hoffmann, Handbuch der Meßtechnik
5. Klingenberg, Automobil-Meßtechnik, Band C
### Competence Certificate

The assessment is carried out in form of a written thesis based on the course “Engineering FinTech Solutions”.

### Prerequisites

In order to take the course “Engineering FinTech Solutions”, students must have completed the module "Data Science for Finance".

Below you will find excerpts from events related to this course:

<table>
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</table>

### Description

This project invites students to either pursue their own FinTech innovation project or to contribute to the Chair’s ongoing innovation projects.

### Learning Content

The course is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

### Workload

The total workload for this course is approximately 270 hours. This consists of regular meetings with members of the research group and time for independent work on the software project.
6.113 Course: Engineering Hydrology [T-BGU-108943]

**Responsible:** Dr.-Ing. Uwe Ehret

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101642 - Natural Hazards and Risk Management 1
- M-WIWI-101644 - Natural Hazards and Risk Management 2
- M-WIWI-104837 - Natural Hazards and Risk Management

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**Recurrence:** Each summer term

**Version:** 1

### Events

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### Competence Certificate

See German version.

### Prerequisites

None
### Course: Enterprise Architecture Management [T-WIWI-102668]

**Responsible:** Thomas Wolf  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101472 - Informatics  
- M-WIWI-101628 - Emphasis in Informatics  
- M-WIWI-101630 - Electives in Informatics

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#### Events

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### Exams

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**Competence Certificate**

Please note that the exam for first writers will be offered for the last time in winter semester 2019/2020. A last examination possibility exists in the summer semester 2020 (only for repeaters).

The assessment of this course is a written (60 min.) or (if necessary) oral examination (30 min.) according to §4(2) of the examination regulation.

**Prerequisites**

None

---

**Below you will find excerpts from events related to this course:**

#### Enterprise Architecture Management

2511600, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Notes**

The following topics will be covered: components of enterprise architecture, enterprise strategy including methods to develop strategies, business process (re)engineering, methods to implement changes within enterprises (management of change).

**Learning objectives:**

Students understand the connection between enterprise strategy, business processes and business objects and IT architecture; they know methods to depict these connections and how they can be developed based on each other.
### 6.115 Course: Entrepreneurial Leadership & Innovation Management [T-WIWI-102833]

**Responsibility:** Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101507 - Innovation Management

<table>
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**Competence Certificate**

Please note: The seminar cannot be offered in the winter semester 2019/2020 due to organizational reasons. Alternative exam assessment.

**Prerequisites**
None

**Recommendation**
None
**6.116 Course: Entrepreneurship [T-WIWI-102864]**

**Responsible:** Prof. Dr. Orestis Terzidis  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101488 - Entrepreneurship (EnTechnon)  
- M-WIWI-101507 - Innovation Management  
- M-WIWI-105010 - Student Innovation Lab (SIL) 1

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Recommendation**
None

*Below you will find excerpts from events related to this course:*

**Entrepreneurship**

2545001, SS 2019, 2 SWS, Language: English, [Open in study portal]

**Description**
This lecture, as an obligatory part of the module "Entrepreneurship", introduces basic concepts of entrepreneurship. It approaches the individual steps of dynamic corporate development. The focus here is the introduction to methods for generating innovative business ideas, the translation of patents into business concepts and general principles of business planning. Other topics are the design and use of service-oriented information systems for founders, technology management, business model generation and lean startup methods for the implementation of business ideas in the way of controlled experiments in the market.

**Learning Content**
This lecture, as an obligatory part of the module "Entrepreneurship", introduces basic concepts of entrepreneurship. It approaches the individual steps of dynamic corporate development. The focus here is the introduction to methods for generating innovative business ideas, the translation of patents into business concepts and general principles of financial planning. Other topics are the design and use of service-oriented information systems for founders, technology management, business model generation and lean startup methods for the implementation of business ideas in the way of controlled experiments in the market.

**Workload**
The total workload for this course is approximately 90 hours. For further information see German version.
6.117 Course: Entrepreneurship Research [T-WIWI-102894]

**Responsible:** Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechnon)

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</table>

**Competence Certificate**

The performance review is done via a so called other methods of performance review (term paper) (alternative exam assessment). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

The topics will be prepared in groups. The presentation of the results is done during a a block period seminar at the end of the semester. Students have to be present all day long during the seminar.

Below you will find excerpts from events related to this course:

**Entrepreneurship Research**

2545002, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**

Content of the seminar is most recently discussed topics in the field of entrepreneurship. Topics and dates will be communicated online via the seminar portal.

**Annotation**

The topics are prepared in small groups. The seminar consists of two attendance meetings (kick-off event and final presentation). Between the appointments, independent work is required. The results will be presented at the end of the semester. There is an obligation to attend all seminars.

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**

Will be announced during/prior to the seminar as this varies from topic to topic.
6.118 Course: Environmental and Resource Policy [T-WIWI-102616]

**Responsible:** Rainer Walz

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101468 - Environmental Economics

<table>
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**Events**

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</table>

**Exams**

**Competence Certificate**

See German version

**Recommendation**

It is recommended to already have knowledge in the area of industrial organization and economic policy. This knowledge may be acquired in the courses Introduction to Industrial Organization [2520371] and Economic Policy [2560280].

**Below you will find excerpts from events related to this course:**

**Environmental and Ressource Policy**

2560548, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.

**Literature**

**Elective literature:**

Michaelis, P.: Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung, Heidelberg

OECD: Environmental Performance Review Germany, Paris
6.119 Course: Environmental Communication [T-BGU-101676]

Responsible: Dr. Charlotte Kämpf
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: M-WIWI-101642 - Natural Hazards and Risk Management 1
M-WIWI-101644 - Natural Hazards and Risk Management 2
M-WIWI-104837 - Natural Hazards and Risk Management

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Events

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Exams

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Competence Certificate
Non exam assessment (following §4(2), 3 of the examination regulation).

Prerequisites
Examination Prerequisite Environmental Communication must be passend.

Recommendation
None

Annotation
None
6.120 Course: Environmental Economics and Sustainability [T-WIWI-102615]

**Responsible:** Prof. Dr. Rainer Walz

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101468 - Environmental Economics

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**Events**

| Semester | Course Code | Title                                      | Credits | Type          | Lecturer |
|----------|-------------|--------------------------------------------|---------|---------------|
| WS 19/20 | 2521547     | Umweltökonomik und Nachhaltigkeit (mit Übung) | 2       | Lecture / Practice (VÜ) | Walz     |

**Exams**

| Semester | Exam Code | Title                                      | Type          | Lecturer |
|----------|-----------|--------------------------------------------|---------------|
| SS 2019  | 7900273   | Environmental Economics and Sustainability | Prüfung (PR) | Mitusch  |

**Competence Certificate**

See German version

**Prerequisites**

None

**Recommendation**

It is recommended to already have knowledge in the area of macro- and microeconomics. This knowledge may be acquired in the courses Economics I: Microeconomics [2600012] and Economics II: Macroeconomics [2600014].
### 6.121 Course: Environmental Law [T-INFO-101348]

**Responsible:** Prof. Dr. Matthias Bäcker  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101217 - Public Business Law  
- M-WIWI-101468 - Environmental Economics

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#### Exams

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Course: European and International Law [T-INFO-101312]

**Responsible:** Ulf Brühann  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

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**Events**

| SS 2019 | 24666 | Europäisches und Internationales Recht | 2 SWS | Lecture (V) | Brühann |

**Exams**

| SS 2019 | 7500084 | European and International Law | Prüfung (PR) | Marsch |
### Course: Examination Prerequisite Environmental Communication [T-BGU-106620]

- **Responsible:** Dr. Charlotte Kämpf
- **Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences
- **Part of:**
  - M-WIWI-101642 - Natural Hazards and Risk Management 1
  - M-WIWI-101644 - Natural Hazards and Risk Management 2
  - M-WIWI-104837 - Natural Hazards and Risk Management

#### Type
- Completed coursework
- Credits: 0
- Recurrence: Each summer term
- Version: 1

#### Events
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#### Competence Certificate
2 literature annotations, appr. 150 words each, and short presentation, appr. 10 min.

#### Prerequisites
- none

#### Recommendation
- none

#### Annotation
- none
6.124 Course: Experimental Economics [T-WIWI-102614]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101505 - Experimental Economics

Type: Written examination
Credits: 4,5
Recurrence: Each winter term
Version: 1

Events

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Exams

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Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Experimental Economics
2540489, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content
Experimental Economics have become a separate field in Economics. Nearly all fields of the economic discipline use economic experiments to verify theoretical results. Besides being used for empirical validation, this method is applied in political and strategic consulting. The lecture gives an introduction to experimental methods in economics and shows differences to experiments in natural sciences. Scientific studies are used to show exemplary applications.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2nd ed., 2006.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.
Course: Extraordinary additional course in the module Cross-Functional Management Accounting [T-WIWI-108651]

**Responsible:** Prof. Dr. Marcus Wouters  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101510 - Cross-Functional Management Accounting

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**Competence Certificate**
The assessment depends on which extraordinary course becomes part of the module "Cross-Functional Management Accounting".

**Prerequisites**
None

**Annotation**
The purpose of this placeholder is to make it possible to include an extraordinary course in the module "Cross-Functional Management Accounting". Proposals for specific courses have to be approved in advance by the module coordinator.
6.126 Course: Fabrication Processes in Microsystem Technology [T-MACH-102166]

**Responsible:** Dr. Klaus Bade  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101291 - Microfabrication

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**Competence Certificate**  
Oral examination, 20 minutes

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Fabrication Processes in Microsystem Technology**  
2143882, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Description**  
*Media:*  
pdf files of presentation sheets

**Learning Content**  
The lecture offers an advanced understanding of manufacturing processes in microsystem technology. Basic aspects of microtechnological processing will be introduced. With examples from semiconductor microfabrication and microsystem technology the base processing steps for conditioning and finishing, patterning, removal are imparted. Nano-patterning is covered is also included and the micro-nano interface is discussed. By the help of typical processing steps elementary mechanisms, process execution, and equipment are explained. Additionally quality control, process control and environmental topics are included.

**Literature**  
M. Madou  
Fundamentals of Microfabrication  
CRC Press, Boca Raton, 1997  
W. Menz, J. Mohr, O. Paul  
Mikrosystemtechnik für Ingenieure  
Dritte Auflage, Wiley-VCH, Weinheim 2005  
L.F. Thompson, C.G. Willson, A.J. Bowden  
Introduction to Microlithography  
Fabrication Processes in Microsystem Technology

2143882, WS 19/20, 2 SWS, Language: German, Open in study portal

Description

Media:

pdf files of presentation sheets

Learning Content

The lecture offers an advanced understanding of manufacturing processes in microsystem technology. Basic aspects of microtechnological processing will be introduced. With examples from semiconductor microfabrication and microsystem technology the base processing steps for conditioning and finishing, patterning, removal are imparted. Nano-patterning is covered is also included and the micro-nano interface is discussed. By the help of typical processing steps elementary mechanisms, process execution, and equipment are explained. Additionally quality control, process control and environmental topics are included.

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Mikrosystemtechnik für Ingenieure
Dritte Auflage, Wiley-VCH, Weinheim 2005

L.F. Thompson, C.G. Willson, A.J. Bowden
Introduction to Microlithography
6.127 Course: Facility Location and Strategic Supply Chain Management [T-WIWI-102704]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102832 - Operations Research in Supply Chain Management

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Exams

| SS 2019 | 7900233 | Facility Location and Strategic Supply Chain Management | Prüfung (PR) | Nickel |

Competence Certificate

Due to a research semester of Professor Nickel in WS 19/20, the course "Facility Location and Strategic Supply Chain Management" does NOT take place in WS 19/20. In particular, neither WS 19/20 nor SS 20 will offer an exam for the lecture. The follow-up exam to the lecture in WS 18/19 takes place in SS 19 and is exclusively for students in the second examination.

The assessment consists of a written exam (60 min) according to Section 4 (2), 1 of the examination regulation.

The exam takes place in every semester.

Prerequisite for admission to examination is the successful completion of the online assessments.

Prerequisites

Prerequisite for admission to examination is the successful completion of the online assessments.

Recommendation

None

Annotation

The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.
Responsible: Dr. Torsten Luedecke
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

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Events

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</table>

Competence Certificate
See German version.

Prerequisites
None

Recommendation
Basic knowledge in corporate finance, accounting, and valuation is required.

Below you will find excerpts from events related to this course:

Financial Analysis
2530205, SS 2019, 2 SWS, Language: English, Open in study portal

Description
This lecture reviews the key financial statements according to international financial reporting standards and provides analytical tools to evaluate the income statement, the balance sheet, and the cash flow statement in order to measure a firm’s liquidity, operational efficiency, and profitability.

Learning Content
Topics:

- Introduction to Financial Analysis
- Financial Reporting Standards
- Major Financial Statements and Other Information
- Recognition and Measurement Issues
- Analysis of Financial Statements
- Financial Reporting Quality

Literature
6.129 Course: Financial Econometrics [T-WIWI-103064]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type: Written examination
Credits: 4.5
Recurrence: Irregular
Version: 2

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics"[2520016]

Annotation
The course takes place each second summer term: 2018/2020....
6 COURSES

Course: Financial Intermediation [T-WIWI-102623]

 Responsible: Prof. Dr. Martin Ruckes
 Organisation: KIT Department of Economics and Management
 Part of:
  M-WIWI-101453 - Applied Strategic Decisions
  M-WIWI-101480 - Finance 3
  M-WIWI-101483 - Finance 2
  M-WIWI-101502 - Economic Theory and its Application in Finance

Type | Credits | Recurrence | Version
--- | --- | --- | ---
Written examination | 4.5 | Each winter term | 1

Events

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Exams

Competence Certificate

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V Financial Intermediation

2530232, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Description

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Competition in the banking sector
- Stability of the financial system
- The macroeconomic role of financial intermediation

Learning Content

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Stability of the financial system
- The macroeconomic role of financial intermediation
- Principles of the prudential regulation of banks

Workload

The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

Elective literature:

6.131 Course: Firm creation in IT security [T-WIWI-110374]

<table>
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<th>Prof. Dr. Orestis Terzidis</th>
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**Competence Certificate**
Alternative exam assessment. The grade consists of the presentation and the written elaboration.

**Prerequisites**
None
6.132 Course: Fixed Income Securities [T-WIWI-102644]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Events

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</table>

Competence Certificate

The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

Knowledge from the course "Derivatives" is very helpful.

Annotation

The course is offered as a block course.

Below you will find excerpts from events related to this course:

Fixed Income Securities

2530260, WS 19/20, 2 SWS, Language: German, Open in study portal

Description

The lecture deals with both German and international bond markets, which are an important source of funding for both the corporate and the public sector. After an overview of the most important bond markets, various definitions of return are discussed. Based on that, the concept of the yield curve is presented. The modelling of the dynamics of the term structure of interest rates provides the theoretical foundation for the valuation of interest rate derivatives, which is discussed in the last part of the lecture.

Learning Content

The lecture deals with both German and international bond markets, which are an important source of funding for both the corporate and the public sector. After an overview of the most important bond markets, various definitions of return are discussed. Based on that, the concept of the yield curve is presented. The modelling of the dynamics of the term structure of interest rates provides the theoretical foundation for the valuation of interest rate derivatives, which is discussed in the last part of the lecture.

Workload

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature


Elective literature:

### 6.133 Course: Freight Transport [T-BGU-106611]

**Responsible:** Bastian Chlond  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-BGU-101064 - Fundamentals of Transportation  
- M-BGU-101065 - Transportation Modelling and Traffic Management

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#### Events

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**Competence Certificate**  
written exam, 60 min.

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
### 6.134 Course: Fuels and Lubricants for Combustion Engines [T-MACH-105184]

**Responsible:** Dr.-Ing. Bernhard Ulrich Kehrwald  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101303 - Combustion Engines II

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**Competence Certificate**

oral examination, Duration: ca. 25 min., no auxiliary means

**Prerequisites**

none

Below you will find excerpts from events related to this course:

#### Fuels and Lubricants for Combustion Engines

2133108, WS 19/20, 2 SWS, Language: German, Open in study portal

**Notes**

Introduction and basics

- Fuels for Gasoline and Diesel engines
- Hydrogen
- Lubricants for Gasoline and Diesel engines
- Coolants for combustion engines

**Learning Content**

Introduction and basics

- Fuels for Gasoline and Diesel engines
- Hydrogen
- Lubricants for Gasoline and Diesel engines
- Coolants for combustion engines

**Workload**

regular attendance: 24 hours  
self-study: 96 hours
Literature
Lecturer notes
6.135 Course: Fundamentals of Catalytic Exhaust Gas Aftertreatment [T-MACH-105044]

**Responsible:**
- Prof. Dr. Olaf Deutschmann
- Prof. Dr. Jan-Dierk Grunwaldt
- Dr.-Ing. Heiko Kubach
- Prof. Dr.-Ing. Egbert Lox

**Organisation:**
KIT Department of Mechanical Engineering

**Part of:**
M-MACH-101303 - Combustion Engines II

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**Exams**

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**Competence Certificate**
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Fundamentals of catalytic exhaust gas aftertreatment**
2134138, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**
1. kind and source of emissions
2. emission legislation
3. principal of catalytic exhaust gas aftertreatment (EGA)
4. EGA at stoichiometric gasoline engines
5. EGA at gasoline engines with lean mixtures
6. EGA at diesel engines
7. economical basic conditions for catalytic EGA

**Workload**
regular attendance: 36 hours
self-study: 84 hours
Literature
Lecture notes available in the lectures

# 6.136 Course: Gas Engines [T-MACH-102197]

**Responsible:** Dr.-Ing. Rainer Golloch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101303 - Combustion Engines II  

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**Competence Certificate**  
Oral examination, duration 25 min., no auxiliary means  

**Prerequisites**  
none
Responsibles: Dr. Markus Klaiber
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101284 - Specialization in Production Engineering

**Course: Gear Cutting Technology [T-MACH-102148]**

<table>
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**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Gear Technology** 2149655, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**

Media:

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)

**Notes**

Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

**Learning Outcomes:**

The students...

- can describe the basic terms of gearings and are able to explain the imparted basics of the gearwheel and gearing theory.
- are able to specify the different manufacturing processes and machine technologies for producing gearings. Furthermore they are able to explain the functional principles and the dis-/advantages of these manufacturing processes.
- can apply the basics of the gearing theory and manufacturing processes on new problems.
- are able to read and interpret measuring records for gearings. are able to make an appropriate selection of a process based on a given application
- can describe the entire process chain for the production of toothed components and their respective influence on the resulting workpiece properties.

**Workload:**

regular attendance: 21 hours
self-study: 99 hours
Learning Content
Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

Workload
regular attendance: 21 hours
self-study: 99 hours
Course: Global Optimization I [T-WIWI-102726]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type          Credits  Recurrence     Version
Written exam   4.5      Each summer term  1

Events
SS 2019 2550134 Globale Optimierung I 2 SWS Lecture (V) Stein
SS 2019 2550135 Übungen zu Globale Optimierung I-II 1 SWS Practice (Ü) Stein

Exams
SS 2019 7900061_SS2019_HK Global Optimization I Prüfung (PR) Stein

Competence Certificate
Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO) and possibly of a compulsory prerequisite. The exam is offered in the lecture of semester and the following semester.

The success check can be done also with the success control for "Global optimization II". In this case, the duration of the written exam is 120 min.

Prerequisites
None

Recommendation
None

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

Globale Optimierung I
2550134, SS 2019, 2 SWS, Open in study portal

Learning Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.
Literature

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
6.139 Course: Global Optimization I and II [T-WIWI-103638]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101473 - Mathematical Programming

<table>
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**Exams**

| SS 2019 | 7900063_SS2019_HK | Global Optimization I and II | Prüfung (PR) | Stein |

**Competence Certificate**

The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The examination is held in the semester of the lecture and in the following semester.

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

**Globale Optimierung I**

| SS 2019 | 2550134, SS 2019 | 2 SWS | Open in study portal |

**Learning Content**

In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Literature**

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
Learning Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The global solution of convex optimization problems is subject of part I of the lecture.

Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via aBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996
6.140 Course: Global Optimization II [T-WIWI-102727]

**Responsibility:** Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101473 - Mathematical Programming

**Type**
- Written examination

**Credits** 4.5

**Recurrence** Each summer term

**Version** 2

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**Competence Certificate**
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of “Global optimization I”. In this case, the duration of the written examination takes 120 minutes.

**Prerequisites**
None

**Annotation**
Part I and II of the lecture are held consecutively in the same semester.

*Below you will find excerpts from events related to this course:*

**Globale Optimierung II**
2550136, SS 2019, 2 SWS, Open in study portal

**Lecture (V)**

**Learning Content**
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate. The global solution of convex optimization problems is subject of part I of the lecture.

Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via aBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.
Literature

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996
6.141 Course: Global Production and Logistics - Part 1: Global Production [T-MACH-105158]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101282 - Global Production and Logistics

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**Exams**

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**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

"T-MACH-108848 - Globale Produktion und Logistik - Teil 1: Globale Produktion" must not be commenced.

Below you will find excerpts from events related to this course:

**Global Production and Logistics - Part 1: Global Production**

2149610, WS 19/20, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**

**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
The lecture examines the management of global production networks of manufacturing companies. It gives an overview of the influencing factors and challenges of global production. In-depth knowledge of common methods and procedures for planning, designing and managing global production networks is imparted.

Therefore, the lecture first of all discusses the connections and interdependencies between the business strategy and the production strategy and illustrates necessary tasks for the definition of a production strategy. Methods for site selection, for the site-specific adaptation of product design and production technology as well as for the establishment of new production sites and for the adaptation of existing production networks to changing framework conditions are subsequently taught within the context of the design of the network footprint. With regard to the management of global production networks, the lecture addresses challenges associated with coordination, procurement and order management in global networks. The lecture is complemented by a discussion on the use of Industry 4.0 applications in global production and current trends in planning, designing and managing global production networks.

The topics include:

- Basic conditions and influencing factors of global production (historical development, targets, chances and threats)
- Framework for planning, designing and managing global production networks
- Production strategies for global production networks
  - From business strategy to production strategy
  - Tasks of the production strategy (product portfolio management, circular economy, planning of production depth, production-related research and development)
- Design of global production networks
  - Basic types of network structures
  - Planning process for the design of the network footprint
  - Adaptation of the network footprint
  - Site selection
  - Location-specific adaptation of production technology and product design
- Management of global production networks
  - Network coordination
  - Procurement process
  - Order management
- Trends in planning, designing and managing global production networks

Learning Outcomes:
The students ...

- can explain the general conditions and influencing factors of global production
- are capable to apply defined procedures for site selection and to evaluate site decisions with the help of different methods
- are able to select the adequate scope of design for siteappropriate production and product construction casespecifically
- can state the central elements in the planning process of establishing a new production site.
- are capable to make use of the methods to design and scale global production networks for company-individual problems
- are able to show up the challenges and potentials of the departments sales, procurement as well as research and development on global basis.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Recommendations:
Combination with Global Production and Logistics – Part 2
Learning Content
The lecture examines the management of global production networks of manufacturing companies. It gives an overview of the influencing factors and challenges of global production. In-depth knowledge of common methods and procedures for planning, designing and managing global production networks is imparted.

Therefore, the lecture first of all discusses the connections and interdependencies between the business strategy and the production strategy and illustrates necessary tasks for the definition of a production strategy. Methods for site selection, for the site-specific adaptation of product design and production technology as well as for the establishment of new production sites and for the adaptation of existing production networks to changing framework conditions are subsequently taught within the context of the design of the network footprint. With regard to the management of global production networks, the lecture addresses challenges associated with coordination, procurement and order management in global networks. The lecture is complemented by a discussion on the use of industry 4.0 applications in global production and current trends in planning, designing and managing global production networks.

The topics include:

- Basic conditions and influencing factors of global production (historical development, targets, chances and threats)
- Framework for planning, designing and managing global production networks
- Production strategies for global production networks
  - From business strategy to production strategy
  - Tasks of the production strategy (product portfolio management, circular economy, planning of production depth, production-related research and development)
- Design of global production networks
  - Basic types of network structures
  - Planning process for the design of the network footprint
  - Adaptation of the network footprint
  - Site selection
  - Location-specific adaptation of production technology and product design
- Management of global production networks
  - Network coordination
  - Procurement process
  - Order management
- Trends in planning, designing and managing global production networks

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Lecture Notes
recommended secondary literature:
6.142 Course: Global Production and Logistics - Part 2: Global Logistics [T-MACH-105159]

Responsible: Prof. Dr.-Ing. Kai Furmans  
Organisation: KIT Department of Mechanical Engineering  
Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems  
M-MACH-101282 - Global Production and Logistics  
M-MACH-104888 - Advanced Module Logistics

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Events

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<td>2 SWS</td>
<td>Lecture (V)</td>
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<td>We recommend attending the course &quot;Logistics - organization, design and control of logistic systems &quot; (2118078) beforehand.</td>
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Exams

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<td>Global Production and Logistics - Part 2: Global Logistics</td>
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</table>

Competence Certificate

The assessment consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

Prerequisites

none

Description

Media:

- presentations, black board
Notes
Characteristics of global trade

- Incoterms
- Customs clearance, documents and export control

Global transport and shipping

- Maritime transport, esp. container handling
- Air transport

Modeling of supply chains

- SCOR model
- Value stream analysis

Location planning in cross-border-networks

- Application of the Warehouse Location Problem
- Transport Planning

Inventory Management in global supply chains

- Stock keeping policies

Inventory management considering lead time and shipping costs

After taking this course students are able to:

- assign basic problems of planning and operation of global supply chains and plan them with appropriate methods,
- describe requirements and characteristics of global trade and transport, and
- evaluate characteristics of the design from logistic chains regarding their suitability.

The assessment consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The main exam is offered every summer semester. A second date for the exam is offered in winter semester only for students that did not pass the main exam.

Recommendations:
We recommend the course "Logistics - organisation, design and control of logistic systems " (2118078) beforehand.

regular attendance: 21 hours
self-study: 99 hours

Learning Content
Characteristics of global trade

- Incoterms
- Customs clearance, documents and export control

Global transport and shipping

- Maritime transport, esp. container handling
- Air transport

Modeling of supply chains

- SCOR model
- Value stream analysis

Location planning in cross-border-networks

- Application of the Warehouse Location Problem
- Transport Planning

Inventory Management in global supply chains

- Stock keeping policies

Inventory management considering lead time and shipping costs

Workload
regular attendance: 21 hours
self-study: 99 hours
Literature

Elective literature:

- Arnold/Isermann/Kuhn/Tempelmeier. HandbuchLogistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
- Domschke. Logistik, Rundreisen und Touren, Oldenbourg Verlag, 1982
- Domschke/Drexel. Logistik, Standorte, Oldenbourg Verlag, 1996
- Gudehus. Logistik, Springer Verlag, 2007
- Tempelmeier. Bestandsmanagement in SupplyChains, Books on Demand 2006
6.143 Course: Graph Theory and Advanced Location Models [T-WIWI-102723]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type: Written examination
Credits: 4.5
Recurrence: Irregular
Version: 2

Competence Certificate
The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.io.r.kit.edu/english/Courses.php.
6.144 Course: Heat Economy [T-WIWI-102695]

**Responsible:** Prof. Dr. Wolf Fichtner  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101452 - Energy Economics and Technology

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### Exams

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<th>7981001</th>
<th>Heat Economy</th>
<th>Prüfung (PR)</th>
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### Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

### Prerequisites

None.

### Recommendation

None

### Annotation

See German version.
6.145 Course: High-Voltage Technology I [T-ETIT-101913]

**Responsible:** Dr.-Ing. Rainer Badent

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101163 - High-Voltage Technology

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**Prerequisites**

none
### 6.146 Course: High-Voltage Technology II [T-ETIT-101914]

**Responsible:** Dr.-Ing. Rainer Badent

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101163 - High-Voltage Technology

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#### Exams

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**Prerequisites**

none
6.147 Course: High-Voltage Test Technique [T-ETIT-101915]

**Responsible:** Dr.-Ing. Rainer Badent

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101164 - Generation and Transmission of Renewable Power

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**Prerequisites**

none

**Responsible:** Prof. Dr. Melanie Volkamer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Exams**

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**Competence Certificate**

The lecture will not be offered in the winter semester 2019/2020.

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**
Successful participation in the exercises.

**Recommendation**
The prior attendance of the lecture "Information Security" is strongly recommended.
6.149 Course: Incentives in Organizations [T-WIWI-105781]

**Responsible:** Prof. Dr. Petra Nieken

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101453 - Applied Strategic Decisions
- M-WIWI-101500 - Microeconomic Theory
- M-WIWI-101505 - Experimental Economics
- M-WIWI-101510 - Cross-Functional Management Accounting

### Events

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### Examination

**Events**

- **SS 2019 2573003**
  - Incentives in Organizations
  - 2 SWS
  - Lecture (V)
  - Nieken

- **SS 2019 2573004**
  - Übung zu Incentives in Organizations
  - 1 SWS
  - Practice (Ü)
  - Nieken, Mitarbeiter

**Exams**

- **SS 2019 7900132**
  - Incentives in Organizations
  - Prüfung (PR)
  - Nieken

**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

In case of a small number of registrations, we might offer an oral exam instead of a written exam.

**Prerequisites**

None

**Recommendation**

Knowledge of microeconomics, game theory, and statistics is assumed.

**Annotation**

The course is carried out routinely in summer.

Below you will find excerpts from events related to this course:

### Incentives in Organizations

- **2573003, SS 2019, 2 SWS, Language: English, Open in study portal**

**Notes**

See Module Handbook
**6.150 Course: Industrial Services [T-WIWI-102822]**

**Responsible:** Prof. Dr. Hansjörg Fromm  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101448 - Service Management  
M-WIWI-101506 - Service Analytics  
M-WIWI-102808 - Digital Service Systems in Industry

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**Events**

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**Exams**

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**Competence Certificate**

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Industrial Services**  
2595505, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**

Services are becoming ever more important in business. Today, the gross income share of services in Germany exceeds 70%. Following this trend, many companies that previously focused solely on the sale of goods, strive to an extension of their business model: In order to realize new competitive advantages in domestic and international markets, they enrich their material goods with customer-specific services. This transformation to a provider of integrated solutions is called "Servitization" (Neely 2009). For this reason, so-called industrial services to companies of increasing importance. They benefit from the increasingly detailed data collected (on "Big Data"), e.g. concerning user profiles, failure statistics, usage history, accrued expenses, etc. Only these data allow in principle to end products and spare parts are delivered faster, cheaper and more targeted and technicians can be used more efficiently with the correct skills. This requires, however, also suitable methods of optimization, prognosis or predictive modeling. When used properly, such methods can minimize logistics costs, increase availability, prevent potential failures and improve repair planning. This is also enabled by latest "Technology Enabled Services" along with corresponding data transfer and analysis ("Internet of Things", automatic error detection, remote diagnostics, centralized collection of consumption data, etc.). The change from goods manufacturer to a provider of integrated solutions requires new services, transformation of business models as well as intelligent new contract types, which are addressed in the course as well.

More specifically, the lessons of this lecture will include:

- Servitization – The Manufacturer’s Transformation to Integrated Solution Provider
- Service Levels – Definitions, Agreements, Measurements and Service Level Engineering
- The “Services Supply Chain”
- Spare Parts Planning – Forecasting, Assortment Planning, Order Quantities and Safety Stocks
- Distribution Network Planning – Network Types, Models, Optimization
- Service Technician Planning
- Condition Monitoring, Predictive Maintenance, Diagnose Systems
- Call Center Services
- Full Service Contracts
- IT-enabled Value-Add Services – Industrial Service Innovation
Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature


### 6.151 Course: Information Engineering [T-MACH-102209]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101281 - Virtual Engineering B  
- M-MACH-101283 - Virtual Engineering A

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**Exams**

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**Competence Certificate**

Alternative exam assessment (written composition and speech)

**Prerequisites**

None
### 6.152 Course: Information Management for Public Mobility Services [T-BGU-106608]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-BGU-101064 - Fundamentals of Transportation  
- M-BGU-101065 - Transportation Modelling and Traffic Management

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<td>6232813</td>
<td>Informationsmanagement für öffentliche Mobilitätsangebote</td>
<td>Vortisch</td>
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**Competence Certificate**  
lecture accompanying exercises, appr. 5 pieces

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
**6.153 Course: Information Service Engineering [T-WIWI-106423]**

**Responsible:** Prof. Dr. Harald Sack  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics  
M-WIWI-101628 - Emphasis in Informatics  
M-WIWI-101630 - Electives in Informatics

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### Events

| SS 2019 | 2511606 | Information Service Engineering | 2 SWS | Lecture (V) | Sack |
| SS 2019 | 2511607 | Übungen zu Information Service Engineering | 1 SWS | Practice (Ü) | Sack |

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<tr>
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### Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.  
The exam takes place every semester and can be repeated at every regular examination date.

### Prerequisites
None

### Annotation
New course starting summer term 2017.

*Below you will find excerpts from events related to this course:*
Learning Content
- Information, Natural Language and the Web
- Natural Language Processing
  - NLP and Basic Linguistic Knowledge
  - NLP Applications, Techniques & Challenges
  - Evaluation, Precision and Recall
  - Regular Expressions and Automata
  - Tokenization
  - Language Model and N-Grams
  - Part-of-Speech Tagging
- Linked Data Engineering
  - Knowledge Representations and Ontologies
  - What's in an URI?
  - Resource Description Framework (RDF)
  - Creating new Models with RDFS
  - Querying RDF(S) with SPARQL
  - More Expressivity with Web Ontology Language (OWL)
  - The Web of Data
  - Vocabularies and Ontologies in the Web of Data
  - Wikipedia, DBpedia, and Wikidata
- Information Retrieval
  - Information Retrieval Models
  - Retrieval Evaluation
  - Web Information Retrieval
  - Document Crawling, Text Processing, and Indexing
  - Query Processing and Result Representation
  - Question Answering
- Knowledge Mining
  - From Data to Knowledge
  - Data Mining
  - Machine Learning Basics for Knowledge Mining
  - Mining Knowledge from Wikipedia
  - Named Entity Resolution
- Exploratory Search and Recommender Systems
  - Semantic Search and Entity Centric Search
  - Collaborative Filtering and Content Based Recommendations
  - From Search to Intelligent Browsing
  - Linked Data Based Exploratory Search
  - Fact Ranking

Annotation
New lecture, since summer semester 2017

Literature
6 COURSES

Course: Information Systems and Supply Chain Management [T-MACH-102128]

6.154 Course: Information Systems and Supply Chain Management [T-MACH-102128]

**Responsible:** Dr. Christoph Kilger

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101263 - Introduction to Logistics
- M-MACH-101278 - Material Flow in Networked Logistic Systems
- M-MACH-101280 - Logistics in Value Chain Networks
- M-MACH-101282 - Global Production and Logistics
- M-MACH-104888 - Advanced Module Logistics

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**Events**

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<td>Information Systems in Logistics and Supply Chain Management</td>
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**Exams**

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**Competence Certificate**
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Information Systems in Logistics and Supply Chain Management**

2118094, SS 2019, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

**Description**

**Media:**
presentations

**Learning Content**

1) Overview of logistics systems and processes
2) Basic concepts of information systems and information technology
3) Introduction to IS in logistics: Overview and applications
4) Detailed discussion of selected SAP modules for logistics support

**Annotation**

none

**Workload**

regular attendance: 21 hours
self-study: 99 hours

**Literature**

# 6.155 Course: Innovation Lab [T-ETIT-110291]

**Responsible:**
- Prof. Dr.-Ing. Sören Hohmann
- Prof. Dr.-Ing. Eric Sax
- Prof. Dr. Wilhelm Stork
- Prof. Dr.-Ing. Thomas Zwick

**Organisation:**
KIT Department of Electrical Engineering and Information Technology

**Part of:**
- M-WIWI-105011 - Student Innovation Lab (SiL) 2

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**Competence Certificate**
see module description

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<tr>
<th>Responsible</th>
<th>Prof. Dr. Marion Weissenberger-Eibl</th>
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| Part of              | M-WIWI-101488 - Entrepreneurship (EnTechnon)  
                      | M-WIWI-101507 - Innovation Management |

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
None

Below you will find excerpts from events related to this course:

#### Innovation Management: Concepts, Strategies and Methods
2545100, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Notes**
The lecture will be held in German.

**Learning Content**
The course ‘Innovation Management: Concepts, Strategies and Methods’ offers scientific concepts which facilitate the understanding of the different phases of the innovation process and resulting strategies and appropriate methodologies suitable for application.

The concepts refer to the entire innovation process so that an integrated perspective is made possible. This is the basis for the teaching of strategies and methods which fulfil the diverse demands of the complex innovation process. The course focuses particularly on the creation of interfaces between departments and between various actors in a company’s environment and the organisation of a company’s internal procedures. In this context a basic understanding of knowledge and communication is taught in addition to the specific characteristics of the respective actors. Subsequently methods are shown which are suitable for the profitable and innovation-led implementation of integrated knowledge.

**Annotation**
This course was formerly named "Innovation Management".

**Workload**
The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**
A detailed bibliography is provided with the lecture notes.

Responsible: Dr. Daniela Beyer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management

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Competence Certificate
Alternative exam assessments (§4(2), 3 SPO). The grade consists of an exposé (15%), a guideline interview or an analysis tool (25%), a group presentation of the results (20%) and a seminar paper (40%).

Prerequisites
None.

Recommendation
Prior attendance of the course Innovation Management [2545015] is recommended.
### 6.158 Course: Innovationtheory and -Policy [T-WIWI-102840]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101478 - Innovation and Growth  
M-WIWI-101497 - Agglomeration and Innovation  
M-WIWI-101514 - Innovation Economics  

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Events

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<td>Prüfung (PR)</td>
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**Competence Certificate**

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

**Prerequisites**  
None

**Recommendation**

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

**Below you will find excerpts from events related to this course:**

### Innovationtheory and -policy

2560236, SS 2019, SWS, Language: German, [Open in study portal](#)

**Learning Content**

- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
Excerpt:

6.159 Course: Integrated Product Development [T-MACH-105401]

**Responsible:** Prof. Dr.-Ing. Albert Albers
Albers Assistenten

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-102626 - Major Field: Integrated Product Development

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<td>Project Work in Product Development</td>
<td>2</td>
<td>Others (sonst.)</td>
<td>Albers</td>
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**Competence Certificate**
oral examination (60 minutes)

**Prerequisites**
none

**Annotation**
Due to organizational reasons, the number of participants is limited. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK homepage from april to july. The selection itself is made by Prof. Albers in personal interviews.

*Below you will find excerpts from events related to this course:*

**Integrated Product Development**
2145156, WS 19/20, 4 SWS, Language: German, [Open in study portal](#)
Notes
Registration required in the previous summer semester. The lecture starts in first week of October.

Prerequisites:
The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK homepage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:
none

Workload:
regular attendance: 84 h
self-study: 288 h

Examination:
oral examination (60 minutes)
combined examination of lectures, tutorials and project work

Course content:
organizational integration: integrated product engineering model, core team management and simultaneous engineering informational integration: innovation management, cost management, quality management and knowledge management personal integration: team coaching and leadership management invited lectures

Learning objectives:
The Students are able to ...

- analyze and evaluate product development processes based on examples and their own experiences.
- plan, control and evaluate the working process systematically.
- choose and use suitable methods of product development, system analysis and innovation management under consideration of the particular situation.
- prove their results.
- develop complex technical solutions in a team and to present them to qualified persons as well as non-qualified persons
- to design overall product development processes under consideration of market-, customer- and company- aspects
Notes

Prerequisites:
The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited to 42 persons. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK homepage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:
none

Workload:
regular attendance: 84 h
self-study: 288 h

Examination:
lectures: 21 h
preparation to exam: 99 h

Course content:
problem solving: analysis techniques, creativity techniques and evaluation methods
professional skills: presentation techniques, moderation and teamcoaching
development tools: MS Project, Szenario-Manager & Pro/Engineer Wildfire

Learning objectives:
The theoretical background taught in the lecture, is deepened through methodworkshops, business games and case studies. The reflexion of the onself procedure allows for an applicability and practicability of the contents in the accompanying development project as well as for the career entry.
Notes
Participation only possible in combination with the lecture 2145156 'Integrated Product Development'.

Prerequisites:
The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).
Due to organizational reasons, the number of participants is limited to 42 persons. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK homepage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:
none

Workload:
regular attendance: 21 h
self-study: 99 h

Examination:
oral examination (60 minutes)
combined examination of lectures, tutorials and project work

Course content:
The project work begins with the early stages of product development, i.e. the identification of market trends and needs. Based on this information the students develop scenarios for future markets and create product profiles, which describe the customers and their demands without anticipating possible product solutions. After having passed several following milestones for ideas, concepts and designs, virtual prototypes and function prototypes are presented to an audience.
The project work is supported by coaching through skilled faculty staff. Additionally weekly tutorials, respectively workshops are given. For doing the project the teams gain access to team workspaces featuring IT-infrastructure and relevant software, such as office, CAD or FEA. Further on the teams learn how team cooperation and knowledge management can be supported in design project by using a wiki system.s

Learning objectives:
The center of "Integrated Product Development" constitutes itself in the development of a technical product within independent working student teams on the basis of the market situation up to virtual and real prototypes. Thereby the integrate treatment of the product development process is of importance. The project teams hereby represent development departments of medium sized companies, in which the presented methods and tools are field - experienced applied and ideas are transformed into concrete product models.
For the preparation of this development project the basics of 3D-CAD-modelling (Pro/ENGINEER) as well as different tools and methods of creative designing, of sketching and solution finding are mediated in workshops. Special events impart an insight of presentation techniques and the meaning of technical design.
6.160 Course: Integrated Production Planning in the Age of Industry 4.0 [T-MACH-109054]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101272 - Integrated Production Planning

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**Events**

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**Exams**

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<td>Lanza</td>
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**Competence Certificate**

Written Exam (120 min)

**Prerequisites**

"T-MACH-108849 - Integrierte Produktionsplanung im Zeitalter von Industrie 4.0" as well as "T-MACH-102106 Integrierte Produktionsplanung" must not be commenced.

Below you will find excerpts from events related to this course:

**Integrated Production Planning in the Age of Industry 4.0**

2150660, SS 2019, 6 SWS, Language: German, Open in study portal

**Description**

**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
Integrated production planning in the age of industry 4.0 will be taught in the context of this engineering science lecture. In addition to a comprehensive introduction to Industry 4.0, the following topics will be addressed at the beginning of the lecture:

- Basics, history and temporal development of production
- Integrated production planning and integrated digital engineering
- Principles of integrated production systems and further development with Industry 4.0

Building on this, the phases of integrated production planning are taught in accordance with VDI Guideline 5200, whereby special features of parts production and assembly are dealt with in the context of case studies:

- Factory planning system
- Definition of objectives
- Data collection and analysis
- Concept planning (structural development, structural dimensioning and rough layout)
- Detailed planning (production planning and control, fine layout, IT systems in an industry 4.0 factory)
- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are rounded off by numerous current practical examples with a strong industry 4.0 reference. Within the exercises the lecture contents are deepened and applied to specific problems and tasks.

Learning Outcomes:
The students ...

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

Workload:

**MACH:**
- regular attendance: 63 hours
- self-study: 177 hours

**WING:**
- regular attendance: 63 hours
- self-study: 207 hours

Learning Content
Integrated production planning in the age of industry 4.0 will be taught in the context of this engineering science lecture. In addition to a comprehensive introduction to Industry 4.0, the following topics will be addressed at the beginning of the lecture:

- Basics, history and temporal development of production
- Integrated production planning and integrated digital engineering
- Principles of integrated production systems and further development with Industry 4.0

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- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are rounded off by numerous current practical examples with a strong industry 4.0 reference. Within the exercises the lecture contents are deepened and applied to specific problems and tasks.
Workload
MACH:
regular attendance: 63 hours
self-study: 177 hours
WING:
regular attendance: 63 hours
self-study: 207 hours

Literature
Lecture Notes
### Course: Integrative Strategies in Production and Development of High Performance Cars [T-MACH-105188]

**Responsible:** Karl-Hubert Schlichtenmayer  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- M-MACH-101282 - Global Production and Logistics  
- M-MACH-101284 - Specialization in Production Engineering

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<td>Integrative Strategies in Production and Development of High Performance Cars</td>
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**Competence Certificate**  
Written Exam (60 min)

**Prerequisites**  
none

_Below you will find excerpts from events related to this course:_

### Integrative Strategies in Production and Development of High Performance Cars  
2150601, SS 2019, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
Notes
The lecture deals with the technical and organizational aspects of integrated development and production of sports cars on the example of Porsche AG. The lecture begins with an introduction and discussion of social trends. The deepening of standardized development processes in the automotive practice and current development strategies follow. The management of complex development projects is a first focus of the lecture. The complex interlinkage between development, production and purchasing are a second focus. Methods of analysis of technological core competencies complement the lecture. The course is strongly oriented towards the practice and is provided with many current examples.

The main topics are:

- Introduction to social trends towards high performance cars
- Automotive Production Processes
- Integrative R&D strategies and holistic capacity management
- Management of complex projects
- Interlinkage between R&D, production and purchasing
- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

Learning Outcomes:
The students ...

- are capable to specify the current technological and social challenges in automotive industry.
- are qualified to identify interlinkages between development processes and production systems.
- are able to explain challenges and solutions of global markets and global production of premium products.
- are able to explain modern methods to identify key competences of producing companies.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
The lecture deals with the technical and organizational aspects of integrated development and production of sports cars on the example of Porsche AG. The lecture begins with an introduction and discussion of social trends. The deepening of standardized development processes in the automotive practice and current development strategies follow. The management of complex development projects is a first focus of the lecture. The complex interlinkage between development, production and purchasing are a second focus. Methods of analysis of technological core competencies complement the lecture. The course is strongly oriented towards the practice and is provided with many current examples.

The main topics are:

- Introduction to social trends towards high performance cars
- Automotive Production Processes
- Integrative R&D strategies and holistic capacity management
- Management of complex projects
- Interlinkage between R&D, production and purchasing
- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Lecture Slides
**6.162 Course: Intelligent CRM Architectures [T-WIWI-103549]**

**Responsible:** Prof. Dr. Andreas Geyer-Schulz

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101470 - Data Science: Advanced CRM

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**Competence Certificate**
This lecture will be offered for the last time in winter semester 2019/20.

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
It is recommended to additionally review the Bachelor-level lecture "Customer Relationship Management" from the module "CRM and Servicemanagement".

Below you will find excerpts from events related to this course:

**Learning Content**
The lecture is structured in three parts:

In the first part the methods used for architecture design are introduced (system analysis, UML, formal specification of interfaces, software and analysis patterns, and the separation in conceptual and IT-architectures. The second part is dedicated to learning architectures and machine learning methods. The third part presents examples of learning CRM-Architectures.
Workload
The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance
- Attending the lecture: $15 \times 90\text{min} = 22\text{h} 30\text{m}$
- Attending the exercise classes: $7 \times 90\text{min} = 10\text{h} 30\text{m}$
- Examination: $1\text{h} 00\text{m}$

Self-study
- Preparation and wrap-up of the lecture: $15 \times 180\text{min} = 45\text{h} 00\text{m}$
- Preparing the exercises: $25\text{h} 00\text{m}$
- Preparation of the examination: $31\text{h} 00\text{m}$

Sum: $135\text{h} 00\text{m}$

Literature
6.163 Course: Interactive Information Systems [T-WIWI-108461]

**Responsible:** Prof. Dr. Alexander Mädche
Dr. Stefan Morana

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-104068 - Information Systems in Organizations
M-WIWI-104080 - Designing Interactive Information Systems

<table>
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**Events**

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<th>2540558</th>
<th>Interactive Systems</th>
<th>3 SWS</th>
<th>Lecture (V)</th>
<th>Mädche, Morana</th>
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| Exams |
| SS 2019 | 791000002 | Interactive Systems | Prüfung (PR) | Mädche |

**Competence Certificate**
The assessment consists of a written exam of 1 hour and by submitting written papers as part of the exercise. Details will be announced at the beginning of the course.

**Prerequisites**
None

**Annotation**
This course replaces T-WIWI-106342 "Interactive Systems" starting summer term 2018.
The course is held in english.

*Below you will find excerpts from events related to this course:

**Interactive Systems**

2540558, SS 2019, 3 SWS, Language: English, [Open in study portal]

**Description**
Advanced information and communication technologies make interactive systems ever-present in the users' private and business life. They are an integral part of smartphones, devices in the smart home, mobility vehicles as well as at the working place in production and administration (e.g. in the form of dashboards).

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. The aim of this course is to introduce the foundations, theoretical grounding, key concepts and principles as well as current practice of interactive systems. The contents of the course abstract from the technical implementation details. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

**Notes**
The lecture is complemented with a capstone project assignment, where students analyze and review existing interactive systems and suggest areas of improvement / extensions.

**Learning Content**
- Basics
- Theoretical foundations
- Key concepts and design principles for specific interactive systems classes
- Capstone project
Literature
The lecture bases to a large extend on


Additional literature will be provided in the lecture.
6.164 Course: International Finance [T-WIWI-102646]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2

### Type
- Written examination

### Credits
- 3

### Recurrence
- Each summer term

### Version
- 1

#### Events

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<th>International Finance</th>
<th>2 SWS</th>
<th>Lecture (V)</th>
<th>Walter, Uhrig-Homburg</th>
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</thead>
</table>

| Exams  | SS 2019 | 7900097 | International Finance | Prüfung (PR) | Uhrig-Homburg |

#### Competence Certificate
See German version.

#### Prerequisites
None

#### Recommendation
None

#### Annotation
See German version.

Below you will find excerpts from events related to this course:

**International Finance**

2530570, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Description**
The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First, the point of view of an international investor; second, that of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore, current exchange rate theories are discussed.

**Learning Content**
The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First, the point of view of an international investor; second, that of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore, current exchange rate theories are discussed.

**Workload**
The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**

**Elective literature:**
6 COURSES

Course: International Management in Engineering and Production [T-WIWI-102882]

6.165 Course: International Management in Engineering and Production [T-WIWI-102882]

Responsibility: Dr. Henning Sasse
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

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Exams

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Competence Certificate
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

International Management in Engineering and Production
2581956, WS 19/20, 2 SWS, Language: English, Open in study portal

Learning Content

- Fundamentals of international business
- Forms of international cooperation and value creation
- Site selection
- Cost driven internationalization and site selection
- Sales and customer driven internationalization and site selection
- Challenges, risks and risk mitigation
- Management of international production sites
- Types and case studies of international production

Workload
The total workload for this course is approximately 105 hours. For further information see German version.

Literature
Will be announced in the course.
**6.166 Course: International Selling – EUCOR [T-WIWI-110381]**

**Responsible:** Erice Casenave
Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101487 - Sales Management
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101488 - Entrepreneurship (EnTechnon)

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<td>International Selling – EUCOR</td>
<td>2 SWS</td>
<td>Block (B) Klarmann</td>
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**Competence Certificate**
Non exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation (presentation). The grade is based on the presentation and the subsequent discussion.

**Prerequisites**
The courses "Business Planning for Founders - EUCOR" and the course "International Selling - EUCOR" must be taken together.

**Annotation**
An application is required to participate in this course. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.

Please note that the courses "Business Planning for Founders - EUCOR" (3 ECTS) and "International Selling - EUCOR" (3 ECTS) can only be taken together (6 ECTS in total). In combination with the mandatory course "Sales Management and Retailing" (3 ECTS) the module is completed.

Below you will find excerpts from events related to this course:

### International Selling – EUCOR

**WS 19/20 2572179, 2 SWS, Language: English, Open in study portal**

**Notes**
This course is offered as part of the EUCOR programme in cooperation with EM Strasbourg. Max. 10 students of KIT and max. 10 students of EM Strasbourg will develop a sales presentation in tandems (teams of 2). This is based on the value proposition of a business model developed in the LV "Business Planning for Founders - EUCOR".

**Annotation**
- An application is required to participate in this event. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.
- Please note that the courses "Business Planning for Founders - EUCOR" (3 ECTS) and "International Selling - EUCOR" (3 ECTS) can only be taken together (6 ECTS in total). In combination with the mandatory course "Sales Management and Retailing" (3 ECTS) the module is completed.

**Workload**
Total workload for 3 ECTS: about 90 hours
### 6.167 Course: Internet Law [T-INFO-101307]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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<td>WS 19/20</td>
<td>7500060</td>
<td>Internet Law</td>
<td>Prüfung (PR)</td>
<td>Dreier, Matz</td>
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</table>
6.168 Course: Introduction to Hydrogeology [T-BGU-101499]

**Responsible:** Prof. Dr. Nico Goldscheider

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101642 - Natural Hazards and Risk Management 1
- M-WIWI-101644 - Natural Hazards and Risk Management 2
- M-WIWI-104837 - Natural Hazards and Risk Management

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**Competence Certificate**
Written exam with 90 minutes

**Prerequisites**
none
Course: Introduction to Microsystem Technology I [T-MACH-105182]

**Responsible:**
- Dr. Vlad Badilita
- Dr. Mazin Jouda
- Prof. Dr. Jan Gerrit Korvink

**Organisation:**
KIT Department of Mechanical Engineering

**Part of:**
M-MACH-101293 - Microsystem Technology

<table>
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<td>Introduction to Microsystem Technology I</td>
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**Competence Certificate**
written examination for implementation in a major field, 30 min oral exam for elective subject

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Introduction to Microsystem Technology I**
2141861, WS 19/20, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

**Learning Content**
- Introduction in Nano- and Microtechnologies
- Silicon and processes for fabricating microelectronics circuits
- Basic physics background and crystal structure
- Materials for micromachining
- Processing technologies for microfabrication
- Silicon micromachining
- Examples

**Workload**
- Literature: 20 h
- Lessons: 21 h
- Preparation and Review: 50 h
- Exam preparation: 30 h

**Literature**
M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
6.170 Course: Introduction to Microsystem Technology II [T-MACH-105183]

Responsible: Dr. Mazin Jouda
Prof. Dr. Jan Gerrit Korvink

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101293 - Microsystem Technology

Type: Written examination
Credits: 3
Recurrence: Each summer term
Version: 1

Events
SS 2019 2142874 Introduction to Microsystem Technology II 2 SWS Lecture (V) Korvink, Badilita

Exams
SS 2019 76-T-MACH-105183 Introduction to Microsystem Technology II Prüfung (PR) Korvink, Badilita

Competence Certificate
written examination for major field, oral exam (30 min) for elective field

Prerequisites
none

Below you will find excerpts from events related to this course:

Introduction to Microsystem Technology II 2142874, SS 2019, 2 SWS, Language: English, Open in study portal

Learning Content
- Introduction in Nano- and Microtechnologies
- Lithography
- LIGA-technique
- Mechanical microfabrication
- Patterning with lasers
- Assembly and packaging
- Microsystems

Workload
Literature: 20 h
Lessons: 21 h
Preparation and Review: 50 h
Exam preparation: 30 h

Literature
M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
**6.171 Course: Introduction to Stochastic Optimization [T-WIWI-106546]**

**Responsible:** Prof. Dr. Steffen Rebennack

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-102832 - Operations Research in Supply Chain Management
- M-WIWI-103289 - Stochastic Optimization

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<td>Einführung in die Stochastische Optimierung</td>
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**Exams**

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**Competence Certificate**

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

**Prerequisites**

None.
6.172 Course: IoT Platform for Engineering [T-MACH-106743]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101281 - Virtual Engineering B
- M-MACH-101283 - Virtual Engineering A

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<td>IoT platform for engineering</td>
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<td>WS 19/20</td>
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<td>IoT platform for engineering</td>
<td>SWS</td>
<td>Ovtcharova, Maier</td>
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**Competence Certificate**
Assessment of another type (graded), procedure see webpage. Number of participants limited to 20 people. There is a participant selection process.

Below you will find excerpts from events related to this course:

**V IoT platform for engineering**
2123352, SS 2019, 3 SWS, [Open in study portal](#)

**Notes**
Number of participants limited to 15 people. There is a participant selection process.

**V IoT platform for engineering**
2123352, WS 19/20, SWS, Language: German, [Open in study portal](#)

**Learning Content**
Industry 4.0, IT systems for fabrication and assembly, process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.
### 6.173 Course: IT- Security Law [T-INFO-109910]

<table>
<thead>
<tr>
<th><strong>Responsible:</strong></th>
<th>PD Dr. Oliver Raabe</th>
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<td><strong>Organisation:</strong></td>
<td>KIT Department of Informatics</td>
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<tr>
<td><strong>Part of:</strong></td>
<td>M-INFO-101242 - Governance, Risk &amp; Compliance</td>
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**6.174 Course: IT-Fundamentals of Logistics [T-MACH-105187]**

**Responsible:** Prof. Dr.-Ing. Frank Thomas  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- M-MACH-101263 - Introduction to Logistics  
- M-MACH-101278 - Material Flow in Networked Logistic Systems  
- M-MACH-104888 - Advanced Module Logistics

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**Competence Certificate**  
The assessment consists of an oral exam (30min) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**  
none

**Annotation**  
1) Detailed script can be downloaded online (www.tup.com), updated and enhanced annually.  
2) CD-ROM with chapters and exercises at the end of the semester available from the lecturer, also updated and enhanced annually.

*Below you will find excerpts from events related to this course:*
Learning Content
The rapid development of information technology influences business processes drastically. A strategic IT-orientation for an enterprise without a critical appreciation of worldwide IT-development (where the half-life value of IT for logistic systems knowledge is less than 3 years) is dangerous. The pressure of costs is always in focus. For this purpose the contents of this course, as well as the detailed script will be continuously revised, and the influences on business processes will be shown in practical examples.

Focusses:

- **System architecture in Material Flow Control Systems (MFCS)**

  A guiding principle for a new system architecture for MFC systems is the consideration of making new standardized, functional groups available for re-usability.

- **Design and application of innovative Material Flow Control Systems (MFCS)**

  The most important task of the MFCS is the commissioning of conveying systems with driving commands in a way that optimally utilizes the facility and serves the logistics processes on schedule.

- **Identification of goods – Application in Logistics**

  Along with business processes, coded information is the link between the flow of information and the flow of materials, and contributes to error prevention in the communication between people and machines.

- **Data communication in Intra-logistics**

  Information describes the content of a message that is of value to the recipient. The recipient can be both a human and a machine.

  - **Business processes for Intra-logistics – Software follows function!**

    If the business processes from Goods Incoming to Goods Outgoing are adapted with reusable building blocks then capabilities become visible. Against this background the consideration becomes apparent, how, through an innovative software architecture, a reusable building-block based framework can be made. Therefore applies: Software follows function. And only if all project requirements are documented in the planing phase, and supported together in an inter-disciplinary team - consisting of logistics planners, the customers (users) and the implementation leader (IL).

  - **Software development in accordance with industrial standards**

    Today's development of object-oriented software, and the increasing penetration of industrial software production with this technology, makes it possible to create system designs that already offer these opportunities in their facility - both for a high degree of reuse and for easier adaptability. In software development, object-oriented methods are used to improve the productivity, maintainability and software quality. An important aspect of object-orientation is: the objects used are primarily intended to depict the real world.

Annotation
1) Detailed script can be downloaded online (www.tup.com), updated and enhanced annually.
2) CD-ROM with chapters and exercises at the end of the semester available from the lecturer, also updated and enhanced annually.

Workload
regular attendance: 21 hours
self-study: 99 hours
6.175 Course: Joint Entrepreneurship Summer School [T-WIWI-109064]

**Responsible:** Prof. Dr. Orestis Terzidis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechnon)

<table>
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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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**Competence Certificate**  
The learning control of the program (Summer School) consists of two parts:  

A) **Investor Pitch:**  
Based on a presentation (investor pitch) in front of a jury, the insights gained and developed during the course of the event are presented and the business idea presented. Among other things, the presentation performance of the team, the structured content and the logical consistency of the business idea are evaluated. The exact evaluation criteria will be announced in the course.

B) **Written elaboration:**  
The second part of the assessment is a written report. The iterative knowledge gain of the entire event is systematically logged and can be further supplemented by the contents of the presentation. The report documents key action steps, applied methods, findings, market analyzes and interviews and prepares them in writing. The exact structure and requirements will be announced in the course.

The grade consists of 50% presentation performance and 50% written preparation.

**Prerequisites**  
The Summer School is aimed at master students of KIT. Prerequisite is the participation in the selection process.

**Recommendation**  
We recommend basic business knowledge, the lecture Entrepreneurship as well as openness and interest in intercultural exchange. Solid knowledge of the English language is an advantage.

**Annotation**  
The working language during the Summer School is English. A one-week stay in China is part of the Summer School.
Course: Knowledge Discovery [T-WIWI-102666]

**Responsible:** Prof. Dr. York Sure-Vetter

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

### Events

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### Exams

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### Competence Certificate

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation. Students can be awarded a bonus on their final grade if they successfully complete special assignments.

### Prerequisites

None

Below you will find excerpts from events related to this course:

**Knowledge Discovery**

2511302, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)
Notes
The lecture provides an overview of machine learning and data mining techniques for knowledge discovery from large data sets. These techniques are examined in respect of algorithms, applicability to different data representations and application in the real world.

Knowledge discovery is a well-established field with a large community investigating methods for the discovery of patterns and regularities in large data sets, including relational databases and unstructured text.

A variety of methods are available to assist in extracting patterns that, if interpreted, provide valuable, possibly previously unknown, insights. This information can be predictive or descriptive in nature.

This lecture provides an overview of this field. The lecture imparts specific techniques and methods, challenges and current and future research work in this field.

Topics of the lectures comprise the whole Machine Learning and Data Mining process like CRISP, data warehousing, OLAP-techniques, learning algorithms, visualization and empirical evaluation. Covered learning techniques range from traditional approaches like decision trees, neural networks and support vector machines to selected approaches resulting from current research. Discussed learning problems are amongst others featurevector-based learning, text mining and social network analysis.

Learning objectives:
Students
- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Workload:
- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

Notes
The exercises are related to the lecture Knowledge Discovery.

Multiple exercises are held that capture the topics, held in the lecture Knowledge Discovery, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

Topics of the lectures comprise the whole Machine Learning and Data Mining process like CRISP, data warehousing, OLAP-techniques, learning algorithms, visualization and empirical evaluation. Covered learning techniques range from traditional approaches like decision trees, neural networks and support vector machines to selected approaches resulting from current research. Discussed learning problems are amongst others featurevector-based learning, text mining and social network analysis.

Learning objectives:
Students
- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.
6.177 Course: Laboratory Production Metrology [T-MACH-108878]

**Responsible:** Dr.-Ing. Benjamin Häfner  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

### Course Details

<table>
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#### Events

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#### Competence Certificate

Alternative Test Achievement: Group presentation of 15 min at the beginning of each experiment and evaluation of the participation during the experiments and Oral Exam (15 min)

#### Prerequisites

none

#### Annotation

For organizational reasons the number of participants for the course is limited. Hence a selection process will take place. Applications are made via the homepage of wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

Below you will find excerpts from events related to this course:

### Description

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/). Additional reference to literature will be provided, as well.
Notes
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The student learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software.

The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coordinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Learning Outcomes:
The students ...

- are able to name, describe and mark out different measurement technologies that are relevant in a production environment.
- are able to conduct measurements with the presented in-line and laboratory based measurement systems.
- are able to analyze measurement results and assess the measurement uncertainty of these.
- are able to deduce whether a work piece fulfills quality relevant specifications by analysing measurement results.
- are able to use the presented measurement technologies for a new task.

Workload:
regular attendance: 31.5 hours
self-study: 88.5 hours

Learning Content
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The student learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software. The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coordinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Workload
regular attendance: 31.5 hours
self-study: 88.5 hours
6.178 Course: Laboratory Work Water Chemistry [T-CIWVT-103351]

**Responsible:** Dr. Gudrun Abbt-Braun  
Prof. Dr. Harald Horn

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:** M-CIWVT-101121 - Water Chemistry and Water Technology I

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**Prerequisites**
none
## 6.179 Course: Large-scale Optimization [T-WIWI-106549]

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101473 - Mathematical Programming  
- M-WIWI-102832 - Operations Research in Supply Chain Management  
- M-WIWI-103289 - Stochastic Optimization

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### Exams

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### Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

### Prerequisites

None.
**6.180 Course: Laser Physics [T-ETIT-100741]**

**Responsible:** Prof. Dr.-Ing. Christian Koos  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:**  
- M-MACH-101292 - Microoptics  
- M-MACH-101295 - Optoelectronics and Optical Communication

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**Prerequisites**

none
### Course: Law of Contracts [T-INFO-101316]

- **Responsible:** Prof. Dr. Thomas Dreier
- **Organisation:** KIT Department of Informatics
- **Part of:**
  - M-INFO-101216 - Private Business Law
  - M-INFO-101242 - Governance, Risk & Compliance

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- **Type:** Written examination
- **Credits:** 3
- **Recurrence:** Each term
- **Version:** 1

**Exams**
- SS 2019 | 7500055 | Law of Contracts | Prüfung (PR) | Dreier, Matz
- WS 19/20 | 7500059 | Law of Contracts | Prüfung (PR) | Dreier, Matz
### Course: Lean Construction [T-BGU-108000]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101884 - Lean Management in Construction

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**Competence Certificate**

- written exam, 70 min.

**Prerequisites**

- none

**Recommendation**

- none

**Annotation**

- none
6.183 Course: Learning Factory “Global Production” [T-MACH-105783]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101282 - Global Production and Logistics  
M-MACH-101284 - Specialization in Production Engineering

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**Competence Certificate**

Alternative test achievement (graded):

- Knowledge acquisition in the context of the seminar (3 achievements 20 min each) with weighting 40%.
- Interaction between participants with weighting 15%.
- Scientific colloquium (in groups of 3 students approx. 45 min each) with weighting 45%.

**Prerequisites**

none

**Annotation**

For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/studium-und-lehre.php).

Due to the limited number of participants, advance registration is required.

Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Below you will find excerpts from events related to this course:

**Description**

**Media:**

E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).
Notes
The learning factory "Global Production" serves as a modern teaching environment for the challenges of global production. To make these challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:

- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection

Learning Outcomes:
The students are able to ...

- evaluate and select alternative locations using appropriate methods.
- use methods and tools of lean management to plan and manage production systems that are suitable for the location.
- use the Six Sigma method and apply goal-oriented process management.
- select an appropriate level of automation of the production units based on quantitative variables.
- make use of well-established methods for the evaluation and selection of suppliers.
- apply methods for planning a global production network depending on company-specific circumstances to sketch a suitable network and classify and evaluating it according to specific criteria.
- apply the learned methods and approaches with regard to problem solving in a global production environment and able to reflect their effectiveness.

Workload:
e-Learning: ≈ 24 h
regular attendance: ≈ 36 h
self-study: ≈ 60 h

Learning Content
The learning factory "Global Production" serves as a modern teaching environment for the challenges of global production. To make these challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:

- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection
Annotation
For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/studium-und-lehre.php).
Due to the limited number of participants, advance registration is required.

Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Workload
- e-Learning: ~ 24 h
- regular attendance: ~ 36 h
- self-study: ~ 60 h
Course: Liberalised Power Markets [T-WIWI-107043]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
M-WIWI-102808 - Digital Service Systems in Industry

<table>
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Exams

| SS 2019 7900253 | Prüfung (PR) | Fichtner |

Competence Certificate
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation.

Prerequisites
See German version.

Recommendation
None

Below you will find excerpts from events related to this course:

**Liberalised Power Markets**
2581998, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Learning Content
1. The European liberalisation process
   1.1 The concept of a competitive market
   1.2 The regulated market
   1.3 Deregulation in Europe
2. Pricing and investments in a liberalised power market
   2.1 Merit order
   2.2 Prices and investments
   2.3 Market flaws and market failure
   2.4 Regulation in liberalised markets
   2.5 Additional regulation mechanisms
3. The power market and the corresponding submarkets
   3.1 List of submarkets
   3.2 Types of submarkets
   3.3 Market rules
4. Risk management
   4.1 Uncertainties in a liberalised market
   4.2 Investment decisions under uncertainty
   4.3 Estimating future electricity prices
   4.4 Portfolio management
5. Market power
   5.1 Defining market power
   5.2 Indicators of market power
   5.3 Reducing market power
6. Market structures in the value chain of the power sector

Annotation
The course "Basics of Liberalised Energy Markets" [2581998] will be reduced to 3 credits in winter term 2015/2016 and the tutorial [2581999] is no longer offered.
Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.

Literature
Elective literature:
6.185 Course: Life Cycle Assessment [T-WIWI-110512]

**Responsible:** Prof. Dr. Frank Schultmann

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101412 - Industrial Production III
- M-WIWI-101471 - Industrial Production II

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<td>2581995</td>
<td>Life Cycle Assessment 2 SWS Lecture (V) Schultmann, Maier</td>
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**Competence Certificate**

The examination takes place in the form of a written examination (according to §4(2), 1 SPO). The examination is offered every semester and can be repeated at any regular examination date.

**Prerequisites**

None.

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Life Cycle Assessment**

2581995, WS 19/20, 2 SWS, Language: English, Open in study portal Lecture (V)

**Learning Content**

Our society has reached a historically unique material prosperity. At the same time, environmental burdens and resource consumption are continuously reaching new peaks - not only regarding greenhouse gas emissions and oil production rates. It is obvious that the material and energy intensity of products and services has to decrease if we want to keep our current level of material prosperity on the long run. Enormous efficiency gains, as they have been reached e.g. for labour productivity, however, require that environmental burdens and resource consumption per unit of product are in the first place known, transparent and can thus be optimised. This data and its calculation are increasingly requested and sooner or later will have to become as essential for management as e.g. unit labour costs.

Life cycle assessment is a methodology in sustainability assessment that provides this information and deduces optimisation potentials and decision support for companies, politics, consumers etc. To this end, material and energy flows are compiled along the whole life cycle of a product from extraction of raw materials, via production and use of a product until its disposal. Subsequently, environmental impacts of these flows are analysed.

This lecture describes structure and individual steps of life cycle assessments in detail. Furthermore, it explains its application in decision support. In interactive phases, participants recapitulate the theoretical basis by own calculations. As an outlook, further instruments in sustainability assessment are introduced that analyse other sustainability aspects.

**Workload**

Total effort required will account for approximately 105h (3.5 credits).

**Literature**

will be announced in the course
**6.186 Course: Logistics - Organisation, Design and Control of Logistic Systems [T-MACH-102089]**

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101280 - Logistics in Value Chain Networks

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**Competence Certificate**
The assessment consists of a 90 minutes written examination (according to §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Recommendation**
Required are lectures on “Linear Algebra” and “Stochastic”.

*Below you will find excerpts from events related to this course:*

**Logistics - Organisation, Design, and Control of Logistic Systems**

2118078, SS 2019, 3 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**
Blackboard, LCD projector, in exercises also PCs.
Learning Content

Introduction
- historical overview
- lines of development

Structure of logistics systems

Distribution logistics
- location planning
- Vehicle Routing Planning
- distribution centers

Inventory management
- demand forecasting
- Inventory management policies
- Bullwhip effect

Production logistics
- layout planning
- material handling
- flow control

Supply Management
- information flow
- transportation organization
- controlling and development of a logistics system
- co-operation mechanisms
- Lean SCM
- SCOR model

Identification Technologies

Workload
180 hrs

Literature
- Arnold/Isermann/Kuhn/Tempelmeier. Handbuch Logistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
- Domschke. Logistik, Rundreisen und Touren, Oldenbourg Verlag, 1982
- Domschke/Drexl. Logistik, Standorte, Oldenbourg Verlag, 1996
- Gudehus. Logistik, Springer Verlag, 2007
- Tempelmeier. Bestandsmanagement in Supply Chains, Books on Demand 2006
### 6.187 Course: Long-Distance and Air Traffic [T-BGU-106301]

**Responsible:** Bastian Chlond  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-BGU-101064 - Fundamentals of Transportation  
- M-BGU-101065 - Transportation Modelling and Traffic Management

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**Competence Certificate**

- written exam, 60 min.

**Prerequisites**

- none

**Recommendation**

- none

**Annotation**

- none
6.188 Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

### Type
- Written examination

### Credits
- 4.5

### Recurrence
- Each winter term

### Version
- 2

#### Events

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**
None.

**Below you will find excerpts from events related to this course:**

### Machine Learning 1 - Fundamental Methods

**2511500, WS 19/20, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**

**Notes**
The field of knowledge acquisition and machine learning is a rapidly expanding field of knowledge and the subject of numerous research and development projects. The acquisition of knowledge can take place in different ways. Thus a system can benefit from experiences already made, it can be trained, or it draws conclusions from extensive background knowledge.

The lecture covers symbolic learning methods such as inductive learning (learning from examples, learning by observation), deductive learning (explanation-based learning) and learning from analogies, as well as sub-symbolic techniques such as neural networks, support vector machines and genetic algorithms. The lecture introduces the basic principles and structures of learning systems and examines the algorithms developed so far. The structure and operation of learning systems is presented and explained with some examples, especially from the fields of robotics and image processing.

**Learning objectives:**

- Students acquire knowledge of the fundamental methods in the field of machine learning.
- Students can classify, formally describe and evaluate methods of machine learning.
- Students can use their knowledge to select suitable models and methods for selected problems in the field of of machine learning.
**6.189 Course: Machine Learning 2 – Advanced Methods [T-WIWI-106341]**

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics
- M-WIWI-101637 - Analytics and Statistics

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**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**

None.

*Below you will find excerpts from events related to this course:*

**Machine Learning 2 - Advanced methods**

| 2511502, SS 2019, 2 SWS, Language: German, [Open in study portal](#) |

**Description**

The field of machine decision-making and inference procedures, taking into account uncertainties and incomplete knowledge, is a rapidly expanding field of knowledge and the subject of numerous research and development projects.

The focus of this lecture is on the embedding and application of machine-learning methods in decision and inference systems starting with methods of dimension reduction, feature selection/evaluation via semi-supervised learning to methods of probabilistic inference (e.g. Dempster Shafer information fusion, dynamic and object-oriented Bayesian networks, POMDP, etc).

The lecture introduces the basic principles and structures and explains algorithms developed so far. The structure and operation of the procedures and methods are presented and explained using a number of application scenarios, in particular from the field of technical (semi-)autonomous systems.

**Notes**

The first exercise will take place on 08.05.2019.
Learning Content
The subject area of machine intelligence and, in particular, machine learning, taking into account real challenges of complex application domains, is a rapidly expanding field of knowledge and the subject of numerous research and development projects.

The lecture "Machine Learning 2" deals with advanced methods of machine learning such as semi-supervised and active learning, deep neural networks (deep learning), pulsed networks, hierarchical approaches, e.g. as well as dynamic, probabilistic relational methods. Another focus is the embedding and application of machine learning methods in real systems.

The lecture introduces the latest basic principles as well as extended basic structures and elucidates previously developed algorithms. The structure and the mode of operation of the methods and methods are presented and explained by means of some application scenarios, especially in the field of technical (sub) autonomous systems (robotics, neurorobotics, image processing, etc.).

Literature
The slides are available as a PDF

Related Literature
- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville

Further (specific) literature on individual topics will be given in the lecture.

Exercises for Machine Learning 2 - Advanced Methods
2511503, SS 2019, 1 SWS, Open in study portal

Notes
The first exercise will take place on 08.05.2019.
# Course: Machine Tools and Industrial Handling [T-MACH-102158]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101286 - Machine Tools and Industrial Handling

<table>
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**Competence Certificate**  
Written exam (120 minutes)

**Prerequisites**  
“T-MACH-109055 - Werkzeugmaschinen und Handhabungstechnik” must not be commenced.

*Below you will find excerpts from events related to this course:*

**Machine Tools and Industrial Handling**  
2149902, WS 19/20, 6 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
The lecture gives an overview of the construction, use and application of machine tools and industrial handling equipment. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools is conveyed. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

The individual topics are:
- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

Learning Outcomes:
The students ...
- are able to assess the use and application of machine tools and handling equipment and to differentiate between them in terms of their characteristics and design.
- can describe and discuss the essential elements of the machine tool (frame, main spindle, feed axes, peripheral equipment, control unit).
- are able to select and dimension the essential components of a machine tool.
- are capable of selecting and evaluating machine tools according to technical and economic criteria.

Workload:
MACH:
regular attendance: 63 hours
self-study: 177 hours
WING:
regular attendance: 63 hours
self-study: 207 hours

Learning Content
The lecture gives an overview of the construction, use and application of machine tools and industrial handling equipment. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools is conveyed. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

The individual topics are:
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- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

Annotation
None
Workload
MACH:
regular attendance: 63 hours
self-study: 177 hours
Wing:/TVWL
regular attendance: 63 hours
self-study: 207 hours
6.191 Course: Management Accounting 1 [T-WIWI-102800]

**Responsible:** Prof. Dr. Marcus Wouters  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101498 - Management Accounting

<table>
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**Competence Certificate**
The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation) at the end of each semester.

**Prerequisites**
None

**Annotation**
Students in the Bachelor’s program can only take the related tutorial and examination. Students in the Master’s program (and Bachelor’s students who are already completing examinations for their Master’s program) can only take the related tutorial and examination.

Below you will find excerpts from events related to this course:

**Management Accounting 1**

**Notes**
see Module Handbook

**Learning Content**
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA1 are: short-term planning, investment decisions, budgeting and activity-based costing.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**
- In addition, several papers that will be available on ILIAS.
Übung zu Management Accounting 1
2579901, SS 2019, 2 SWS, Language: English, Open in study portal

Notes
see Module Handbook
6.192 Course: Management Accounting 2 [T-WIWI-102801]

**Responsible:** Prof. Dr. Marcus Wouters  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101498 - Management Accounting

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**Exams**

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**Competence Certificate**

The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation) at the end of each semester.

**Prerequisites**

None

**Recommendation**

It is recommended to take part in the course "Management Accounting 1" before this course.

**Annotation**

Students in the Bachelor’s program can only take the related tutorial and examination. Students in the Master’s program (and Bachelor’s students who are already completing examinations for their Master’s program) can only take the related tutorial and examination.

Below you will find excerpts from events related to this course:

**Management Accounting 2**

2579903, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Notes**

see Module Handbook

**Learning Content**

The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems and customer value propositions.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature

- In addition, several papers that will be available on ILIAS.

Notes

see Module Handbook

Notes

see Module Handbook
Course: Management of IT-Projects [T-WIWI-102667]

**Responsible:** Dr. Roland Schätzle

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

**Type**
- Written examination

**Credits** 4.5

**Recurrence** Each summer term

**Version** 3

### Events

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### Exams

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**Competence Certificate**

The assessment takes place in the form of a written examination (exam) in the amount of 60 minutes. The examination is offered every semester and can be repeated at any regular examination date.

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited. The exact details will be announced in the lecture.

**Prerequisites**

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

---

Below you will find excerpts from events related to this course:

**Management of IT-Projects**

2511214, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**

The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
  - plan of the project structure
  - flow chart
  - project schedule
  - plan of resources
- effort estimation
- project infrastructure
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.
Workload
Lecture 30h
Exercise 15h
Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam & 1h
Total: 150h

Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004

Further literature is given in each lecture individually.
### 6.194 Course: Management of Water Resources and River Basins [T-BGU-106597]

**Responsible:** Dr.-Ing. Uwe Ehret  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-WIWI-101642 - Natural Hazards and Risk Management 1  
- M-WIWI-101644 - Natural Hazards and Risk Management 2  
- M-WIWI-104837 - Natural Hazards and Risk Management

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**Competence Certificate**

course associated assignments, short reports appr. 2 pages each, and final take home exam, report appr. 10 pages and colloquium

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none

**Responsible:** Dr. Thomas Reiß

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechnon)

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<td>2 SWS</td>
<td>Prüfung (PR)</td>
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</table>

**Competence Certificate**

Written exam 100% following §4, Abs. 2.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

The credit points for T-WIWI-102612 "Management of New Technologies" were reduced to 3 credit points in the 2019 summer semester.

Below you will find excerpts from events related to this course:

**Managing New Technologies**

2545003, SS 2019, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

**Learning Content**

The course provides an overview of the international development of a selected number of key technologies such as biotechnology, nanotechnology, neurotechnologies, converging technologies. Methods for monitoring new technologies including foresight approaches will be presented and the economic and social impacts of new technologies will be discussed.

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**

- Hausschildt/Salomo: Innovationsmanagement
- Borchert et al.: Innovations- und Technologiemanagement
- Specht/Möhrle: Gabler Lexikon Technologiemanagement
6.196 Course: Manufacturing Technology [T-MACH-102105]

**Responsible:** Prof. Dr.-Ing. Volker Schulze
Dr.-Ing. Frederik Zanger

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101276 - Manufacturing Technology

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</table>

**Exams**

| SS 2019 | 76-T-MACH-102105 | Manufacturing Technology | Prüfung (PR) | Schulze |

**Competence Certificate**

Written Exam (180 min)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

**Manufacturing Technology**

2149657, WS 19/20, 6 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**

**Media:**

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
Notes
The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Quality control
- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming, plastics engineering)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lecture provides an excursion to an industry company.

Learning Outcomes:
The students ...

- are capable to specify the different manufacturing processes and to explain their functions.
- are able to classify the manufacturing processes by their general structure and functionality according to the specific main groups.
- have the ability to perform a process selection based on their specific characteristics.
- are enabled to identify correlations between different processes and to select a process regarding possible applications.
- are qualified to evaluate different processes regarding specific applications based on technical and economic aspects.
- are experienced to classify manufacturing processes in a process chain and to evaluate their specific influence on surface integrity of workpieces regarding the entire process chain.

Workload:
regular attendance: 63 hours
self-study: 177 hours

Learning Content
The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

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- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lecture provides an excursion to an industry company.

Annotation
None

Workload
regular attendance: 63 hours
self-study: 177 hours

Literature
Lecture Notes

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101409 - Electronic Markets
- M-WIWI-101411 - Information Engineering
- M-WIWI-101446 - Market Engineering
- M-WIWI-101453 - Applied Strategic Decisions
- M-WIWI-102754 - Service Economics and Management

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**Competence Certificate**
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) up to 6 bonus points can be obtained. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by max. one grade level (0.3 or 0.4).

**Prerequisites**
None

**Below you will find excerpts from events related to this course:**

### Market Engineering: Information in Institutions

**Lecture (V)**

**Description**
The ongoing advancements in information technology have revolutionized traditional business processes and given rise to electronic marketplaces. In contrast to physical marketplaces, electronic markets do not just evolve, but must be carefully designed, implemented and monitored and evaluated. Moreover electronic markets demand open and flexible platforms as well as adequate standards and information services. Future Market Engineers must therefore be able to consider the economic, legal and technological dimension of markets simultaneously. The lecture focuses on the discussion of (1) Microstructure, (2) IT Infrastructure, and (3) Business Structure of electronic markets. Hence, students will be taught the economic incentives that a market can impose on market participants, development models for implementing markets, and business models for the application of markets.

**Learning Content**
The ongoing advancements in information technology have revolutionized traditional business processes and given rise to electronic marketplaces. In contrast to physical marketplaces, electronic markets do not just evolve, but must be carefully designed, implemented and monitored and evaluated. Moreover electronic markets demand open and flexible platforms as well as adequate standards and information services. Future Market Engineers must therefore be able to consider the economic, legal and technological dimension of markets simultaneously. The lecture focuses on the discussion of (1) Microstructure, (2) IT Infrastructure, and (3) Business Structure of electronic markets. Hence, students will be taught the economic incentives that a market can impose on market participants, development models for implementing markets, and business models for the application of markets.
Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature


6 COURSES  
Course: Market Research [T-WIWI-107720]

6.198 Course: Market Research [T-WIWI-107720]

Responsible: Prof. Dr. Martin Klarmann  
Organisation: KIT Department of Economics and Management  
Part of: M-WIWI-101487 - Sales Management  
M-WIWI-101490 - Marketing Management  
M-WIWI-101510 - Cross-Functional Management Accounting  
M-WIWI-101647 - Data Science: Evidence-based Marketing

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Exams

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</table>

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites

None

Recommendation

None

Annotation

Please note that this course has to be completed successfully by students interested in master thesis positions at the Marketing & Sales Research Group.

Below you will find excerpts from events related to this course:

Market Research

2571150, SS 2019, 2 SWS, Language: English, Open in study portal

Learning Content

Within the lecture, essential statistical methods for measuring customer attitudes (e.g. satisfaction measurement), understanding customer behavior and making strategic decisions will be discussed. The practical use as well as the correct handling of different survey methods will be taught, such as experiments and surveys. To analyze the collected data, various analysis methods are presented, including hypothesis tests, factor analyses, cluster analyses, variance and regression analyses. Building on this, the interpretation of the results will be discussed.

Topics addressed in this course are for example:

- Theoretical foundations of market research
- Statistical foundations of market research
- Measuring customer attitudes
- Understanding customer reactions
- Strategical decision making

Annotation

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
Workload
The total workload for this course is approximately 135.0 hours.
Presence time: 30 hours
Preparation and wrap-up of the course: 45.0 hours
Exam and exam preparation: 60.0 hours

Literature
Course: Marketing Analytics [T-WIWI-103139]

**Responsibility:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101647 - Data Science: Evidence-based Marketing

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**Competence Certificate**
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation)

**Prerequisites**
The prerequisite for taking the course is the successful completion of the course Market Research [2571150].

**Recommendation**
It is strongly recommended to complete the course Market Research prior to taking the Marketing Analytics course.

**Annotation**
For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu).

Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing & Sales Research Group.

**Below you will find excerpts from events related to this course:**

**Marketing Analytics**

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</table>

**Learning Content**
In this course various relevant market research questions are addressed, as for example measuring and understanding customer attitudes, preparing strategic decisions and sales forecasting. In order to analyze these questions, students learn to handle social media data, panel data, nested observations and experimental design. To analyze the data, advanced methods, as for example multilevel modeling, structural equation modeling and return on marketing models are taught. Also, problems of causality are addressed in-depth. The lecture is accompanied by a computer-based exercise, in the course of which the methods are applied practically.

**Annotation**
For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu).

Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing & Sales Research Group.

**Workload**
Total workload for 4.5 ECTS: ca. 135 hours
Literature

- Cameron, A. Colin, Trivedi, Pravin K. (2005), Microeconometrics: methods and applications, New York.
- Chapman, Christopher, Feit, Elea M. (2015), R for Marketing Research and Analytics, Cham.
### 6.200 Course: Marketing Strategy Business Game [T-WIWI-102835]

**Responsible:** Prof. Dr. Martin Klarmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101490 - Marketing Management  
- M-WIWI-101510 - Cross-Functional Management Accounting

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#### Events

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#### Competence Certificate

The assessment (alternative exam assessment) consists of a group presentation and a subsequent round of questions totalling 20 minutes.

#### Prerequisites

None

#### Recommendation

None

#### Annotation

Please note that only one of the courses from the election block can be chosen in the module.  
Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS points in the respective module to all students. Participation in a specific course cannot be guaranteed.  
In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

Below you will find excerpts from events related to this course:

#### Learning Content

Using Markstrat, a marketing strategy business game, students work in groups representing a company that competes on a simulated market against the other groups' companies.

#### Workload

The total workload for this course is approximately 45.0 hours. For further information see German version.

#### Literature

### 6.201 Course: Master Thesis [T-WIWI-103142]

**Responsible:** Studiendekan der KIT-Fakultät für Informatik  
Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101659 - Module Masterarbeit

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#### Exams

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<td>Oberweis</td>
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<td>8179-10002</td>
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<td>SS 2019</td>
<td>8179-10003</td>
<td>Conceptual Design and Evaluation of Modular Handling and Assembly Systems for Stacking Fuel Cells for Use in Automotive Production</td>
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<td>SS 2019</td>
<td>8179-10004</td>
<td>Analyzing Power Plant Behavior and Identifying Strategies with Generative Adversarial Neural Networks</td>
<td>Weinhardt</td>
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<td>SS 2019</td>
<td>8179-10008</td>
<td>Development and Simulation of Business Models for the Circular Economy in a Global Context</td>
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<td>SS 2019</td>
<td>8179-10009</td>
<td>Analysis of Manufacturing Processes and Identification of Potential Issues in PEMFC Assembly for Automotive Mass Production with Focus on Technology Transfer from Other Industries</td>
<td>Fleischer</td>
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<td>SS 2019</td>
<td>8179-10010</td>
<td>Trajektorienplanung in kooperativen Multi-Agent-Szenarien durch Deep Reinforcement Learning</td>
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<td>SS 2019</td>
<td>8179-10011</td>
<td>Dynamic Pricing in Parahotellerie - an adaption using the example of CASAMUNDO</td>
<td>Heller, Schienle</td>
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<td>SS 2019</td>
<td>8179-10012</td>
<td>Development and Implementation of Computer-Controlled Players for Use in Software-Based Wargaming Simulations</td>
<td>Lindstädt</td>
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<td>SS 2019</td>
<td>8179-10015</td>
<td>Kopplung von Strom- und Gasinfrastruktur auf Verteilnetzebene zur Vermeidung von Einspeisemanagement</td>
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<td>SS 2019</td>
<td>8179-10016</td>
<td>Development of a Generic Process Model for the Integration of BPM and IoT</td>
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<td>SS 2019</td>
<td>8179-10017</td>
<td>Reinforcement Learning in der Produktion - Eine Analyse der Entscheidungen, des Agentenverhaltens und des Einflusses von Demonstrationsdaten</td>
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<td>SS 2019</td>
<td>8179-10018</td>
<td>The Impact of Sustainability on Trading Behavior - A Retail Investor Perspective</td>
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<td>SS 2019</td>
<td>8179-10019</td>
<td>Development of a tool for linearizing economies-of-scale at the example of a techno-economic analysis of a lignocellulose biorefinery</td>
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<td>WS 19/20</td>
<td>8179-10020</td>
<td>Development of an instrument for the analysis, evaluation and avoidance of transport relevant CO2 emissions using the example of an automotive supplier</td>
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<td>SS 2019 8179-10021</td>
<td>Measurement of Option Liquidity</td>
<td>Uhrig-Homburg</td>
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<td>SS 2019 8179-10022</td>
<td>Business Models in Artificial Intelligence: Deduction of an Exemplary Business Model Based on an Analysis of Markets, Companies, and Experts</td>
<td>Lindstädt</td>
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<td>SS 2019 8179-10025</td>
<td>Early Customer Integration in der Serviceentwicklung</td>
<td>Weinhardt</td>
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<td>WS 19/20 8179-10027</td>
<td>A Techno-Economic Assessment of Compressed Biomethane Gas Production for Natural Gas Vehicles in Thailand</td>
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<td>SS 2019 8179-10028</td>
<td>Investigation of the Deployment Potential of the Augmented Reality Solution MiRA on the NH90 Assembly Line and Development of an Implementation Roadmap</td>
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<td>WS 19/20 8179-10029</td>
<td>Creation of a Model for Planning the Migration of Production Sites towards Autonomous Plants within a Global Production Network for a Middle-Class Automotive Supplier</td>
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<td>SS 2019 8179-10030</td>
<td>Development of a Simulation Model and Execution of a Simulation Study to Derive Recommendations for the Example of the Matrix Production of the Schaufensterfabrik II at SEW Eurodrive GmbH</td>
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<td>SS 2019 8179-10031</td>
<td>Fusion of mobility surveys supported by matching methods</td>
<td>Vortisch</td>
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<td>SS 2019 8179-10032</td>
<td>Development of a Modular Planning Model for the Support of Production Ramp Ups in Global Value-Added Networks</td>
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<td>SS 2019 8179-10033</td>
<td>Development of a Generic Change Management Model to Guide and Accompany Industry 4.0-Initiatives within Companies</td>
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<td>SS 2019 8179-10034</td>
<td>Development of a Concept for Scalable Automation of Assembly Systems</td>
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<td>SS 2019 8179-10035</td>
<td>Conception and Implementation of an Integrative Graphical Process and Data-Modeling System for Production and Logistics Planning</td>
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<td>SS 2019 8179-10036</td>
<td>Development of a Method for Designing Business Performance Management within Global Production Networks Using the Example of a Medium-Sized Automotive Supplier</td>
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<td>SS 2019 8179-10038</td>
<td>Semantic Segmentation of Worn Machine Inserts with Deep Learning</td>
<td>Satzger</td>
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<td>SS 2019 8179-10039</td>
<td>Archetypes of Analytics-Based Services</td>
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<td>SS 2019 8179-10040</td>
<td>AI-based Recommendation of Design Steps Based on the CAD Model Tree</td>
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<td>SS 2019 8179-10041</td>
<td>Machine Learning in Production: Development of an Application for Human Activity Recognition on the Shop Floor</td>
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<td>SS 2019 8179-10042</td>
<td>Development of a Decentralized Technology Approach to Improve Order and Quality Management in Automotive Value Networks Using Distributed Ledger Technology</td>
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<td>SS 2019 8179-10043</td>
<td>Digitization in Industrial Assembly by Means of an Assistance System</td>
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<td>SS 2019</td>
<td>8179-10044</td>
<td>Development of a Planning Model for Assessing the Feasibility of the Integration of New Vehicle Models into Existing Product Lines</td>
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<td>SS 2019</td>
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<td>Semi-Automated Selection of an Optimal Industry 4.0 Retrofit for Machine Tools</td>
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<td>SS 2019</td>
<td>8179-10047</td>
<td>Predicting Taxi Trips with Deep Spatial-Temporal Neural Networks</td>
<td>Nickel</td>
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<td>SS 2019</td>
<td>8179-10048</td>
<td>Impact of the Minimum Connection Time on the supply chain and connectivity: case study of Lufthansa Cargo AG</td>
<td>Nickel</td>
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<td>SS 2019</td>
<td>8179-10049</td>
<td>Optimierungsprozess der Fabrikumstrukturierungsplanung des Groblayouts von KMU im Sondermaschinenbau</td>
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<td>SS 2019</td>
<td>8179-10050</td>
<td>: Procedural and methodical support of customer-oriented requirements management in the Early Phase of PGE – Product Generation Engineering</td>
<td>Albers</td>
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<td>SS 2019</td>
<td>8179-10051</td>
<td>Product portfolio-spanning definition of functional product concepts in the Early Phase of the PGE – Product Generation Engineering by the example of the concept development at Dr. Ing. h.c. F. Porsche AG</td>
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<td>SS 2019</td>
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<td>Design and Evaluation of an ePrescription System Based on Distributed Ledger Technology</td>
<td>Sunyaev</td>
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<td>SS 2019</td>
<td>8179-10053</td>
<td>Development of a cost model of a scalable modular supporting structure for bridge cranes</td>
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<td>SS 2019</td>
<td>8179-10054</td>
<td>Entwicklung einer Methode zur Erstellung eines Conversational Agents, der eine gesunde Ernährung unterstützt</td>
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<td>SS 2019</td>
<td>8179-10055</td>
<td>Conceptual design of a traceability model within a global production network of era-contact GmbH</td>
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<td>8179-10056</td>
<td>Weighted Network analysis of the European airport network</td>
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<td>8179-10059</td>
<td>Job Shop Selection and Scheduling in Production Networks - An Optimization Approach</td>
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<td>SS 2019</td>
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<td>Jobs-to-be-done method-based business opportunity design for an existing product program</td>
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<td>SS 2019</td>
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<td>166/5000 Cloud-based software functions to support the completion of jobs via a cloud manufacturing platform (using the example of Heidelberger Druckmaschinen AG)</td>
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<td>WS 19/20</td>
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<td>Probabilistic Forecasting and the Integration of Wind Power into the Swedish Electrical Grid</td>
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<td>Optimization and innovation of mobility systems using the example of Auckland's public transportation</td>
<td>Jochem</td>
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<td>SS 2019</td>
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<td>Information Sharing in Digital Ecosystems</td>
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<td>8179-10066</td>
<td>Optimization and Innovation of Mobility Systems using the Example of Aucklands's Public Transportation</td>
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<td>8179-10069</td>
<td>Bewertung haptischer Warnungen als Eskalationsstufe in der Übernahmeaufforderung des hochautomatisierten Fahrens bei der Daimler AG</td>
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<td>SS 2019</td>
<td>8179-10070</td>
<td>Laufzeitsicherheitsnachweise für Industrie 4.0 Materialflussanwendungen - Konzeptstudien mit System-Theoretischer Prozessanalyse</td>
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<td>Analysis of the Connectivity Structure in Knowledge Graphs</td>
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<td>8179-10072</td>
<td>Improvement of Metaheuristik for logistics optimization</td>
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<td>8179-10073</td>
<td>Simulative investigation of different control strategies for shuttle systems</td>
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<td>8179-10074</td>
<td>Applying Nudges in Change Management – a Study about Choice Architectures as a Support for Organizational Change Processes</td>
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<td>8179-10075</td>
<td>Überwindung des Kaltstartproblems in der KI-Technologie - ein umfragebasiertes Ansatz am Beispiel von tragbarem Schlaf-Tracker AURA</td>
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<td>Usage profiles of free-floating carsharing in Karlsruhe</td>
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<td>SS 2019</td>
<td>8600-10001</td>
<td>Agility scenarios of agile cooperation and derivation of an Agility Roadmap 2025 using Daimler AG as an example</td>
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<td>SS 2019</td>
<td>8610-10003</td>
<td>Nachweis der DSGVO-Konformität: Entwurf einer automatisierten Lösung zur Erstellung des Verarbeitungsverzeichnisses</td>
<td>Sunyaev</td>
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<td>SS 2019</td>
<td>8610-10004</td>
<td>Probabilistic Forecasting of Individual Electrical Load Using GRU Considering Weather Effects</td>
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<td>SS 2019</td>
<td>8610-10006</td>
<td>Evaluation and Implementation of Methods for Process Recognition With Artificial Neural Networks in Videos</td>
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<td>SS 2019</td>
<td>8610-10007</td>
<td>Evaluation eines Konversationsagente als instruktives Assistenzsystem für industrielle und häusliche Wartungsarbeit</td>
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<td>SS 2019</td>
<td>8610-10008</td>
<td>A Distributed Platform Approach to Cooperative Perception Based on Cellular-V2X Communication</td>
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<td>SS 2019</td>
<td>8610-10009</td>
<td>Analyse von Bodenfeuchte-Zeitreihen mithilfe von neuronalen Netzen (Deep Learning)</td>
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<td>Value Propositions of Startups in the Context of Fundraising: Overstatements due to Vision Communications</td>
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<td>Designing a Self-Learning Decision Support System for Viticulture Campaigns</td>
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<td>WS 19/20</td>
<td>8610-10012</td>
<td>Meta-Learning zur Erkennung von Anomalien in Energiezeitreihen</td>
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**Competence Certificate**

see module description

**Prerequisites**

see module description

**Final Thesis**

This course represents a final thesis. The following periods have been supplied:

- **Submission deadline**: 6 months
- **Maximum extension period**: 3 months
- **Correction period**: 8 weeks

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019
6.02 Course: Material Flow in Logistic Systems [T-MACH-102151]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101263 - Introduction to Logistics
- M-MACH-101277 - Material Flow in Logistic Systems

<table>
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<td>Material flow in logistic systems</td>
<td>6 SWS</td>
<td>Others (sonst.)</td>
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<td>Material Flow in Logistic Systems</td>
<td>Prüfung (PR)</td>
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**Competence Certificate**
The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade.):
  - 40% assessment of the result of the case studies as group work,
  - 20% assessment of the oral examination during the case study colloquiums as individual performance.

A detailed description of the learning control can be found under Annotations.

**Prerequisites**
none

**Recommendation**
Recommended elective subject: Probability Theory and Statistics

**Annotation**
Students are divided into groups for this course. Five case studies are carried out in these groups. The results of the group work during the lecture period are presented and evaluated in writing. In the oral examination during the case study colloquiums, the understanding of the result of the group work and the models dealt with in the course is tested. The participation in the oral defenses is compulsory and will be controlled. For the written submission the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

_Below you will find excerpts from events related to this course:_

**Material flow in logistic systems**
2117051, WS 19/20, 6 SWS, Language: German, [Open in study portal](#) Others (sonst.)

**Description**
Students are divided into groups for this course. Five case studies are carried out in these groups. The results of the group work during the lecture period are presented and evaluated in writing. During the colloquiums, the result of the case study is presented and the understanding of the group work and the models dealt with in the course are tested in an oral defense. The participation in the colloquiums is compulsory and will be controlled. For the written submission and the presentation the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

**Media:** Presentations, black board, book, video recordings
Notes

Learning Content:
- Elements of material flow systems (conveyor elements, fork, join elements)
- Models of material flow networks using graph theory and matrices
- Queueing theory, calculation of waiting time, utilization
- Warehousing and order-picking
- Shuttle systems
- Sorting systems
- Simulation
- Calculation of availability and reliability
- Value stream analysis

After successful completion of the course, you are able (alone and in a team) to:
- Accurately describe a material handling system in a conversation with an expert.
- Model and parameterize the system load and the typical design elements of a material handling system.
- Design a material handling system for a task.
- Assess the performance of a material handling system in terms of the requirements.
- Change the main lever for influencing the performance.
- Expand the boundaries of today’s methods and system components conceptually if necessary.

Literature:
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg, 2009

Description:
Students are divided into groups for this course. Five case studies are carried out in these groups. The results of the group work during the lecture period are presented and evaluated in writing. During the colloquiums, the result of the case study is presented and the understanding of the group work and the models dealt with in the course are tested in an oral defense. The participation in the colloquiums is compulsory and will be controlled. For the written submission and the presentation the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

We strongly recommend to attend the introductory session at 16.10.2019. In this session, the teaching concept of "Materialfluss in Logistiksysteme" is explained and outstanding issues are clarified.

Workload:
- Regular attendance: 35 h
- Self-study: 135 h
- Group work: 100 h

Competence Certificate:
The assessment (Prüfungsleistung anderer Art) consists of the following assignments:
- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade.):
  - 40% assessment of the result and the presentation of the case studies as group work,
  - 20% assessment of the oral examination during the colloquiums as individual performance.

Learning Content
- Elements of material flow systems (conveyor elements, fork, join elements)
- Models of material flow networks using graph theory and matrices
- Queueing theory, calculation of waiting time, utilization
- Warehousing and order-picking
- Shuttle systems
- Sorting systems
- Simulation
- Calculation of availability and reliability
- Value stream analysis

Annotation
none
Workload
Regular attendance: 35 h
Self-study: 135 h
Group work: 100 h

Literature
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg, 2009
6.203 Course: Mathematical Models and Methods for Production Systems [T-MACH-105189]

**Responsible:** Marion Baumann
Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101278 - Material Flow in Networked Logistic Systems

**Type:** Oral examination
**Credits:** 6
**Recurrence:** Each winter term
**Version:** 1

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<td>4 SWS</td>
<td>Lecture (V)</td>
<td>Baumann, Furmans</td>
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</table>

**Competence Certificate**
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Mathematical models and methods for Production Systems**
2117059, WS 19/20, 4 SWS, Language: English, [Open in study portal](#)

**Notes**

**Media:**
black board, lecture notes, presentations

**Learning Content:**
- single server systems: M/M/1, M/G/1: priority rules, model of failures
- networks: open and closed approximations, exact solutions and approximations
- application to flexible manufacturing systems, AGV (automated guided vehicles) - systems
- modeling of control approaches like constant work in process (ConWIP) or kanban
- discrete-time modeling of queuing systems

**Learning Goals:**
Students are able to:
- Describe queueing systems with analytical solvable stochastic models,
- Derive approaches for modeling and controlling material flow and production systems based on models of queueing theory,
- Use simulation and exakt methods.

**Recommendations:**
- Basic knowledge of statistic
- recommended compulsory optional subject: Stochastics
- recommended lecture: Materials flow in logistic systems (also parallel)

**Workload:**
regular attendance: 42 hours
self-study: 198 hours
6.204 Course: Metal Forming [T-MACH-105177]

**Responsible:** Dr.-Ing. Thomas Herlan

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

<table>
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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
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**Events**

| SS 2019 | 2150681 | Metal Forming | 2 SWS | Lecture (V) | Herlan |

**Exams**

| SS 2019 | 76-T-MACH-105177 | Metal Forming | Prüfung (PR) | Schulze |

**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Metal Forming**

2150681, SS 2019, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019
Notes
At the beginning of the lecture the basics of metal forming are briefly introduced. The focus of the lecture is on massive forming (forging, extrusion, rolling) and sheet forming (car body forming, deep drawing, stretch drawing). This includes the systematic treatment of the appropriate metal forming Machines and the corresponding tool technology. Aspects of tribology, as well as basics in material science and aspects of production planning are also discussed briefly. The plastic theory is presented to the extent necessary in order to present the numerical simulation method and the FEM computation of forming processes or tool design. The lecture will be completed by product samples from the forming technology.

The topics are as follows:

- Introduction and basics
- Hot forming
- Metal forming machines
- Tools
- Metallographic fundamentals
- Plastic theory
- Tribology
- Sheet forming
- Extrusion
- Numerical simulation

Learning Outcomes:
The students ...

- are able to reflect the basics, forming processes, tools, Machines and equipment of metal forming in an integrated and systematic way.
- are capable to illustrate the differences between the forming processes, tools, machines and equipment with concrete examples and are qualified to analyze and assess them in terms of their suitability for the particular application.
- are also able to transfer and apply the acquired knowledge to other metal forming problems.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
At the beginning of the lecture the basics of metal forming are briefly introduced. The focus of the lecture is on massive forming (forging, extrusion, rolling) and sheet forming (car body forming, deep drawing, stretch drawing). This includes the systematic treatment of the appropriate metal forming Machines and the corresponding tool technology. Aspects of tribology, as well as basics in material science and aspects of production planning are also discussed briefly. The plastic theory is presented to the extent necessary in order to present the numerical simulation method and the FEM computation of forming processes or tool design. The lecture will be completed by product samples from the forming technology.

The topics are as follows:

- Introduction and basics
- Hot forming
- Metal forming machines
- Tools
- Metallographic fundamentals
- Plastic theory
- Tribology
- Sheet forming
- Extrusion
- Numerical simulation

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
### 6.205 Course: Methods and Models in Transportation Planning [T-BGU-101797]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101065 - Transportation Modelling and Traffic Management

<table>
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<td>Berechnungsverfahren und Modelle in der Verkehrsplanung</td>
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**Exams**

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</table>

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
Course: Methods in Economic Dynamics [T-WIWI-102906]

**Responsible:** Prof. Dr. Ingrid Ott

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101514 - Innovation Economics

### Type
Examination of another type

### Credits
1.5

### Recurrence
Each summer term

### Version
2

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<td>7900108</td>
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</table>

**Competence Certificate**
Alternative exam assessment.

**Prerequisites**
None

**Recommendation**
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantitative-mathematical methods.

Below you will find excerpts from events related to this course:

**Learning Content**
The workshop offers the possibility to deepen the understanding about different aspects of theoretical modelling of innovation-based growth and induced economic effects. This includes the implementation of formal models in computer algebra systems as well as recording, processing and econometric analysis of related data from relational databases (concerning for example patents or trademarks). Moreover, methods of network theory are discussed.

**Annotation**
The course has been added summer 2015.

**Workload**
The total workload for this course is approximately 45 hours.

Lecture: 15h
Preparation of lecture/exam: 30h
6.207 Course: Methods in Innovation Management [T-WIWI-110263]

**Responsible:** Dr. Daniel Jeffrey Koch  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101507 - Innovation Management  
M-WIWI-101507 - Innovation Management

<table>
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**Events**

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</table>

**Competence Certificate**  
Alternative exam assessments (§4(2), 3 SPO). The final grade is composed 75% of the grade of the written paper and 25% of the grade of the presentation.

**Prerequisites**  
None.

**Recommendation**  
Prior attendance of the course "Innovation Management: Concepts, Strategies and Methods" is recommended.
6.208 Course: Microactuators [T-MACH-101910]

**Responsible:** Prof. Dr. Manfred Kohl

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101290 - BioMEMS
- M-MACH-101292 - Microoptics
- M-MACH-101293 - Microsystems Technology

<table>
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**Events**

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**Exams**

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<th>Kohl</th>
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</thead>
</table>

**Competence Certificate**
written exam, 60 min.

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Microactuators**

2142881, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Description**

**Media:**
Script of ppt-slides

**Learning Content**

- Basic knowledge in the material science of the actuation principles
- Layout and design optimization
- Fabrication technologies
- Selected developments
- Applications

The lecture includes amongst others the following topics:

- Microelectromechanical systems: linear actuators, microrelais, micromotors
- Medical technology and life sciences: Microvalves, micropumps, microfluidic systems
- Microrobotics: Microgrippers, polymer actuators (smart muscle)
- Information technology: Optical switches, mirror systems, read/write heads

**Annotation**

Details will be announced at the beginning of the lecture

**Workload**

lecture time 1.5 h/week
self preparation: 8.5 h/week
Literature
- Lecture notes
- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004
6.209 Course: Mixed Integer Programming I [T-WIWI-102719]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101473 - Mathematical Programming  
- M-WIWI-102832 - Operations Research in Supply Chain Management  
- M-WIWI-103289 - Stochastic Optimization  

### Events

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<td>SWS</td>
<td>Lecture (V)</td>
<td>Stein</td>
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<td>WS 19/20</td>
<td>Exercises Mixed Integer Programming I</td>
<td>SWS</td>
<td>Practice (Ü)</td>
<td>Stein</td>
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### Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of Mixed Integer Programming II [25140]. In this case, the duration of the written examination takes 120 minutes.

### Prerequisites

None

### Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

### Annotation

The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).

**Below you will find excerpts from events related to this course:**

### Mixed Integer Programming I

<table>
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**Learning Content**

Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.

The lecture treats methods for the numerical solution of linear optimization problems which depend on continuous as well as discrete variables. It is structured as follows:

- Existence results and concepts of linear as well as convex optimization  
- LP relaxation and error bounds for rounding  
- Gomory's cutting plane method  
- Benders decomposition

Part II of the lecture treats nonlinear mixed integer programs. The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.
Literature

- J. Kallrath: Gemischt-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
6.210 Course: Mixed Integer Programming II [T-WIWI-102720]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
         M-WIWI-102832 - Operations Research in Supply Chain Management
         M-WIWI-103289 - Stochastic Optimization

<table>
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<tr>
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Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of Mixed Integer Programming I [2550138]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).
6.211 Course: Mobility Services and new Forms of Mobility [T-BGU-103425]

- **Responsible:** Dr.-Ing. Martin Kagerbauer
- **Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences
- **Part of:**
  - M-BGU-101064 - Fundamentals of Transportation
  - M-BGU-101065 - Transportation Modelling and Traffic Management

**Type:** Oral examination

**Credits:** 3

**Recurrence:** Each summer term

**Version:** 1

### Events

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<td>6232811</td>
<td>Mobilitätsservices und neue Formen der Mobilität</td>
<td>2 SWS</td>
<td>Lecture / Practice (VÜ)</td>
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</tr>
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### Exams

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<td>Mobility Services and new Forms of Mobility</td>
<td>Prüfung (PR)</td>
<td>Kagerbauer</td>
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</table>

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
6.212 Course: Model Based Application Methods [T-MACH-102199]

**Responsible:** Dr. Frank Kirschbaum  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

<table>
<thead>
<tr>
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<tbody>
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**Competence Certificate**

take-home exam, short presentation with oral examination

**Prerequisites**

none
Course: Modeling and Analyzing Consumer Behavior with R [T-WIWI-102899]

**Responsible:** Dr. Verena Dorner  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101448 - Service Management  
M-WIWI-101489 - Strategy, Communication, and Data Analysis  
M-WIWI-101506 - Service Analytics

**Type**  
Written examination

**Credits**  
4.5

**Recurrence**  
Each summer term

**Version**  
1

### Events

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<th>Version</th>
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### Exams

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<th>Version</th>
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### Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

### Prerequisites

None

### Recommendation

None

### Annotation

Number of participants limited.

---

Below you will find excerpts from events related to this course:

### Learning Content

Students learn the fundamental methods, algorithms and concepts for analysing consumer data. The students deepen their knowledge in working on a case study and computer exercises, especially in the areas of e-commerce and behavioural economics. In addition, students learn to write applications in R and to organize and execute larger data mining and general data analytics projects. Furthermore, students learn methods for evaluating and visualizing data.

The event will focus on the following topics:

1. basic programming concepts in R  
2. data mining with R using established process models such as CRISP-DM  
3. text mining and analysis of online data with R  
4. working on a case study from the area of Consumer and User Analytics  
5. data visualization and evaluation with R
Annotation
The course has been added summer term 2015.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
Wickham, Hadley, ggplot2: Elegant Graphics for Data Analysis (Use R!), Springer 2009 (2nd edition)
6.214 Course: Modeling and OR-Software: Advanced Topics [T-WIWI-106200]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-102808 - Digital Service Systems in Industry
- M-WIWI-102832 - Operations Research in Supply Chain Management

<table>
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<td>2550490</td>
<td>Modellieren und OR-Software: Fortgeschrittene Themen</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Pomes, Zander, Bakker</td>
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**Competence Certificate**
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the software laboratory and the following term.

**Prerequisites**
None.

**Recommendation**
Basic knowledge as conveyed in the module Introduction to Operations Research is assumed.
Successful completion of the course Modeling and OR-Software: Introduction.

**Annotation**
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.
The lecture is held in every term. The planned lectures and courses for the next three years are announced online.

*Below you will find excerpts from events related to this course:*

**Modellieren und OR-Software: Fortgeschrittene Themen**
2550490, WS 19/20, 3 SWS, Language: German, Open in study portal

**Practical course (P)**

**Learning Content**
The advanced course is designated for Master students that already attended the introductory course or gained equivalent experience elsewhere, e.g. during a seminar or bachelor thesis.

We will work on advanced topics and methods in OR, among others cutting planes, column generation and constraint programming. The Software used for the exercises is IBM ILOG CPLEX Optimization Studio. The associated modelling programming languages are OPL and ILOG Script.

**Annotation**
The lecture is for Master students who have already attended the introduction or have achieved comparable knowledge e.g. in a Bachelor thesis.
Interested students are requested to send an e-mail to Anika Pomes (anika.pomes@kit.edu) from now until 29.09.2019, including the Bachelor’s and the current Master’s grade transcripts. If the introduction has not been checked, please let us know how the necessary knowledge has been obtained.
For further information see the webpage of the course.
The lecture is offered in every winter term. The planned lectures and courses for the next three years are announced online.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
### 6.215 Course: Morphodynamics [T-BGU-101859]

**Responsible:** Prof. Dr. Franz Nestmann  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-WIWI-101642 - Natural Hazards and Risk Management 1  
- M-WIWI-101644 - Natural Hazards and Risk Management 2  
- M-WIWI-104837 - Natural Hazards and Risk Management

<table>
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</tbody>
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**Events**  
- **SS 2019 6222805 Morphodynamics 2 SWS Lecture / Practice (VU)**  
  - Nestmann

**Exams**  
- **SS 2019 8230101859 Morphodynamics Prüfung (PR)**  
  - Nestmann

**Competence Certificate**  
See German version.

**Prerequisites**  
None
### Course: Multivariate Statistical Methods [T-WIWI-103124]

<table>
<thead>
<tr>
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<th>Prof. Dr. Oliver Grothe</th>
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<tbody>
<tr>
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</table>
| Part of     | M-WIWI-101473 - Mathematical Programming  
            | M-WIWI-101637 - Analytics and Statistics  
            | M-WIWI-101639 - Econometrics and Statistics II  
            | M-WIWI-103289 - Stochastic Optimization |

#### Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4).

The exam is offered every semester. Re-examinations are offered only for repeaters.

#### Prerequisites

None

#### Recommendation

The course covers highly advanced statistical methods with a quantitative focus. Hence, participants are necessarily expected to have advanced statistical knowledge, e.g. acquired in the course “Advanced Statistics”. Without this, participation in the course is not advised.

Previous attendance of the course Analysis of Multivariate Data is recommended. Alternatively, the script can be provided to interested students.
6.217 Course: Nanotechnology for Engineers and Natural Scientists [T-MACH-105180]

**Responsible:** Prof. Dr. Martin Dienwiebel  
PD Dr. Hendrik Hölscher  
Stefan Walheim

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101294 - Nanotechnology

**Type**  
Written examination

**Credits**  
4

**Recurrence**  
Each summer term

**Version**  
1

### Events

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<td>2</td>
<td>Lecture (V)</td>
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#### Exams

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<td>Nanotechnology for Engineers and Natural Scientists</td>
<td>Prüfung (PR)</td>
<td>Hölscher, Dienwiebel</td>
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<td>76-T-MACH-105180</td>
<td>Nanotechnology for Engineers and Natural Scientists</td>
<td>Prüfung (PR)</td>
<td>Hölscher, Dienwiebel</td>
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</table>

**Competence Certificate**  
written exam 90 min

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

<table>
<thead>
<tr>
<th>V</th>
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<th>Lecture (V)</th>
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<tr>
<td></td>
<td>2142861, SS 2019, 2 SWS, Language: German, Open in study portal</td>
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</tbody>
</table>
Notes
1) Introduction into nanotechnology
2) History of scanning probe techniques
3) Scanning tunneling microscopy (STM)
4) Atomic force microscopy (AFM)
5) Dynamic Modes (DFM, ncAFM, MFM, KPFM, ...)
6) Friction force microscopy & nanotribology
7) Nanolithography
8) Other families of the SPM family

The student can
- explain the most common measurement principles of nanotechnology especially scanning probe methods and is able to use them for the characterisation of chemical and physical properties of surfaces
- describe interatomic forces and their influence on nanotechnology
- describe methods of micro- and nanofabrication and of nanolithography
- explain simple models used in contact mechanics and nanotribology
- describe basic concepts used for nanoscale components

preliminary knowledge in mathematics and physics

Learning Content
1) Introduction into nanotechnology
2) History of scanning probe techniques
3) Scanning tunneling microscopy (STM)
4) Atomic force microscopy (AFM)
5) Dynamic Modes (DFM, ncAFM, MFM, KPFM, ...)
6) Friction force microscopy & nanotribology
7) Nanolithography
8) Other families of the SPM family

Workload
lectures 30 h
self study 30 h
preparation for examination 30 h

Literature
1. Lecture notes, slides, script
6.218 Course: Nanotechnology with Clusterbeams [T-MACH-102080]

Responsible: Dr. Jürgen Gspann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101293 - Microsystem Technology
        M-MACH-101294 - Nanotechnology

Competence Certificate
written examination
presence in more than 70% of the lectures
Duration: 1 h

aids: none

Prerequisites
none
6.219 Course: Nanotribology and -Mechanics [T-MACH-102167]

**Responsible:** Prof. Dr. Martin Dienwiebel  
PD Dr. Hendrik Hölscher

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101291 - Microfabrication  
M-MACH-101294 - Nanotechnology

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<td>Nanotribology and -Mechanics</td>
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<td>Nanotribology and -Mechanics</td>
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**Exams**

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<td>76-T-MACH-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>2</td>
<td>Prüfung (PR)</td>
<td>Dienwiebel</td>
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</table>

**Competence Certificate**

presentation (40%) and colloquium (30 min, 60%)

no tools or reference materials

**Prerequisites**

none

**Recommendation**

preliminary knowledge in mathematics and physics

Below you will find excerpts from events related to this course:
Notes
In the summer semester the lecture is offered in German and in the winter semester in English!

Part 1: Fundamentals of nanotribology
- General tribology / nanotechnology
- Forces and dissipation on the nanometer scale
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Carbon-based tribosystems
- Electronic friction
- Nanotribology in liquids
- Atomic abrasion
- nanolubrication

Part 2: Topical papers
The student can
- explain the physical foundations and common models used in the field of nanotribology and nanomechanics
- describe the most important experimental methods in nanotribology
- critically evaluate scientific papers on nanotribological issues with respect to their substantial quality

preliminary knowledge in mathematics and physics recommended
regular attendance: 22.5 hours
preparation for presentation: 22.5 hours
self-study: 75 hours
presentation (40%) and oral examination (30 min, 60%) no tools or reference materials

Learning Content
Part 1: Fundamentals of nanotribology
- General tribology / nanotechnology
- Forces and dissipation on the nanometer scale
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Carbon-based tribosystems
- Electronic friction
- Nanotribology in liquids
- Atomic abrasion
- nanolubrication

Part 2: Topical papers

Workload
regular attendance: 22.5 hours
preparation for presentation: 22.5 hours
self-study: 75 hours

Literature
Edward L. Wolf
Nanophysics and Nanotechnology, Wiley-VCH, 2006
C. Mathew Mate
Lecture notes, slides and copies of articles

Nanotribology and -Mechanics
2182712, WS 19/20, 2 SWS, Language: English, Open in study portal
Notes
In the summer semester the lecture is offered in German and in the winter semester in English!

Part 1: Fundamentals of nanotribology
- General tribology / nanotechnology
- Forces and dissipation on the nanometer scale
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Carbon-based tribosystems
- Electronic friction
- Nanotribology in liquids
- Atomic abrasion
- Nanolubrication

Part 2: Topical papers
The student can
- explain the physical foundations and common models used in the field of nanotribology and nanomechanics
- describe the most important experimental methods in nanotribology
- critically evaluate scientific papers on nanotribological issues with respect to their substantial quality

preliminary knowledge in mathematics and physics recommended
regular attendance: 22.5 hours
preparation for presentation: 22.5 hours
self-study: 75 hours
presentation (40%) and oral examination (30 min, 60%)
no tools or reference materials

Learning Content
Part 1: Basics:
- Nanotechnology
- Forces at nanometer scale
- contact mechanics models (Hertz, JKR, DMT)
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Atomic-Scale Wear

Part 2: Topical papers

Workload
regular attendance: 22.5 hours
preparation for presentation: 22.5 hours
self-study: 75 hours

Literature
Lecture notes, slides and copies of articles

Responsible: Dr. rer. nat. Pradyumn Kumar Shukla
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Events

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Exams

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Competence Certificate
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called "bonus exam", 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exercises. The bonus exam may be split into several shorter written tests.

The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Below you will find excerpts from events related to this course:

Nature-Inspired Optimization Methods
2511106, SS 2019, 2 SWS, Language: English, Open in study portal

Learning Content
Many optimization problems are too complex to be solved to optimality. A promising alternative is to use stochastic heuristics, based on some fundamental principles observed in nature. Examples include evolutionary algorithms, ant algorithms, or simulated annealing. These methods are widely applicable and have proven very powerful in practice. During the course, such optimization methods based on natural principles are presented, analyzed and compared. Since the algorithms are usually quite computational intensive, possibilities for parallelization are also investigated.
6.221 Course: Non- and Semiparametrics [T-WIWI-103126]

**Responsible:** Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101638 - Econometrics and Statistics I  
- M-WIWI-101639 - Econometrics and Statistics II

**Type**  
Written examination  
**Credits**  
4,5  
**Recurrence**  
Irregular  
**Version**  
1

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<td>Schienle, Görgen</td>
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**Competence Certificate**  
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**  
None

**Recommendation**  
Knowledge of the contents covered by the course "Applied Econometrics" [2520020]

**Annotation**  
The course takes place every second winter semester: 2018/19 then 2020/21
6.222 Course: Nonlinear Optimization I [T-WIWI-102724]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

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Events

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Exams

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<td>Nonlinear Optimization I</td>
<td>Prüfung (PR)</td>
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Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The exam takes place in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

The module component exam T-WIWI-103637 "Nonlinear Optimization I and II" may not be selected.

Annotation

Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

Nonlinear Optimization I

2550111, WS 19/20, 2 SWS, Open in study portal

Learning Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Annotation

Part I and II of the lecture are held consecutively in the same semester.
Literature

Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
6.223 Course: Nonlinear Optimization I and II [T-WIWI-103637]

**Responsible:** Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101473 - Mathematical Programming

---

**Type**

Written examination

**Credits**

9

**Recurrence**

Each winter term

**Version**

6

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**Competence Certificate**

The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The exam takes place in the semester of the lecture and in the following semester.

**Prerequisites**

None.

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.

---

Below you will find excerpts from events related to this course:

**Nonlinear Optimization I**

2550111, WS 19/20, 2 SWS, Open in study portal

**Learning Content**

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.
Learning Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
### 6.224 Course: Nonlinear Optimization II [T-WIWI-102725]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101473 - Mathematical Programming

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#### Events

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<td>Practice (Ü)</td>
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<td>Nonlinear Optimization II</td>
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<td>Lecture (V)</td>
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#### Exams

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<td>Stein</td>
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**Competence Certificate**  
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The exam takes place in the semester of the lecture and in the following semester.

The exam can also be combined with the examination of Nonlinear Optimization I [2550111]. In this case, the duration of the written exam takes 120 minutes.

**Prerequisites**  
None.

**Annotation**  
Part I and II of the lecture are held consecutively in the same semester.

#### Below you will find excerpts from events related to this course:

**Nonlinear Optimization II**  
2550113, WS 19/20, 2 SWS, Open in study portal  
**Lecture (V)**

**Learning Content**  
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Annotation**  
Part I and II of the lecture are held consecutively in the same semester.
Literature

Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
6.225 Course: Novel Actuators and Sensors [T-MACH-102152]

**Responsible:** Prof. Dr. Manfred Kohl  
Dr. Martin Sommer  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:**  
M-MACH-101293 - Microsystem Technology  
M-MACH-101294 - Nanotechnology  
M-MACH-101295 - Optoelectronics and Optical Communication  

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**Events**

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<td>Novel actuators and sensors</td>
<td>Kohl, Sommer</td>
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</table>

**Compence Certificate**  
written exam, 60 minutes  

**Prerequisites**  
none  

Below you will find excerpts from events related to this course:

**Novel actuators and sensors**  
2141865, WS 19/20, 2 SWS, Language: German, Open in study portal  

**Description**  
**Media:**  
Script / script of ppt foils (part 2)  

**Learning Content**  
**Contents:**  
- Basic knowledge in the material science of actuator and sensor principles  
- Layout and design optimization  
- Fabrication technologies  
- Selected developments  
- Applications  

**Index:** The lecture includes amongst others the following topics:  
- Piezo actuators  
- Magnetostrictive actuators  
- Shape memory actuators  
- Electro-/magnetorheological actuators  
- Sensors: Concepts, materials, fabrication  
- Micromechanical sensors: Pressure, force, inertia sensors  
- Temperature sensors  
- Micro sensors for bio analytics  
- Mechano-magnetic sensors  

The lecture addresses students in the fields of mechanical engineering, mechatronics and information technology, materials science and engineering, electrical engineering and economic sciences. A comprehensive introduction is given in the basics and current developments on the macroscopic length scale.  

The lecture is core subject of the major course “Actuators and Sensors” of the specialization “Mechatronics and Microsystems Technology” in Mechanical Engineering.
Workload

Work Lecture:

time of attendance: 21 hours
Self-study: 99 hours

Literature

- Lecture notes
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
6.226 Course: Operation Methods for Earthmoving [T-BGU-101801]

**Responsible:** Dr.-Ing. Heinrich Schlick

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101110 - Process Engineering in Construction

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**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
# Course: Operation Methods for Foundation and Marine Construction [T-BGU-101832]

**Responsible:** Dr.-Ing. Harald Schneider  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101110 - Process Engineering in Construction

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### Prerequisites
None

### Recommendation
None

### Annotation
None

Economics Engineering M.Sc.  
Module Handbook as of 01.10.2019
6.228 Course: Operations Research in Health Care Management [T-WIWI-102884]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-102805 - Service Operations

### Type
- Written examination

### Credits
- 4,5

### Recurrence
- Irregular

### Version
- 2

**Competence Certificate**
The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

**Prerequisites**
None

**Recommendation**
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

**Annotation**
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102805 - Service Operations
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

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Exams

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Competence Certificate
The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the module Introduction to Operations Research and in the lectures Facility Location and Strategic SCM, Tactical and operational SCMs assumed.

Annotation
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

Below you will find excerpts from events related to this course:

Operations Research in Supply Chain Management
2550480, SS 2019, 2 SWS, Language: English, Open in study portal

Learning Content
Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture's focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.

In form and content, the lecture addresses all levels of Supply Chain Management: After a short introduction, the tactical and operational level will be discussed with regard to inventory models, scheduling as well as cutting and packing. The strategic level will be discussed in terms of layout planning. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.

Annotation
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.
Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
6.230 Course: Optical Transmitters and Receivers [T-ETIT-100639]

**Responsible:** Prof. Dr. Wolfgang Freude

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-MACH-101295 - Optoelectronics and Optical Communication

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**Prerequisites**

none
### 6.231 Course: Optical Waveguides and Fibers [T-ETIT-101945]

**Responsible:** Prof. Dr.-Ing. Christian Koos  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:**  
- M-MACH-101292 - Microoptics  
- M-MACH-101295 - Optoelectronics and Optical Communication

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**Prerequisites**

- none
6.232 Course: Optimization Models and Applications [T-WIWI-110162]

**Responsible:** Dr. Nathan Sudermann-Merx

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101473 - Mathematical Programming
- M-WIWI-102832 - Operations Research in Supply Chain Management
- M-WIWI-103289 - Stochastic Optimization

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**Competence Certificate**

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

The prerequisite for participation in the exam is the achievement of a minimum number of points in delivery sheets. Details will be announced at the beginning of the course.

**Prerequisites**

None.
6.233 Course: Optimization under Uncertainty [T-WIWI-106545]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103289 - Stochastic Optimization

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Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

Prerequisites
None.
### 6.234 Course: Optoelectronic Components [T-ETIT-101907]

**Responsible:** Prof. Dr. Wolfgang Freude  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-MACH-101293 - Microsystem Technology

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**Prerequisites**

none
## 6.235 Course: Panel Data [T-WIWI-103127]

**Responsible:** apl. Prof. Dr. Wolf-Dieter Heller  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101638 - Econometrics and Statistics I  
M-WIWI-101639 - Econometrics and Statistics II

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**Prerequisites**  
None
6.236 Course: Parametric Optimization [T-WIWI-102855]

**Responsible:** Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101473 - Mathematical Programming

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**Competence Certificate**

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

**Prerequisites**

None

**Recommendation**

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

**Annotation**

The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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6.238 Course: Personalization and Services [T-WIWI-102848]

Responsible: Dr.-Ing. Andreas Sonnenbichler
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-101470 - Data Science: Advanced CRM

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<td>Written exam</td>
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<td>Each winter term</td>
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Events

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<tr>
<td>WS 19/20</td>
<td>Personalization &amp; Services</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Sonnenbichler, Geyer-Schulz</td>
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<tr>
<td>WS 19/20</td>
<td>Exercise Personalization &amp; Services</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
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Exams

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<tbody>
<tr>
<td>SS 2019</td>
<td>Personalization and Services</td>
<td>Prüfung (PR)</td>
<td>Geyer-Schulz</td>
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</table>

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V Personalization & Services
2540533, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content

- Personalization of Services and Applications
- User Modeling
- User Profiles
- Authentication
- Authorization
- Applications in e-Commerce and for internet-based Services
- Personalized Web Search
- Privacy
Workload
The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance
- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study
- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Literature
The course follows latest scientific papers. References to these papers are listed at the end of each course unit.
6.239 Course: PH APL-ING-TL01 [T-WIWI-106291]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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6.240 Course: PH APL-ING-TL02 [T-WIWI-106292]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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### 6.241 Course: PH APL-ING-TL03 [T-WIWI-106293]

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6.242 Course: PH APL-ING-TL04 ub [T-WIWI-106294]

Organisation: University
Part of:  M-WIWI-101404 - Extracurricular Module in Engineering

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### 6.243 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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6.244 Course: PH APL-ING-TL06 ub [T-WIWI-106296]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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**Organisation:** University

**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering
6.246 Course: Photovoltaic System Design [T-ETIT-100724]

Responsible: Robin Grab
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101164 - Generation and Transmission of Renewable Power

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Events

| SS 2019 | 2307380 | Photovoltaische Systemtechnik | 2 SWS | Lecture (V) | Grab |

Exams

| SS 2019 | 7307380 | Photovoltaics | Prüfung (PR) | Leibfried |

Prerequisites
none
### 6.247 Course: Physics for Engineers [T-MACH-100530]

**Responsible:** Prof. Dr. Martin Dienwiebel  
Prof. Dr. Peter Gumbsch  
Prof. Dr. Alexander Nesterov-Müller  
Dr. Daniel Weygand  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101291 - Microfabrication  
M-MACH-101293 - Microsystem Technology

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<th>Version</th>
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<td>Weygand, Dienwiebel, Gumbsch</td>
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<td>2142890</td>
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<td>76-T-MACH-100530</td>
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<td>Prüfung (PR)</td>
<td>Gumbsch, Weygand, Nesterov-Müller, Dienwiebel</td>
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</table>

**Competence Certificate**  
written exam 90 min

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Physics for Engineers**  
2142890, SS 2019, 2 SWS, Language: German, Open in study portal

**Lecture (V)**
Notes

1) Foundations of solid state physics
   - Wave particle dualism
   - Tunnelling
   - Schrödinger equation
   - H-atom

2) Electrical conductivity of solids
   - solid state: periodic potentials
   - Pauli Principle
   - band structure
   - metals, semiconductors and isolators
   - p-n junction / diode

3) Optics
   - quantum mechanical principles of the laser
   - linear optics
   - non-linear optics

Exercises (2142891, 2 SWS) are used for complementing and deepening the contents of the lecture as well as for answering more extensive questions raised by the students and for testing progress in learning of the topics.

The student
   - has the basic understanding of the physical foundations to explain the relationship between the quantum mechanical principles and the optical as well as electrical properties of materials
   - can describe the fundamental experiments, which allow the illustration of these principles

regular attendance: 22,5 hours (lecture) and 22,5 hours (excerises 2142891)
self-study: 97,5 hours and 49 hours (excerises 2142891)
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Learning Content

1) Foundations of solid state physics
   - Wave particle dualism
   - Tunnelling
   - Schrödinger equation
   - H-atom

2) Electrical conductivity of solids
   - solid state: periodic potentials
   - Pauli Principle
   - band structure
   - metals, semiconductors and isolators
   - p-n junction / diode

3) Optics
   - quantum mechanical principles of the laser
   - linear optics
   - non-linear optics

Exercises (2142891, 2 SWS) are used for complementing and deepening the contents of the lecture as well as for answering more extensive questions raised by the students and for testing progress in learning of the topics.

Workload
regular attendance: 22,5 hours (lecture) and 22,5 hours (excerises 2142891)
self-study: 97,5 hours and 49 hours (excerises 2142891)

Literature

- Tipler und Mosca: Physik für Wissenschaftler und Ingenieure, Elsevier, 2004
- Harris, Moderne Physik, Pearson Verlag, 2013
### Course: Planning and Management of Industrial Plants [T-WIWI-102631]

**Responsible:** Prof. Dr. Frank Schultmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101471 - Industrial Production II

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#### Events

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<td>Planning and Management of Industrial Plants</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Glöser-Chahoud, Schultmann</td>
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<tr>
<td>WS 19/20</td>
<td>2581953</td>
<td>Übungen Anlagenwirtschaft</td>
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<td>Practice (Ü)</td>
<td>Rosenberg, Schultmann</td>
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#### Exams

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<td>7981952</td>
<td>Planning and Management of Industrial Plants</td>
<td>Prüfung (PR)</td>
<td>Schultmann</td>
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</table>

#### Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

#### Prerequisites
None

#### Recommendation
None

Below you will find excerpts from events related to this course:

### Planning and Management of Industrial Plants

**Code:** 2581952, **WS 19/20**, 2 SWS, **Language:** German, [Open in study portal](#)

#### Learning Content
Industrial plant management incorporates a complex set of tasks along the entire life cycle of an industrial plant, starting with the initiation and erection up to operating and dismantling. During this course students will get to know special characteristics of industrial plant management. Students will learn important methods to plan, realize and supervise the supply, start-up, maintenance, optimisation and shut-down of industrial plants. Alongside, students will have to handle the inherent question of choosing between technologies and evaluating each of them. This course pays special attention to the specific characteristics of plant engineering, commissioning and investment.

#### Workload
Total effort required will account for approximately 165h (5.5 credits).

#### Literature
will be announced in the course
### Course: PLM for Product Development in Mechatronics [T-MACH-102181]

**Responsible:** Prof. Dr.-Ing. Martin Eigner  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101281 - Virtual Engineering B  
M-MACH-101283 - Virtual Engineering A

<table>
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#### Events

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<td>SWS</td>
<td>Lecture (V)</td>
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<td>PLM for product development in mechatronics</td>
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#### Exams

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<td>PLM for Product Development in Mechatronics</td>
<td>Prüfung (PR)</td>
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</table>

**Competence Certificate**  
Oral examination 20 min.

**Prerequisites**  
none

Below you will find excerpts from events related to this course:

**PLM for product development in mechatronics**  
2122376, SS 2019, SWS, Language: German, [Open in study portal]

**Workload**  
The total workload for this course is approximately 120 hours. For further information see German version.

**PLM for product development in mechatronics**  
2122376, WS 19/20, SWS, Language: German, [Open in study portal]

**Workload**  
The total workload for this course is approximately 120 hours. For further information see German version.
### Course: PLM-CAD Workshop [T-MACH-102153]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101281 - Virtual Engineering B  
M-MACH-101283 - Virtual Engineering A

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<td>SS 2019</td>
<td>2121357</td>
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<td>Practical course</td>
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### Exams

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<td>PLM-CAD Workshop</td>
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**Competence Certificate**  
Alternative exam assessment (graded)

**Prerequisites**  
None

**Annotation**  
Number of participants is limited, compulsory attendance
6.251 Course: Plug-and-play material handling [T-MACH-106693]

Responsibilities: 
Jonathan Dziedzitz  
Prof. Dr.-Ing. Kai Furmans

Organisation: 
KIT Department of Mechanical Engineering

Part of: 
M-MACH-104888 - Advanced Module Logistics

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Events

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<tr>
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<td>2117070</td>
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<td>Practical course (P)</td>
<td>Furmans, Dziedzitz</td>
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Competence Certificate
Presentation of the four steps of the course content (design, implementation, test concept and evaluation)

Prerequisites
None
### 6.252 Course: Polymers in MEMS A: Chemistry, Synthesis and Applications [T-MACH-102192]

**Responsible:** Dr.-Ing. Bastian Rapp  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101291 - Microfabrication  
- M-MACH-101293 - Microsystem Technology

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<td>Each winter term</td>
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</table>

**Events**

| WS 19/20 | 2141853 | Polymers in MEMS A: Chemistry, Synthesis and Applications | 2 SWS | Rapp |

**Competence Certificate**

Oral examination

**Prerequisites**

none

---

Below you will find excerpts from events related to this course:

---

**Polymers in MEMS A: Chemistry, Synthesis and Applications**

2141853, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**

The lecture slides will be given out as scriptum during each lecture course.
Learning Content
We all come in contact with numerous polymeric products in everyday life. From water bottles to packaging to the cover of the iPad, many things are made of polymers. Polymers are also important materials for modern microelectromechanical systems (MEMS) allowing cost effective mass market compatible products, e.g., in the life sciences or diagnostics. But polymers are not just cost-effective replacements for more expensive classical materials in MEMS (such as, e.g., silicon) – some polymers have intrinsic properties that make them ideal materials for sensors, actuators or templates for biology and chemistry in MEMS.

This lecture will introduce the basics of organic chemistry required for understanding what polymers are, how they are manufactured and which mechanisms are responsible for their unique properties. The lecture will highlight (in the context of MEMS but also in a wider scope) where and why polymers are applied with a strong focus on their chemical and physical properties (and on their synthesis).

Some of the topics covered are:

- What is the basic chemistry of polymers? What are monomers, what are macromolecules and how are they formed?
- How are polymers produced on industrial scale – but also on the laboratory scale? Numerous examples of how to make (commonly and lesser known) polymers will be discussed including materials such as Plexiglas.
- Why are polymers so important for biochemistry and tissue engineering?
- How do photoresists work and why do some polymers contract when exposed to light?
- What are high-performance polymers and why do they have such a wide application range, e.g., in implants?
- What polymers fuel the household 3D printing community and what materials do 3D printers such as, e.g., the RepRap work with?
- How does 3D printing and rapid prototyping work and which polymers can be employed for which techniques?
- Why does silicone always smell like vinegar and why is this material so important for modern day microfluidics? How do you built fluid-logic devices using silicone?
- How do shape memory polymers remember their shape?
- What are polymer foams and why are they not only important for heat insulation but also for organic chemistry?
- How do glues work? Why are there two-component glues, what is superglue and how can you make glue from potatoes?
- What is the basic chemistry of polymers? What are monomers, what are macromolecules and how are they formed?
- How are polymers produced on industrial scale – but also on the laboratory scale? Numerous examples of how to make (commonly and lesser known) polymers will be discussed including materials such as Plexiglas.
- Why are polymers so important for biochemistry and tissue engineering?
- How do photoresists work and why do some polymers contract when exposed to light?
- What are high-performance polymers and why do they have such a wide application range, e.g., in implants?
- What polymers fuel the household 3D printing community and what materials do 3D printers such as, e.g., the RepRap work with?
- How does 3D printing and rapid prototyping work and which polymers can be employed for which techniques?
- Why does silicone always smell like vinegar and why is this material so important for modern day microfluidics? How do you built fluid-logic devices using silicone?
- How do shape memory polymers remember their shape?
- What are polymer foams and why are they not only important for heat insulation but also for organic chemistry?
- How do glues work? Why are there two-component glues, what is superglue and how can you make glue from potatoes?

The lecture will be given in German language unless non-German speaking students attend. In this case, the lecture will be given in English (with some German translations of technical vocabulary). The lecture slides are in English language and will be handed out for taking notes. Additional literature is not required.

For further details, please contact the lecturer, Dr. Ing. Bastian E. Rapp (bastian.rapp@kit.edu). Preregistration is not necessary.

The examination will be held in oral form at the end of the lecture. The lecture can be chosen as "Nebenfach" or part of a "Hauptfach". The second lecture of the lecture series "Polymers in MEMS B – Physics, manufacturing and applications" (which is also held in winter semester) can be combined with this lecture as part of a "Hauptfach". In summer semester, the third part of the lecture series "Polymers in MEMS C – Biopolymers, Biopolymers and applications" will be given which may be combined with lectures A and B to form a complete "Hauptfach".

Annotation
For further details, please contact the lecturer, Dr. Ing. Bastian E. Rapp (bastian.rapp@kit.edu). Preregistration is not necessary.

Workload
- lecture: 15 * 1.5 h (22 h)
- lecture preparation (before and after lecture): 15 * 2 h (30 h)
- preparation of final exam: 70 h
6.253 Course: Polymers in MEMS B: Physics, Microstructuring and Applications [T-MACH-102191]

**Responsible:** Dr.Ing. Matthias Worgull
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101291 - Microfabrication
- M-MACH-101293 - Microsystem Technology

<table>
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<th>Recurrence</th>
<th>Version</th>
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**Exams**
- SS 2019, 76-T-MACH-102191, Polymers in MEMS B: Physics, Microstructuring and Applications, Prüfung (PR), Worgull

**Competence Certificate**
Oral examination

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Polymers in MEMS B: Physics, Microstructuring and Applications**
2141854, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**
The lecture slides will be given out as scriptum during each lecture course.
Learning Content
We all come in contact with numerous polymeric products in everyday life. From water bottles to packaging to the cover of the iPad, many things are made of polymers. Polymers are also important materials for modern microelectromechanical systems (MEMS) allowing cost effective mass market compatible products, e.g., in the life sciences or diagnostics. But polymers are not just cost-effective replacements for more expensive classical materials in MEMS (such as, e.g., silicon) – some polymers have intrinsic properties that make them ideal materials for sensors, actuators or templates for biology and chemistry in MEMS. This lecture will introduce the basics of physics and material science required for the understanding of the mechanical behavior seen from the engineers view. Micro and nanostructuring of polymers allows the fabrication of micro parts fulfilling their tasks in mostly invisible different applications. But also the fabrication of polymer parts with functional surfaces inspired from Bionics will be presented in this lesson. The lesson will give further an overview over the polymer based structuring processes and will underline the importance by a number of applications e.g. photonic structures or Lotus-like structures.

Some of the topics covered are:

- How can polymers described from the view of engineers?
- What are the differences between polymers and metals?
- Rheology of polymer melts – How does polymer melts flow?
- How can polymers be formed and demolded?
- Which structuring processes (replication) processes are available?
- How does stress influence molded parts (e.g. the deformation of a CD in a hot car)
- Shrinkage of polymers – which precision is achievable
- Gluing or welding – How can polymers be assembled?
- Simulation of replication processes
- Characterization of polymers – which properties can be measured?

The lecture will be given in German language unless non-German speaking students attend. In this case, the lecture will be given in English (with some German translations of technical vocabulary). The lecture slides are in English language and will be handed out for taking notes. Additional literature is not required.

For further details, please contact the lecturer, PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is not necessary.

The examination will be held in oral form at the end of the lecture. The lecture can be chosen as "Nebenfach" or part of a "Hauptfach". The second lecture of the lecture series "Polymers in MEMS A – Chemistry, synthesis and applications " (which is also held in winter semester) can be combined with this lecture as part of a "Hauptfach". In summer semester, the third part of the lecture series "Polymers in MEMS C – Biopolymers, Biopolymers and applications" will be given which may be combined with lectures A and B to form a complete "Hauptfach".

Annotation
For further details, please contact the lecturer, PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is not necessary.

Workload
- lecture: 15 * 1.5 h (22 h)
- lecture preparation (before and after lecture): 15 * 2 h (30 h)
- preparation of final exam: 70 h
6 COURSES

6.254 Course: Polymers in MEMS C: Biopolymers and Bioplastics [T-MACH-102200]

 Responsible: Dr.-Ing. Bastian Rapp
 Dr.Ing. Matthias Worgull
 Organisation: KIT Department of Mechanical Engineering

 Part of: M-MACH-101291 - Microfabrication
 M-MACH-101293 - Microsystem Technology

<table>
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</tr>
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<td>Worgull, Rapp</td>
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Exams

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<td>Polymers in MEMS C: Biopolymers and Bioplastics</td>
<td>Worgull, Rapp</td>
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</tbody>
</table>

Competence Certificate

Oral examination

Prerequisites

none

Below you will find excerpts from events related to this course:

Polymers in MEMS C - Biopolymers and Bioplastics

2142855, SS 2019, 2 SWS, Language: German, Open in study portal
Learning Content
Polymers are ubiquitous in everyday life: from packaging materials all the way to specialty products in medicine and medical engineering. Today it is difficult to find a product which does not (at least in parts) consist of polymeric materials. The question of how these materials can be improved with respect to their disposal and consumption of (natural) resources during manufacturing is often raised. Today polymers must be fully recycled in Germany and many other countries due to the fact that they do not (or only very slowly) decompose in nature. Furthermore significant reductions of crude oil consumption during synthesis are of increasing importance in order to improve the sustainability of this class of materials. With respect to disposal polymers which do not have to be disposed by combustion but rather allow natural decomposition (composting) are of increasing interest. Polymers from renewable sources are also of interest for modern microelectromechanical systems (MEMS) especially if the systems designed are intended as single-use products.

This lecture will introduce the most important classes of these so-called biopolymers and bioplastics. It will also discuss and highlight polymers which are created from naturally created analogues (e.g. via fermentation) to petrochemical polymer precursors and describe their technical processing. Numerous examples from MEMS as well as everyday life will be given.

Some of the topics covered are:

- What are biopolyurethanes and how can you produce them from castor oil?
- What are “natural glues” and how are they different from chemical glues?
- How do you make tires from natural rubbers?
- What are the two most important polymers for life on earth?
- How can you make polymers from potatoes?
- Can wood be formed by injection molding?
- How do you make buttons from milk?
- Can you play music on biopolymers?
- Where and how do you use polymers for tissue engineering?
- How can you built LEGO with DNA?

The lecture will be given in German language unless non-German speaking students attend. In this case, the lecture will be given in English (with some German translations of technical vocabulary). The lecture slides are in English language and will be handed out for taking notes. Additional literature is not required.

For further details, please contact the lecturer, Dr. Ing. Bastian E. Rapp (bastian.rapp@kit.edu) and PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is not necessary.

Annotation
For further details, please contact the lecturer, Dr. Ing. Bastian E. Rapp (bastian.rapp@kit.edu) and PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is not necessary.

Workload

- lecture: 15 * 1.5 h (22 h)
- lecture preparation (before and after lecture): 15 * 2 h (30 h)

preparation of final exam: 70 h

Literature
Additional literature is not required.
6.255 Course: Portfolio and Asset Liability Management [T-WIWI-103128]

**Responsible:** Dr. Mher Safarian

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101639 - Econometrics and Statistics II

**Type**

Written examination

**Credits**

4.5

**Recurrence**

Each summer term

**Version**

1

### Events

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### Exams

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### Competence Certificate

The assessment of this course consists of a written examination (following §4(2), 1 SPOs, 180 min.) and of possible additional assignments during the course (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

### Prerequisites

None

### Description

Portfolio theory: principles of investment, Markowitz-portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorail CAPM, arbitrage pricing theory (APT), arbitrage and hedging, multi factorail models, equity-portfolio management, passive strategies, active investment.

Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management.

### Learning Content

Portfolio theory: principles of investment, Markowitz-portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorail CAPM, arbitrage pricing theory (APT), arbitrage and hedging, multi factorail models, equity-portfolio management, passive strategies, active investment.

Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management.

### Workload

The total workload for this course is approximately 150 hours. For further information see German version.

### Literature

To be announced in lecture.

### Elective literature:

To be announced in lecture.
### 6.256 Course: Power Network [T-ETIT-100830]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101164 - Generation and Transmission of Renewable Power

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6.257 Course: Power Transmission and Power Network Control [T-ETIT-101941]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101164 - Generation and Transmission of Renewable Power

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**Events**

| SS 2019 | 2307372 | Power Transmission and Power Network Control | 2 SWS | Lecture (V) | Leibfried |
| SS 2019 | 2307374 | Übungen zu 2307372 Energieübertragung und Netzregelung | 1 SWS | Practice (Ü) | Nowak |

**Exams**

| SS 2019 | 7307372 | Power Transmission and Power Network Control | Prüfung (PR) | Leibfried |
| WS 19/20 | 7307372 | Power Transmission and Power Network Control | Prüfung (PR) | Leibfried |

**Prerequisites**

none
**6.258 Course: Practical Course Polymers in MEMS [T-MACH-105556]**

**Responsible:** Dr.-Ing. Bastian Rapp  
Dr.Ing. Matthias Worgull  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101291 - Microfabrication

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**Competence Certificate**

The practical course will close with an oral examination. There will be only passed and failed results, no grades.

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Practical Course Polymers in MEMS**

2142856, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**

descriptions of the experiments

**Learning Content**

This practical course complements the lectures "Polymers in MEMS A", "Polymers in MEMS B" and "Polymers in MEMS C" and will allow students to gain a deeper understanding of polymers and their processing. During the course of this practical course, various polymers will be synthesized and molded into components suitable for microelectromechanical systems (MEMS) applications. The aim of the course is to bring a polymer all the way from synthesis to application.

The practical course will be given in German language unless non-German speaking students attend. In this case, the course will be given in English (with some German translations of technical vocabulary). Lecture notes for the experiments are in English language and will be handed out to the students. The practical course will be held "en block" at the end of the semester (presumably beginning of October).

For further details, please contact the lecturer, Dr. Ing. Bastian E. Rapp (bastian.rapp@kit.edu) and PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is mandatory. The number of participants is limited to 5 students.

**Workload**

- practical course: 3 * 8 h (24 h)
- experiment preparation (before and after lecture): 30 h
- preparation of final exam: 66 h

**Literature**

Scripts of the corresponding lectures, further literature as named there.
6.259 Course: Practical Seminar Digital Service Systems [T-WIWI-106563]

**Responsible:** Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-102808 - Digital Service Systems in Industry

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<td>2540554</td>
<td>Practical Seminar: Information Systems &amp; Service Design</td>
<td>3 SWS</td>
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**Competence Certificate**

The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

**Prerequisites**

None

**Recommendation**

None

**Annotation**

New course title starting summer term 2017: "Practical Seminar Digital Service Systems". The current range of seminar topics is announced on the KSRI website www.ksri.kit.edu.

*Below you will find excerpts from events related to this course:*

**Practical Seminar: Information Systems & Service Design**

**2540554, SS 2019, 3 SWS, Open in study portal**

**Lecture (V)**

**Description**

Contemporary trends of every increasing digitalization in businesses lead to new challenges and fusion of technologies blurring the lines between the digital, physical and biological spheres, thereby calling for a new approaches for corporate management. Recently, physician Michio Kaku put it like the following: "The destiny of computers – like other mass technologies like electricity, paper, and running water- is to become invisible, that is, to disappear into the fabric of our lives, to be everywhere and nowhere, silently and seamlessly carrying out our wishes." Michio Kaku (2016)

In the Practical Seminar Digital Service Design students address a real-world challenge in businesses and apply digital service design practices and tools. Furthermore, during the time of the seminar the students prototypical implement a running digital service.

Real-world challenges will vary over time. This time, the challenges are from the domain of **Future Corporate Management**. The practical seminar is carried out in close cooperation with SAP SE and leverages state-of-the-art digital platforms for prototyping.

**Learning Content**

- Foundations
- Digital Service Design Challenges in Future Corporate Management
- Basics of Digital Service Design practices and tools
- Prototyping and development Digital Services
- Delivering digital service prototypes
Practical Seminar: Information Systems & Service Design
2540554, WS 19/20, 3 SWS, Language: English, Open in study portal

Description
Contemporary trends of every increasing digitalization in businesses lead to new challenges and fusion of technologies blurring the lines between the digital, physical and biological spheres, thereby calling for a new approaches for corporate management. Recently, physician Michio Kaku put it like the following: “The destiny of computers – like other mass technologies like electricity, paper, and running water- is to become invisible, that is, to disappear into the fabric of our lives, to be everywhere and nowhere, silently and seamlessly carrying out our wishes.” Michio Kaku (2016)

In the Practical Seminar Digital Service Design students address a real-world challenge in businesses and apply digital service design practices and tools. Furthermore, during the time of the seminar the students prototypical implement a running digital service.

Real-world challenges will vary over time. This time, the challenges are from the domain of Future Corporate Management. The practical seminar is carried out in close cooperation with SAP SE and leverages state-of-the-art digital platforms for prototyping.

Learning Content
- Foundations
- Digital Service Design Challenges in Future Corporate Management
- Basics of Digital Service Design practices and tools
- Prototyping and development Digital Services
- Delivering digital service prototypes
**6 COURSES**

**Course: Practical Seminar Service Innovation [T-WIWI-102799]**

**Responsible:** Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101410 - Business & Service Engineering
- M-WIWI-102806 - Service Innovation, Design & Engineering

**Type:** Examination of another type

**Credits:** 4.5

**Recurrence:** Irregular

**Version:** 1

### Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

### Prerequisites

None

### Recommendation

Knowledge of Service Innovation Methods is assumed. Therefore it is recommended to attend the course Service Innovation [2540468] beforehand.

### Annotation

Due to the project work, the number of participants is limited and participation requires knowledge about models, concepts and approaches that are taught in the Service Innovation lecture. Having taken the Service Innovation lecture or demonstrating equivalent knowledge is a prerequisite for participating in this Practical Seminar. Details for registration will be announced on the web pages for this course.

The seminar is not offered regularly.
6 COURSES

Course: Practical Seminar: Data-Driven Information Systems [T-WIWI-106207]

| Responsible: | Prof. Dr. Alexander Mädche  
|             | Prof. Dr. Thomas Setzer  
|             | Prof. Dr. Christof Weinhardt  

| Organisation: | KIT Department of Economics and Management  
| Part of: | M-WIWI-103117 - Data Science: Data-Driven Information Systems  

| Type | Examination of another type  
| Credits | 4,5  
| Recurrence | Each term  
| Version | 1  

**Competence Certificate**
The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

**Prerequisites**
None

**Recommendation**
At least one module offered by the institute should have been chosen before attending this seminar.

**Annotation**
The course is held in English. The course is not offered regularly.
Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]

6.262

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-102805 - Service Operations

<table>
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| Events | | | |
|--------|---|----------------|
| SS 2019 | 2550498 | Practical seminar: Health Care Management |
| SS 2019 | 7900014 | Practical Seminar: Health Care Management (with Case Studies) |

<table>
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**Competence Certificate**

Due to a research semester of Professor Nickel in WS 19/20, the courses Location Planning and Strategic SCM and Practice Seminar: Health Care Management do NOT take place in WS 19/20. Please also refer to the information at https://doi.ior.kit.edu/Lehrveranstaltungen.php for further details.

The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

**Prerequisites**

None.

**Recommendation**

Basic knowledge as conveyed in the module Introduction to Operations Research is assumed.

**Annotation**

The credits have been reduced to 4,5 starting summer term 2016.

The lecture is offered every term.

The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

**Practical seminar: Health Care Management**

2550498, SS 2019, 5 SWS, Language: German, Open in study portal

**Learning Content**

Processes in a hospital are often grown historically ("We have always done it this way"), so that there has not been the need to analyze processes until reforms of the health system have put increasing pressure on hospitals. Consequently, nowadays hospitals look for possibilities to improve their processes. The students are confronted with case studies and are asked to develop a solution. Therefore they have to collect and analyze relevant data, processes and structures. When developing the solution the students have to bear in mind that besides the economic efficiency also the quality of care and patient satisfaction (e.g. measured in waiting time) may not be neglected in the health care sector.

**Annotation**

The lecture is offered every term.

The planned lectures and courses for the next three years are announced online.

**Workload**

The total workload for this course is approximately 135 hours. For further information see German version.
Literature

Elective literature:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhausssteuerung, Oldenbourg, 2008

**Responsible:** Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-102806 - Service Innovation, Design & Engineering

<table>
<thead>
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<table>
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<th>SS 2019</th>
<th>2540554</th>
<th>Practical Seminar: Information Systems &amp; Service Design</th>
<th>3 SWS</th>
<th>Lecture (V)</th>
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<td>Exams</td>
<td>SS 2019</td>
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<td>Information Systems and Design (ISSD) Seminar</td>
<td>Prüfung (PR)</td>
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<td>Interactive Analytics Seminar</td>
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**Competence Certificate**
The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

**Prerequisites**
None.

**Recommendation**
Attending the course „Digital Service Design” is recommended, but not mandatory.

**Annotation**
The course is held in English.

Below you will find excerpts from events related to this course:

**Practical Seminar: Information Systems & Service Design**
2540554, SS 2019, 3 SWS, Open in study portal

**Description**
Contemporary trends of every increasing digitalization in businesses lead to new challenges and fusion of technologies blurring the lines between the digital, physical and biological spheres, thereby calling for a new approaches for corporate management. Recently, physician Michio Kaku put it like the following: "The destiny of computers – like other mass technologies like electricity, paper, and running water- is to become invisible, that is, to disappear into the fabric of our lives, to be everywhere and nowhere, silently and seamlessly carrying out our wishes." Michio Kaku (2016)

In the Practical Seminar Digital Service Design students address a real-world challenge in businesses and apply digital service design practices and tools. Furthermore, during the time of the seminar the students prototypical implement a running digital service.

Real-world challenges will vary over time. This time, the challenges are from the domain of Future Corporate Management. The practical seminar is carried out in close cooperation with SAP SE and leverages state-of-the-art digital platforms for prototyping.
Learning Content

- Foundations
- Digital Service Design Challenges in Future Corporate Management
- Basics of Digital Service Design practices and tools
- Prototyping and development Digital Services
- Delivering digital service prototypes
6.264 Course: Practical Training in Basics of Microsystem Technology [T-MACH-102164]

**Responsible:** Dr. Arndt Last  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101290 - BioMEMS  
M-MACH-101291 - Microfabrication  
M-MACH-101292 - Microoptics  
M-MACH-101293 - Microsystem Technology  
M-MACH-101294 - Nanotechnology

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<td>Practical Training in Basics of Microsystem Technology</td>
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**Competence Certificate**

The assessment consists of a written exam

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Introduction to Microsystem Technology - Practical Course**

2143875, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Practical course (P)**

**Learning Content**

In the practical training includes nine experiments:

1. Hot embossing of plastics micro structures  
2. Micro electroforming  
3. Mikro optics: "LIGA-micro spectrometer"  
4. UV-lithography  
5. Optical waveguides  
6. Capillary electrophoresis on a chip  
7. SAW gas sensor  
8. Metrology  
9. Atomic force microscopy  

Each student takes part in only five experiments.  
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

**Workload**

Time of attendance: 21 h + 2 h exam  
Privat studies: 5 h preparing experiments + 10 h preparing the exam
Learning Content
In the practical training includes nine experiments:
1. Hot embossing of plastics micro structures
2. Micro electroforming
3. Mikro optics: "LIGA-micro spectrometer"
4. UV-lithography
5. Optical waveguides
6. Capillary electrophoresis on a chip
7. SAW gas sensor
8. Metrology
9. Atomic force microscopy
Each student takes part in only five experiments.
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

Workload
Time of attendance: 21 h + 2 h exam
Privat studies: 5 h preparing experiments + 10 h preparing the exam
6.265 Course: Predictive Mechanism and Market Design [T-WIWI-102862]

**Responsible:** Prof. Dr. Johannes Philipp Reiß

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101453 - Applied Strategic Decisions
- M-WIWI-101505 - Experimental Economics

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Annotation**
The course is given every second fall term, e.g., WS2017/18, WS2019/20, ...
The retake exam is given in the summer term subsequent to the fall term where the course (lecture and final exam) is given.
6.266 Course: Price Management [T-WIWI-105946]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
Dr Paul Glenn

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101409 - Electronic Markets

### Type
- Written examination

### Credits
- 4,5

### Recurrence
- Each summer term

### Version
- 1

**Competence Certificate**
Lecture and exam will not be offered in summer semester 2019. The next examination is in the summer semester 2020.

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The lecture is offered for the first time in summer term 2016.
6.267 Course: Price Negotiation and Sales Presentations [T-WIWI-102891]

**Responsible:** Prof. Dr. Martin Klarmann
Mark Schröder

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101487 - Sales Management

<table>
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<td>WS 19/20</td>
<td>2572198</td>
<td>Price Negotiation and Sales Presentations</td>
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<td>Klarmann, Schröder</td>
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**Competence Certificate**

This alternative exam assessment consists of a presentation with a subsequent discussion totalling 25 minutes. Moreover learning contents are checked by realistic 30-minute price negotiations.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing & Sales (marketing.iism.kit.edu).

Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed.

For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu).

Please note that only one of the courses from the election block can be attended in the module.

Below you will find excerpts from events related to this course:

**Price Negotiation and Sales Presentations**

2572198, WS 19/20, 1 SWS, Language: German, [Open in study portal]

**Learning Content**

At first, theoretical knowledge about the behavior in selling contexts is discussed. Then, in a practical part, students will apply this knowledge in their own price negotiations.

**Annotation**

- In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in winter term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in winter term starts.
- Please note that only one of the following courses can be chosen in the Sales Management Module: Country Manager Simulation, Case Studies in Sales and Pricing or Preisverhandlungen und Verkaufspräsentationen.
- Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS in the respective module to all students. Participation in a specific course cannot be guaranteed.

**Workload**

The total workload for this course is approximately 45.0 hours. For further information see German version.

**Literature**

None
6.268 Course: Pricing [T-WIWI-102883]

 Responsible: Dr. Sven Feurer
 Organisation: KIT Department of Economics and Management
 Part of: M-WIWI-101487 - Sales Management
 M-WIWI-101489 - Strategy, Communication, and Data Analysis
 M-WIWI-101490 - Marketing Management
 M-WIWI-101510 - Cross-Functional Management Accounting

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Events

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<td>Pricing</td>
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<td>WS 19/20</td>
<td>2572169</td>
<td>Übung zu Pricing</td>
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Exams

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Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Pricing
2572157, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content
This course addresses central elements and peculiarities of pricing goods and services. The topics are below others:

- Price demand functions
- Concept of the price elasticity of demand
- Key concepts of behavioral pricing
- Decision-making areas in pricing

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
# 6.269 Course: Principles of Food Process Engineering [T-CIWVT-101874]

**Responsible:** Dr. Volker Gaukel  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-CIWVT-101120 - Principles of Food Process Engineering  
**Type:** Oral examination  
**Credits:** 9  
**Version:** 1

### Events

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<td>Vertiefung verfahrenstechnischer Grundlagen am Beispiel Lebensmittel</td>
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<td>SS 2019</td>
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<td>Produktgestaltung: Beispiele aus der Praxis</td>
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<td>22207</td>
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### Exams

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**Prerequisites:** none
**6.270 Course: Process Engineering [T-BGU-101844]**

**Responsible:** Dr.-Ing. Harald Schneider  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101110 - Process Engineering in Construction

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
6.271 Course: Process Mining [T-WIWI-109799]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics  
M-WIWI-101628 - Emphasis in Informatics  
M-WIWI-101630 - Electives in Informatics

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

**Annotation**
Former name (up to winter semester 2018/1019) "Workflow Management".

Below you will find excerpts from events related to this course:

**Process Mining**
2511204, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Learning Content**
The area of process mining covers approaches which aim at deducting new knowledge on the basis of logfiles generated by information systems. Such information systems are e.g., workflow-management-systems which are used for an efficient control of processes in enterprises and organisations. The lecture introduces the foundations of processes and respective modeling and analysis techniques. In the following, the foundations of process mining and the three classical types of approaches - discovery, conformance and enhancement - will be taught. In addition to the theoretical basics, tools, application scenarios in practice and open research questions are covered as well.

**Workload**
- Lecture 30h  
- Exercise 15h  
- Preparation of lecture 30h  
- Preparation of exercises 30h  
- Exam preparation 44h  
- Exam 1h  
- Total: 150h
Literature


Further literature is given in the lecture.
Course: Product and Innovation Management [T-WIWI-109864]

6.272

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101490 - Marketing Management
M-WIWI-101510 - Cross-Functional Management Accounting
M-WIWI-101514 - Innovation Economics

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Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

Product and Innovation Management
2571154, SS 2019, 2 SWS, Language: English, Open in study portal

Learning Content
This course addresses topics around the management of new as well as existing products. After the foundations of product management, especially the product choice behavior of customers, students get to know in detail different steps of the innovation process. Another section regards the management of the existing product portfolio.

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
Total effort for 3 credit points: approx. 90 hours
Presence time: 30 hours
Preparation and wrap-up of LV: 45.0 hours
Exam and exam preparation: 15.0 hours

Literature

**Responsible:** Dr. Stefan Kienzle  
Dr. Dieter Steegmüller

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

<table>
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**Events**

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<td>2149670</td>
<td>Product- and Production-Concepts for modern Automobiles</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Steegmüller, Kienzle</td>
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</table>

**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**

T-MACH-105166 - Materials and Processes for Body Lightweight Construction in the Automotive Industry must not have been started.

*Below you will find excerpts from events related to this course:*

**Product- and Production-Concepts for modern Automobiles**

2149670, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
The lecture illuminates the practical challenges of modern automotive engineering. As former leaders of the automotive industry, the lecturers refer to current aspects of automotive product development and production.

The aim is to provide students with an overview of technological trends in the automotive industry. In this context, the course also focuses on changes in requirements due to new vehicle concepts, which may be caused by increased demands for individualisation, digitisation and sustainability. The challenges that arise in this context will be examined from both a production technology and product development perspective and will be illustrated with practical examples thanks to the many years of industrial experience of both lecturers.

The topics covered are:

- General conditions for vehicle and body development
- Integration of new drive technologies
- Functional requirements (crash safety etc.), also for electric vehicles
- Development Process at the Interface Product & Production, CAE/Simulation
- Energy storage and supply infrastructure
- Aluminium and lightweight steel construction
- FRP and hybrid parts
- Battery, fuel cell and electric motor production
- Joining technology in modern car bodies
- Modern factories and production processes, Industry 4.0.

Learning Outcomes:
The students …

- are able to name the presented general conditions of vehicle development and are able to discuss their influences on the final product using practical examples.
- are able to name the various lightweight approaches and identify possible areas of application.
- are able to identify the different production processes for manufacturing lightweight structures and explain their functions.
- are able to perform a process selection based on the methods and their characteristics.

Workload:
regular attendance: 25 hours
self-study: 95 hours

Learning Content
The lecture illuminates the practical challenges of modern automotive engineering. As former leaders of the automotive industry, the lecturers refer to current aspects of automotive product development and production.

The aim is to provide students with an overview of technological trends in the automotive industry. In this context, the course also focuses on changes in requirements due to new vehicle concepts, which may be caused by increased demands for individualisation, digitisation and sustainability. The challenges that arise in this context will be examined from both a production technology and product development perspective and will be illustrated with practical examples thanks to the many years of industrial experience of both lecturers.

The topics covered are:

- General conditions for vehicle and body development
- Integration of new drive technologies
- Functional requirements (crash safety etc.), also for electric vehicles
- Development Process at the Interface Product & Production, CAE/Simulation
- Energy storage and supply infrastructure
- Aluminium and lightweight steel construction
- FRP and hybrid parts
- Battery, fuel cell and electric motor production
- Joining technology in modern car bodies
- Modern factories and production processes, Industry 4.0.

Workload
regular attendance: 25 hours
self-study: 95 hours
### 6.274 Course: Production and Logistics Controlling [T-WIWI-103091]

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**Competence Certificate**

The assessment consists of a written exam (60 minutes) following §4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None
6.275 Course: Production and Logistics Management [T-WIWI-102632]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III

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Competence Certificate
The assessment consists of a written exam (90 minutes) (following § 4(2), 1 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

Production and Logistics Management
2581954, SS 2019, Language: German, Open in study portal

Description
This course covers central tasks and challenges of an operative production and logistics management. Students get to know the set-up and mode of operation of planning systems such as PPS-, ERP- and Advanced Planning Systems to cope with the accompanying planning tasks. Methods to solve these tasks will be explored with respect to manufacturing program planning, material and time. Alongside to MRP II, students will be introduced to integrated supply chain management approaches in PPS. Finally, commercially available PPS-, ERP- and Advanced Planning Systems will be presented and discussed.

Learning Content
This course covers central tasks and challenges of operational production and logistics management. Systems analytically, central planning tasks are discussed. Exemplary solution approaches for these tasks are presented. Further practical approaches are explained. Students get to know the set-up and mode of operation of planning systems such as PPS-, ERP- and Advanced Planning Systems to cope with the accompanying planning tasks. Alongside to MRP II, students will be introduced to integrated supply chain management approaches in Supply Chain Management.

Workload
Total effort required will account for approximately 165h (5.5 credits).

Literature
will be announced in the course
6.276 Course: Project Lab Cognitive Automobiles and Robots [T-WIWI-109985]

 Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
 Organisation: KIT Department of Economics and Management
 Part of: M-WIWI-101472 - Informatics
 M-WIWI-101628 - Emphasis in Informatics
 M-WIWI-101630 - Electives in Informatics

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Events

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</table>

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Details of the grade formation will be announced at the beginning of the course.

Prerequisites
None

Below you will find excerpts from events related to this course:

Project lab Cognitive automobiles and robots
2512501, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Practical course (P)

Notes
Learning objectives:

- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- The students master the analysis and solution of corresponding problems in the team.
- The students can evaluate, document and present their concepts and results.

Workload:
The workload of 4.5 credits consists of time of attendance at the test site for the practical implementation of the chosen solution, as well as the time for literature research and planning / specification of the planned solution. In addition, a short report and a presentation of the work carried out will be prepared.
### 6.277 Course: Project Lab Machine Learning [T-WIWI-109983]

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Exams**

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<th>Zöllner</th>
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**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Details of the grade formation will be announced at the beginning of the course.

**Prerequisites**

None
## Course: Project Management [T-WIWI-103134]

### Responsible:
Prof. Dr. Frank Schultmann

### Organisation:
KIT Department of Economics and Management

### Part of:
- M-WIWI-101412 - Industrial Production III
- M-WIWI-101471 - Industrial Production II

### Type
- Written examination

### Credits
- 3.5

### Recurrence
- Each winter term

### Version
- 1

### Events

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### Exams

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### Competence Certificate
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

### Prerequisites
None

### Recommendation
None

Below you will find excerpts from events related to this course:

#### Project Management

2581963, WS 19/20, 2 SWS, Language: English, Open in study portal

### Learning Content

1. Introduction
2. Principles of Project Management
3. Project Scope Management
4. Time Management and Resource Scheduling
5. Cost Management
6. Quality Management
7. Risk Management
8. Stakeholder
9. Communication, Negotiation and Leadership
10. Project Controlling

### Workload
The total workload for this course is approximately 105 hours. For further information see German version.

### Literature
will be announced in the course
6.279 Course: Project Management in Construction and Real Estate Industry I [T-BGU-103432]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-BGU-101884 - Lean Management in Construction
- M-BGU-101888 - Project Management in Construction

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
6.280 Course: Project Management in Construction and Real Estate Industry II [T-BGU-103433]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-BGU-101884 - Lean Management in Construction
- M-BGU-101888 - Project Management in Construction

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**Exams**

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
## 6.281 Course: Project Paper Lean Construction [T-BGU-101007]

### Responsible:
Prof. Dr.-Ing. Shervin Haghsheno

### Organisation:
KIT Department of Civil Engineering, Geo- and Environmental Sciences

### Part of:
M-BGU-101884 - Lean Management in Construction

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### Competence Certificate

- **Project:**
  - Report, appr. 10 pages, and presentation, appr. 10 min.

### Prerequisites
none

### Recommendation
none

### Annotation
none
6.282 Course: Project Studies [T-BGU-101847]

**Responsible:** Prof. Dr.-Ing. Sascha Gentes

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101110 - Process Engineering in Construction

<table>
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**Exams**

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
**6.283 Course: Public Management [T-WIWI-102740]**

- **Responsible:** Prof. Dr. Berthold Wigger
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101504 - Collective Decision Making
  - M-WIWI-101511 - Advanced Topics in Public Finance

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**Competence Certificate**
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

**Prerequisites**
None

**Recommendation**
Basic knowledge of Public Finance is required.

*Below you will find excerpts from events related to this course:*

**Learning Content**
The lecture "Public Management" deals with the economic theory of public sector administration. It is divided into four parts. The first section gives an overview of the legal framework of governmental administration in the Federal Republic of Germany and introduces the classical theory of administration as developed by Weber. Part two studies concepts of public decision-making, which have a significant impact on the operation of public sector administrations and where one focus is on consistency problems of collective decision-making. The third chapter deals with efficiency problems arising in conventionally organized public administrations and companies. X-inefficiency, information and control problems, the isolated consideration of income-spending relations as well as rent-seeking problems will be considered. In section four the concept of New Public Management, which is a new approach to public sector administration that is mainly based in contract theory, is introduced. Its foundations in institutional economics are developed, with a focus on the specific incentive structures in self-administered administrations. Finally, the achievements of New Public Management approaches are discussed.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Elective literature:
### 6.284 Course: Public Media Law [T-INFO-101311]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

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#### Exams

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### 6.285 Course: Public Revenues [T-WIWI-102739]

**Responsible:** Prof. Dr. Berthold Wigger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101511 - Advanced Topics in Public Finance  

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<td>SS 2019</td>
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**Competence Certificate**  
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

**Prerequisites**  
None

**Recommendation**  
Basic knowledge of Public Finance is required.

*Below you will find excerpts from events related to this course:*

### Public Revenues

**2560120, SS 2019, 2 SWS, Language: German, [Open in study portal](#)**  

**Description**  
The Public Revenues lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

**Learning Content**  
The Public Revenues lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

**Workload**  
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
Elective literature:

6.286 Course: Python for Computational Risk and Asset Management [T-WIWI-110213]

**Responsible:** Prof. Dr Maxim Ulrich  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105032 - Data Science for Finance

<table>
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<td>2 SWS</td>
<td>Practical course (P)</td>
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**Competence Certificate**  
The assessment is carried out in form of twelve weekly Python programming tasks and offered each winter term. The grade of this course is determined by the points achieved in the programming tasks.

**Prerequisites**  
None.

**Recommendation**  
Good knowledge of statistics and first programming experience with Python is recommended.

Below you will find excerpts from events related to this course:

**Description**  
The aim of this course is to provide students with strong knowledge in Python to independently solve real-world data problems related to automated robo investment advisory.

**Learning Content**  
The course covers several topics from a programming perspective, among them:

- Quantitative Portfolio Strategies: Extensions to Mean-Variance Portfolio Optimization
- Return Densities: Forecasting with Traditional and Machine Learning Approaches, Monte Carlo Simulation
- Financial Economics: Rationalizing Risk Premiums via Stochastic Discount Factor
- Multi-Asset Valuation: DCF Approach, No-Arbitrage and Ito Calculus

**Workload**  
The total workload for this course is approximately 90 hours.
### 6.287 Course: Quality Management [T-MACH-102107]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101282 - Global Production and Logistics  
M-MACH-101284 - Specialization in Production Engineering

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<td>SS 2019</td>
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<td>Quality Management</td>
<td>Prüfung (PR)</td>
<td>Lanza</td>
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</tbody>
</table>

**Competence Certificate**  
Written Exam (60 min)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

#### Quality Management  
2149667, WS 19/20, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**

Lecture notes will be provided in Ilias ([https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/))
Notes
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:
- The term "Quality"
- Total Quality Management (TQM) and Six Sigma
- Universal methods and tools
- QM during early product stages – product definition
- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Learning Outcomes:
The students ...
- are capable to comment on the content covered by the lecture.
- are capable of substantially quality philosophies.
- are able to apply the QM tools and methods they have learned about in the lecture to new problems from the context of the lecture.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about in the lecture for a specific problem.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

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- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours

Responsible: Dr. Dogan Keles
Patrick Plötz

Organisation: KIT Department of Economics and Management


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<td>2581007</td>
<td>Quantitative Methods in Energy Economics</td>
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<td>Lecture (V)</td>
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Exams

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</table>

Competence Certificate

The assessment consists of a written exam (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

Quantitative Methods in Energy Economics
2581007, WS 19/20, 2 SWS, Language: English, Open in study portal

Learning Content

Energy economics makes use of many quantitative methods in exploration and analysis of data as well as in simulations and modelling. This lecture course aims at introducing students of energy economics into the application of quantitative methods and techniques as taught in elementary courses to real problems in energy economics. The focus is mainly on regression, simulation, time series analysis and related statistical methods as applied in energy economics.

Workload

The total workload for this course is approximately 120 hours. For further information see German version.
### Course: Quantum Functional Devices and Semiconductor Technology [T-ETIT-100740]

** Responsible:** Prof. Dr.-Ing. Christian Koos  
** Organisation:** KIT Department of Electrical Engineering and Information Technology  
** Part of:**  
- M-MACH-101294 - Nanotechnology  
- M-MACH-101295 - Optoelectronics and Optical Communication  

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**Prerequisites**  
none
6.290 Course: Rail System Technology [T-MACH-102143]

**Responsible:** Prof. Dr.-Ing. Peter Gratzfeld

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101274 - Rail System Technology

<table>
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**Exams**

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**Competence Certificate**

Oral examination

Duration: ca. 45 minutes

No tools or reference materials may be used during the exam.

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Rail System Technology**

2115919, SS 2019, 2 SWS, Language: German, Open in study portal

**Description**

Media:

All slides are available for download (Ilias-platform).

**Notes**

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)
Learning Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

Rail Vehicle Technology
2115996, SS 2019, 2 SWS, Language: German, Open in study portal

Description
Media:
All slides are available for download (Ilias-platform).

Notes
1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
5. Brakes: tasks, basics, principles, blending, brake control
6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Learning Content

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
5. Brakes: tasks, basics, principles, blending, brake control
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7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

Rail System Technology
2115919, WS 19/20, 2 SWS, Language: German, Open in study portal
Description

Media:
All slides are available for download (Ilias-platform).

Notes

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Learning Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signalling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

Rail Vehicle Technology
2115996, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
5. Brakes: tasks, basics, principles, blending, brake control
6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Learning Content

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
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7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons
Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).
6.291 Course: Recommender Systems [T-WIWI-102847]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101410 - Business & Service Engineering
M-WIWI-101470 - Data Science: Advanced CRM

**Type** | **Credits** | **Recurrence** | **Version**
---|---|---|---
Written examination | 4.5 | Each summer term | 1

**Events**

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<td>Lecture (V)</td>
<td>Geyer-Schulz</td>
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<td>1 SWS</td>
<td>Practice (Ü)</td>
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**Exams**

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<td>Prüfung (PR)</td>
<td>Geyer-Schulz</td>
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</table>

**Competence Certificate**

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Recommender Systems**

2540506, SS 2019, 2 SWS, Language: German, Open in study portal

**Learning Content**

At first, an overview of general aspects and concepts of recommender systems and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

**Workload**

The total workload for this course is approximately 135 hours (4.5 credits):

- Time of attendance
  - Attending the lecture: 15 x 90min = 22h 30m
  - Attending the exercise classes: 7 x 90min = 10h 30m
  - Examination: 1h 00m

- Self-study
  - Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
  - Preparing the exercises: 25h 00m
  - Preparation of the examination: 31h 00m

Sum: 135h 00m
Literature

Elective literature:
6.292 Course: Regulation Theory and Practice [T-WIWI-102712]

<table>
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<tr>
<th>Responsible:</th>
<th>Prof. Dr. Kay Mitusch</th>
</tr>
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<tr>
<td>Organisation:</td>
<td>KIT Department of Economics and Management</td>
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<tr>
<td>Part of:</td>
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<tr>
<td>Oral exam</td>
<td>4.5</td>
<td>see Annotations</td>
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**Competence Certificate**
The lecture is not offered for an indefinite period of time. Result of success is made by a 20-30 minutes oral examination. Examination is offered every semester and can be retried at any regular examination date.

**Prerequisites**
None

**Recommendation**
Basic knowledge and skills of microeconomics from undergraduate studies (bachelor’s degree) are expected. Particularly helpful but not necessary: Industrial Economics and Principal-Agent- or Contract theories. Prior attendance of the lecture Competition in Networks [26240] is helpful in any case but not considered a formal precondition.

**Annotation**
The lecture is not offered for an indefinite period of time.
**Course: Risk Management in Industrial Supply Networks [T-WIWI-102826]**

**Responsible:** Dr. Marcus Wiens  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101412 - Industrial Production III  
M-WIWI-101471 - Industrial Production II

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
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**Events**
- **WS 19/20**  
  - 2581992: Risk Management in Industrial Supply Networks  
  - 2 SWS  
  - Lecture (V)  
  - Wiens
- **WS 19/20**  
  - 2581993: Übung zu Risk Management in Industrial Supply Networks  
  - 1 SWS  
  - Practice (Ü)  
  - Klein, Wiens

**Exams**
- **SS 2019**  
  - 7981992: Risk Management in Industrial Supply Networks  
  - Prüfung (PR)  
  - Schultmann

**Competence Certificate**
The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following § 4(2), 1 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
None

Below you will find excerpts from events related to this course:

**Risk Management in Industrial Supply Networks**
- **2581992, WS 19/20, 2 SWS, Language: English**  
  - Lecture (V)

**Learning Content**
- supply chain management: introduction, aims and trends  
- industrial risk management  
- definition and characterization of risks: sourcing and procurement, demand, production and infrastructure  
- identification of risks  
- risk controlling  
- risk assessment and decision support tools  
- risk prevention and mitigation strategies  
- robust design of supply chain networks  
- supplier selection  
- capacity management  
- business continuity management

**Workload**
The total workload for this course is approximately 105 hours. For further information see German version.

**Literature**
will be announced in the course
6.294 Course: Roadmapping [T-WIWI-102853]

**Responsible:** Dr. Daniel Jeffrey Koch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

<table>
<thead>
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<th>Credits</th>
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<th>Version</th>
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<td>Each summer term</td>
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**Events**

<table>
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<tr>
<th>Semester</th>
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<th>Type</th>
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<th>Responsible</th>
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<tr>
<td>SS 2019</td>
<td>2545102</td>
<td>Roadmapping</td>
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</tr>
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**Exams**

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<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 2019</td>
<td>7900055</td>
<td>Prüfung</td>
</tr>
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</table>

**Competence Certificate**

**Prerequisites**
None

**Recommendation**
Prior attendance of the course Innovation Management is recommended.

**Annotation**
See German version.

*Below you will find excerpts from events related to this course:*

**Roadmapping**
2545102, SS 2019, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**
Roadmapping is a method used to support innovation decisions in the early phase of innovation management. The roadmapping process addresses the procedure of constructing roadmaps which can then be assessed. Roadmapping provides structured and graphical visualizations of preferably future-oriented topics which have innovation potentials. The benefits of the roadmapping method lie in the structured bundling of both technology- and market-driven individual topics and the joint setting of priorities and processes to achieve predetermined corporate targets. As a rule, roadmaps represent a consensus reached by the people involved in their compilation. For this reason, roadmaps are suited to the designation and initial prioritization of emerging technologies and corresponding development projects.

**Workload**
The total workload for this course is approximately 90 hours. For further information see German version.
6.295 Course: Safety Engineering [T-MACH-105171]

**Responsible:** Hans-Peter Kany  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101263 - Introduction to Logistics  
M-MACH-101278 - Material Flow in Networked Logistic Systems  
M-MACH-104888 - Advanced Module Logistics

<table>
<thead>
<tr>
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<th>Credits</th>
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<td>4</td>
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**Events**

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<tr>
<td>WS 19/20</td>
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<td>Safety Engineering</td>
<td>2 SWS</td>
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<td>Safety Engineering</td>
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</table>

**Competition Certificate**
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Safety Engineering**

2117061, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**
presentations
Learning content
The course provides basic knowledge of safety engineering. In particular the basics of health at the working place, job safety in Germany, national and European safety rules and the basics of safe machine design are covered. The implementation of these aspects will be illustrated by examples of material handling and storage technology. This course focuses on: basics of safety at work, safety regulations, basic safety principles of machine design, protection devices, system security with risk analysis, electronics in safety engineering, safety engineering for storage and material handling technique, electrical dangers and ergonomics. So, mainly, the technical measures of risk reduction in specific technical circumstances are covered.

Learning goals
The students are able to:

- Name and describe relevant safety concepts of safety engineering,
- Discuss basics of health at work and labour protection in Germany,
- Evaluate the basics for the safe methods of design of machinery with the national and European safety regulations and
- Realize these objectives by using examples in the field of storage and material handling systems.

Recommendations
None

Workload
Regular attendance: 21 hours
Self-study: 99 hours

Note
Dates: See IFL-Homepage

Learning Content
The course provides basic knowledge of safety engineering. In particular the basics of health at the working place, job safety in Germany, national and European safety rules and the basics of safe machine design are covered. The implementation of these aspects will be illustrated by examples of material handling and storage technology. This course focuses on: basics of safety at work, safety regulations, basic safety principles of machine design, protection devices, system security with risk analysis, electronics in safety engineering, safety engineering for storage and material handling technique, electrical dangers and ergonomics. So, mainly, the technical measures of risk reduction in specific technical circumstances are covered.

Annotation
none

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
6.296 Course: Sales Management and Retailing [T-WIWI-102890]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101487 - Sales Management

Type | Credits | Recurrence | Version
--- | --- | --- | ---
Written examination | 3 | Each winter term | 1

Events
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<th>Credits</th>
<th>Recurrence</th>
<th>Responsible</th>
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<td>Sales Management and Retailing</td>
<td>2 SWS</td>
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<td>Klarmann</td>
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<td>Klarmann</td>
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<td>Prüfung (PR)</td>
<td>Klarmann</td>
<td></td>
</tr>
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Exams

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
None

Annotation
The lecture is compulsory for the module Sales Management. It is taught in English.
For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

Sales Management and Retailing
2572156, WS 19/20, 2 SWS, Language: English, Open in study portal

Learning Content
The aim of the course “Sales Management and Retailing” is on the one hand to give insights into the challenging realization of a successful sales management and on the other hand to discuss peculiarities of retailing contexts. The contents are below others:

- Customer relationship management (word-of-mouth-analysis, key account management, loyalty programs, complain management etc.)
- Retail marketing (trends, point of sale design etc.)
- Retailer-producer relationships

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
This course is held in English.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
6.297 Course: Selected Applications of Technical Logistics [T-MACH-102160]

Responsible: Viktor Milushev
Dr.-Ing. Martin Mittwollen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-104888 - Advanced Module Logistics

<table>
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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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</thead>
<tbody>
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Events

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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
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<td>3 SWS</td>
<td>Lecture (V)</td>
<td>Mittwollen, Milushev</td>
</tr>
</tbody>
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Exams

<table>
<thead>
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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Prüfung (PR)</td>
<td>Mittwollen</td>
<td></td>
</tr>
</tbody>
</table>

Competence Certificate

The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites

none

Recommendation

Knowledge out of Basics of Technical Logistics (T-MACH-102163) / Elements and Systems of Technical Logistics (T-MACH-102159) preconditioned

Below you will find excerpts from events related to this course:

Selected Applications of Technical Logistics

2118087, SS 2019, 3 SWS, Language: German, Open in study portal

Description

Media:
supplementary sheets, projector, blackboard

Notes

Details according schedule will be published

Learning Content

- design and dimension of machines from intralogistics
- static and dynamic behaviour
- operation properties and specifics
- Inside practical lectures: sample applications and calculations in addition to the lectures

Annotation

Knowledge out of Basics of Technical Logistics preconditioned

Workload

presence: 36h
rework: 84h

Literature

Recommendations during lessons

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019

564
Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

<table>
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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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Events

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<th>SWS</th>
<th>Organiser</th>
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<tbody>
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<td>Selected Issues in Critical Information Infrastructures</td>
<td>SWS</td>
<td>Seminar (S)</td>
<td>Sunyaev, Lins</td>
</tr>
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Exams

<table>
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<th>Exam Code</th>
<th>Course Title</th>
<th>Type</th>
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</tr>
</thead>
<tbody>
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<td>Selected Issues in Critical Information Infrastructures</td>
<td>Prüfung (PR)</td>
<td>Sunyaev</td>
</tr>
</tbody>
</table>

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

Prerequisites
None.

Annotation
T-WIWI-109251 "Selected Issues in Critical Information Infrastructures" serves to credit an extracurricular course in the module "Critical Digital Infrastructures".
### 6.299 Course: Selected Legal Issues of Internet Law [T-INFO-108462]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr. Thomas Dreier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>KIT Department of Informatics</td>
</tr>
<tr>
<td>Part of</td>
<td>M-INFO-101215 - Intellectual Property Law</td>
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<tbody>
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</tr>
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<th>24821</th>
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<th>2 SWS</th>
<th>Colloquium (KOL)</th>
<th>Dreier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 2019</td>
<td></td>
<td></td>
<td></td>
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</tr>
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<tbody>
<tr>
<td>SS 2019</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>
6.300 Course: Selected Topics on Optics and Microoptics for Mechanical Engineers [T-MACH-102165]

**Responsible:** Dr.-Ing. Timo Mappes

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101290 - BioMEMS
- M-MACH-101292 - Microoptics
- M-MACH-101293 - Microsystem Technology

**Type**
- Oral examination

**Credits**
- 3

**Recurrence**
- Each term

**Version**
- 1

**Competence Certificate**
- Oral examination

**Prerequisites**
- none
## 6.301 Course: Semantic Web Technologies [T-WIWI-102874]

### Responsible:
Prof. Dr. York Sure-Vetter

### Organisation:
KIT Department of Economics and Management

### Part of:
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

### Type
- Written examination

### Credits
- 4.5

### Recurrence
- Each summer term

### Version
- 2

### Events

<table>
<thead>
<tr>
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<th>Type</th>
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<tr>
<td>SS 2019</td>
<td>2511310</td>
<td>Semantic Web Technologies</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Sure-Vetter, Acosta Deibe, Käfer</td>
</tr>
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<td>SS 2019</td>
<td>2511311</td>
<td>Exercises to Semantic Web Technologies</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
<td>Sure-Vetter, Acosta Deibe, Käfer</td>
</tr>
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</table>

### Exams

<table>
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<th>Event</th>
<th>Code</th>
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<td>Prüfung (PR)</td>
<td>Sure-Vetter</td>
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<td>WS 19/20</td>
<td>7900022</td>
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### Competence Certificate
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

### Prerequisites
None

### Recommendation
Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required.

### Below you will find excerpts from events related to this course:

#### V Semantic Web Technologies
2511310, SS 2019, 2 SWS, Language: English, Open in study portal

### Description
The aim of the Semantic Web is to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals.

Central concepts are the representation of knowledge in form of RDF and ontologies, the access via Linked Data, as well as querying the data by using SPARQL. This lecture provides the foundations of knowledge representation and processing for the corresponding technologies and presents example applications.

### Learning Content
The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications
Workload

- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours

Literature


Additional Literature


Exercises to Semantic Web Technologies

2511311, SS 2019, 1 SWS, Language: English, Open in study portal

Description

Multiple exercises are held that capture the topics, held in the lecture Semantic Web Technologies, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

Learning Content

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Workload

The total workload for the lecture Semantic Web Technologies is given out on the description of the lecture.

Literature


Additional Literature

6.302 Course: Seminar Data-Mining in Production [T-MACH-108737]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-WIWI-101808 - Seminar Module

<table>
<thead>
<tr>
<th>Events</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>SS 2019</td>
<td>2151643</td>
<td>Seminar Data Mining in Production</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
</tr>
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<td>WS 19/20</td>
<td>2151643</td>
<td>Seminar Data Mining in Production</td>
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Exams

<table>
<thead>
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<th>Events</th>
<th></th>
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<tbody>
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<td>Seminar Data-Mining in Production</td>
<td>Prüfung (PR)</td>
<td>Lanza</td>
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</table>

Competence Certificate
alternative test achievement (graded):
- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

Prerequisites
none

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Below you will find excerpts from events related to this course:

Seminar Data Mining in Production
2151643, SS 2019, 2 SWS, Language: German, Open in study portal

Description
Media:
KNIME Analytics Platform
Notes
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Learning Outcomes:
The students ...
- can name, describe and distinguish between different methods, procedures and techniques of production data analysis.
- can perform basic data analyses with the data mining tool KNIME.
- can analyze and evaluate the results of data analyses in the production environment.
- are able to derive suitable recommendations for action.
- are able to explain and apply the CRISP-DM model.

Workload:
regular attendance: 10 hours
self-study: 80 hours

Learning Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
regular attendance: 10 hours
self-study: 80 hours

Seminar Data Mining in Production
2151643, WS 19/20, 2 SWS, Language: German, Open in study portal

Description
Media:
KNIME Analytics Platform
Notes
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Learning Outcomes:
The students ... 

- can name, describe and distinguish between different methods, procedures and techniques of production data analysis.
- can perform basic data analyses with the data mining tool KNIME.
- can analyze and evaluate the results of data analyses in the production environment.
- are able to derive suitable recommendations for action.
- are able to explain and apply the CRISP-DM model.

Workload:
regular attendance: 10 hours
self-study: 80 hours

Learning Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
regular attendance: 10 hours
self-study: 80 hours

Economics Engineering M.Sc.
Module Handbook as of 01.10.2019
# 6.303 Course: Seminar in Business Administration A (Master) [T-WIWI-103474]

**Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

<table>
<thead>
<tr>
<th>Events</th>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
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<td>Interactive Analytics Seminar</td>
<td>2 SWS</td>
<td></td>
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<td>SS 2019</td>
<td>Seminar Human Resource Management (Master)</td>
<td>2 SWS</td>
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<td>Seminar Human Resources and Organizations (Master)</td>
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<td>Seminar (S)</td>
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</tr>
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<td>Automated Financial Advisory</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
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</tr>
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<td>SS 2019</td>
<td>Applied Risk and Asset Management</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
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<td>SS 2019</td>
<td>Seminar in Finance (Master, Prof. Uhrig-Homburg)</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
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<td>Seminar (S)</td>
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<td>Seminar (S)</td>
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<td>Hospital Management</td>
<td>2 SWS</td>
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<td>Digital Experience and Participation</td>
<td>2 SWS</td>
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<td>Smart Grids and Energy Markets</td>
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**Exams**

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<th>Lecture/Exam</th>
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<td>Schultmann</td>
</tr>
</tbody>
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Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

V Seminar Human Resource Management (Master) 2500006, SS 2019, 2 SWS, Open in study portal Seminar (S)

Notes
See Module Handbook

V Seminar Human Resources and Organizations (Master) 2500007, SS 2019, 2 SWS, Open in study portal Seminar (S)

Notes
See Module Handbook

V Automated Financial Advisory 2530372, SS 2019, 2 SWS, Language: English, Open in study portal Seminar (S)

Learning Content
At the beginning of the semester, a selection of seminar topics will be discussed with each student of the seminar.

Workload
The total workload for this course is approximately 90 hours.

Literature
Literature will be distributed during the first lecture.
Seminar in Finance (Master, Prof. Uhrig-Homburg)
2530580, SS 2019, 2 SWS, Language: German, Open in study portal

Learning Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.

The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced at the end of the foregoing semester.

Masterseminar Big Data Mining in Finance
2540510, SS 2019, 2 SWS, Language: German/English, Open in study portal

Literature

Hospital Management
2550493, SS 2019, 2 SWS, Language: German, Open in study portal

Description
The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries.

Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

Learning Content
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Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

Annotation
It is planned to offer the course every semester.

Workload
The total workload for this course is approximately 90 hours.

Seminar Management Accounting
2579904, SS 2019, 2 SWS, Language: English, Open in study portal

Notes
see Module Handbook
Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Special Topics in Management Accounting
2579905, SS 2019, 2 SWS, Language: English, Open in study portal

Notes
see Module Handbook

Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

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Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Seminar Human Resource Management (Master)
2500006, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook
### Seminar in Data Science for Finance
2500029, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Description**
The aim of this seminar is to master real-world challenges of computational risk and asset management. The CRAM team offers a wide range of topics across different asset classes and different stages of the investment process.

**Learning Content**
Students will work on a quantitative problem related to risk and asset management. This seminar is ideally suited for students who want to deepen and apply their statistics / programming skills and knowledge about financial markets. Industry-relevant problems will be solved with financial data and modern statistical tools in close collaboration with a supervisor. Topics which students solved in the past include the option-based pricing of dividends during the Euro crisis, the estimation of risk neutral moments with high-frequency data and the application of a particle filter to estimate stochastic volatility. The current topics will be presented during the first meeting.

### Data Science in Service Management
2540473, WS 19/20, 2 SWS, Language: German/English, [Open in study portal](#)

**Notes**
wird auf deutsch und englisch gehalten

### Masterseminar in Data Science and Machine Learning
2540510, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Workload**
The total workload for this course is approximately 90 hours (3 ECTS). Depending on the realization of the work, the times may vary. The main focus is always on working independently.

### Digital Service Design Seminar
2540559, WS 19/20, 3 SWS, [Open in study portal](#)

**Description**
Contemporary trends of every increasing digitalization in businesses lead to new challenges and fusion of technologies blurring the lines between the digital, physical and biological spheres, thereby calling for a new approaches for corporate management. Recently, physician Michio Kaku put it like the following: "The destiny of computers – like other mass technologies like electricity, paper, and running water- is to become invisible, that is, to disappear into the fabric of our lives, to be everywhere and nowhere, silently and seamlessly carrying out our wishes." Michio Kaku (2016)

In the Practical Seminar Digital Service Design students address a real-world challenge in businesses and apply digital service design practices and tools. Furthermore, during the time of the seminar the students prototypical implement a running digital service.

Real-world challenges will vary over time. This time, the challenges are from the domain of Future Corporate Management. The practical seminar is carried out in close cooperation with SAP SE and leverages state-of-the-art digital platforms for prototyping.

**Learning Content**
- Foundations
- Digital Service Design Challenges in Future Corporate Management
- Basics of Digital Service Design practices and tools
- Prototyping and development Digital Services
- Delivering digital service prototypes
Annotation
Students interested in master thesis positions at the chair of marketing should participate in the marketing seminar. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu)

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
will be announced in the seminar.

Seminar: Human Resources and Organizations (Bachelor)
2573010, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook

Seminar: Human Resource Management (Bachelor)
2573011, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook
### Course: Seminar in Business Administration B (Master) [T-WIWI-103476]

**Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

<table>
<thead>
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<th>Events</th>
<th>Credits</th>
<th>Type</th>
<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>SS 2019</td>
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<td>Each term</td>
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<td>Each term</td>
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<td>Each term</td>
<td>1</td>
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<td>1</td>
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<td>Smart Grids and Energy Markets</td>
<td>Each term</td>
<td>1</td>
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**Exams**

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Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Seminar Human Resource Management (Master)
2500006, SS 2019, 2 SWS, Open in study portal

Notes
See Module Handbook

Seminar Human Resources and Organizations (Master)
2500007, SS 2019, 2 SWS, Open in study portal

Notes
See Module Handbook

Automated Financial Advisory
2530372, SS 2019, 2 SWS, Language: English, Open in study portal

Learning Content
At the beginning of the semester, a selection of seminar topics will be discussed with each student of the seminar.

Workload
The total workload for this course is approximately 90 hours.

Literature
Literature will be distributed during the first lecture.

Seminar in Finance (Master, Prof. Uhrig-Homburg)
2530580, SS 2019, 2 SWS, Language: German, Open in study portal
Learning Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.
The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced at the end of the foregoing semester.

Literature:


Description
The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries.
Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

Learning Content
The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries.
Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

Annotation
It is planned to offer the course every semester.

Workload
The total workload for this course is approximately 90 hours.

Notes
see Module Handbook
Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Special Topics in Management Accounting
2579905, SS 2019, 2 SWS, Language: English, Open in study portal

Notes
see Module Handbook

Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Seminar Human Resource Management (Master)
2500006, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook

Seminar Human Resources and Organizations (Master)
2500007, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook
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<td>German/English</td>
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<td>WS 19/20</td>
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<td>2572181</td>
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**Seminar in Data Science for Finance**

**Description**
The aim of this seminar is to master real-world challenges of computational risk and asset management. The CRAM team offers a wide range of topics across different asset classes and different stages of the investment process.

**Learning Content**
Students will work on a quantitative problem related to risk and asset management. This seminar is ideally suited for students who want to deepen and apply their statistics / programming skills and knowledge about financial markets. Industry-relevant problems will be solved with financial data and modern statistical tools in close collaboration with a supervisor. Topics which students solved in the past include the option-based pricing of dividends during the Euro crisis, the estimation of risk neutral moments with high-frequent data and the application of a particle filter to estimate stochastic volatility. The current topics will be presented during the first meeting.

**Notes**
wird auf deutsch und englisch gehalten

**Digital Service Design Seminar**

**Description**
Contemporary trends of every increasing digitalization in businesses lead to new challenges and fusion of technologies blurring the lines between the digital, physical and biological spheres, thereby calling for a new approaches for corporate management. Recently, physician Michio Kaku put it like the following: “The destiny of computers – like other mass technologies like electricity, paper, and running water- is to become invisible, that is, to disappear into the fabric of our lives, to be everywhere and nowhere, silently and seamlessly carrying out our wishes.” Michio Kaku (2016)

In the Practical Seminar Digital Service Design students address a real-world challenge in businesses and apply digital service design practices and tools. Furthermore, during the time of the seminar the students prototypical implement a running digital service.

Real-world challenges will vary over time. This time, the challenges are from the domain of Future Corporate Management. The practical seminar is carried out in close cooperation with SAP SE and leverages state-of-the-art digital platforms for prototyping.

**Learning Content**
- Foundations
- Digital Service Design Challenges in Future Corporate Management
- Basics of Digital Service Design practices and tools
- Prototyping and development Digital Services
- Delivering digital service prototypes

**Learning Content**

The seminar teaches students to gain a systematic overview of a field of literature in Marketing - an important prerequisite for a successful master thesis. Central aspects are identification of relevant literature sources, systematization of the field, working out central insights, writing comprehensively, and identification of research gaps.
Annotation
Students interested in master thesis positions at the chair of marketing should participate in the marketing seminar. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu)

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
will be announced in the seminar.

Seminar: Human Resources and Organizations (Bachelor)
2573010, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook

Seminar: Human Resource Management (Bachelor)
2573011, WS 19/20, 2 SWS, Open in study portal

Notes
See Module Handbook

**Responsible:** Prof. Dr. Ingrid Ott

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101514 - Innovation Economics

**Type** Examination of another type

**Credits** 3

**Recurrence** Each term

**Version** 1

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**Competence Certificate**
The assessment is carried out through a term paper within the range of 12 to 15 pages, a presentation of the results of the work in a seminar meeting, and active participation in the discussions of the seminar meeting (§ 4 (2), 3 SPO).

The final grade is composed of the weighted graded examinations. (Essay 50%, 40% oral presentation, active participation 10%).

**Prerequisites**
None

**Recommendation**
At least one of the lectures “Theory of Endogenous Growth” or "Innovation Theory and Policy” should be attended in advance, if possible.
### 6.306 Course: Seminar in Economics A (Master) [T-WIWI-103478]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

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**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates  
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods  
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.
Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.
The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

**Advanced Topics in Econometrics**
2521310, SS 2019, 2 SWS, Language: English, [Open in study portal]

Annotation
The course will be offered in English.

**Topics in Political Economics (Master)**
2560552, SS 2019, 2 SWS, Language: English, [Open in study portal]

Description
In many companies relative reward schemes are used whereby employees earn a bonus if they perform better than their colleagues. Moreover, hierarchical structures mean that in many organizations, employees find themselves in constant competition for promotions. This is meant to provide incentives for higher performance. However, competitive remuneration schemes could also have detrimental effects such that individual workers may view their colleagues as direct competitors generating more selfish and/or less helpful behavior in the workplace. Furthermore, age, gender and culture seem to have impacts on willingness to compete. For example, in western cultures, adult men sometimes enter competition even though their performance level is way too low for success, i.e., they harm themselves by over-competitiveness. In contrast, adult females sometimes compete less than they could do successfully.

Another challenge in contest design, e.g. in sports, is that when competition takes place among workers with mixed abilities it may lead to a discouragement effect, which establishes that lower ability individuals often reduce effort competing against an individual they do not feel up to (e.g. it has been found that average golf players performed significantly worse when competing against a superstar like Tiger Woods). One solution suggested by the economic literature is to level the playing field between advantaged and disadvantaged individuals by favoring weaker individuals through bid-caps, asymmetric tie-breaking rules, or advances. In sports, asymmetric tie-breaking is already common, for instance, in the Champions League soccer playoffs “away goals” become the decisive factor in determining the winning team in case of a tie.

Contests are not only a well-established mechanism for incentivizing workers but also for encouraging innovation and advancing R&D. Elements of research and innovation contests can be found in the procurement of various goods and services. For instance, the construction of new buildings, proposals in a venture capital firm or TV shows for entertainment companies all flow through a similar innovation process that involves the solicitation of bids from multiple potential suppliers and the preparation of a pilot or a proposal. In other cases, e.g., in lobbying contests, it is often discussed whether investments are beneficial or not. Some authors have argued that investments into lobbying should be capped in order to soften competition among asymmetrically strong interest groups (e.g. the lobbying industry versus consumers’ interest groups). Of course, then the question arises whether such caps achieve the respective design goal or not.

In this seminar, we discuss questions like: How can we design workplaces and labor contracts to increase motivation and productivity? How can contests be used to foster innovation? Which role should social preferences play and how could they inspire specific contest designs? How should sport contests be engineered depending on the respective goals? How should we design lobbying contests?

Also related topics are very welcome!

Notes
Participation will be limited to 12 students.

Annotation
For further questions, please contact Patrick Maus (Patrick.Maus@kit.edu).

Workload
About 90 hours
Morals and Social Behavior (Master)
2560554, SS 2019, 2 SWS, Language: English, Open in study portal

Description
For a long time, economists studied given markets and mechanisms to predict outcomes, future developments or generally the participants’ behavior. In contrast, Market Design uses theory, empirical and experimental work to design markets which incentivize their participants in a way that leads to a “desirable” outcome. In this, the designer can have different objectives, for example: Maximizing efficiency, welfare or minimizing negative externalities.

Prominent applications of Market Design include, quite topical, Germany’s auction of 5G mobile licenses and matching markets, where there are two large populations that need to be matched to one another (think of hospitals and interns, students and dorm rooms or kidney donors and receivers). In this seminar, we think about ways to either design new markets or how we could alter existing ones in a socially beneficial way. Alternatively, research ideas could focus on finding failures or shortcomings of ineffectively designed markets.

Notes
Participation will be limited to 12 students.

Annotation
For further questions, please contact David Huber (david.huber@kit.edu).

Workload
About 90 hours.

Topics on Political Economics (Bachelor)
2560140, WS 19/20, 2 SWS, Language: English, Open in study portal

Workload
About 90 hours.

Topics on Political Economics (Master)
2560142, WS 19/20, 2 SWS, Language: English, Open in study portal

Workload
About 90 hours.
6.307 Course: Seminar in Economics B (Master) [T-WIWI-103477]

Responsible: Professorenschaft des Fachbereichs Volkswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

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<th>Recurrence</th>
<th>Version</th>
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<td>2 SWS</td>
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<td>2 SWS</td>
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<td>Seminar in Macroeconomics I</td>
<td>Prüfung (PR)</td>
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Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.
Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

### Advanced Topics in Econometrics
2521310, SS 2019, 2 SWS, Language: English, [Open in study portal]

**Annotation**
The course will be offered in English.

### Topics in Political Economics (Master)
2560552, SS 2019, 2 SWS, Language: English, [Open in study portal]

**Description**
In many companies relative reward schemes are used whereby employees earn a bonus if they perform better than their colleagues. Moreover, hierarchical structures mean that in many organizations, employees find themselves in constant competition for promotions. This is meant to provide incentives for higher performance. However, competitive remuneration schemes could also have detrimental effects such that individual workers may view their colleagues as direct competitors generating more selfish and/or less helpful behavior in the workplace. Furthermore, age, gender and culture seem to have impacts on willingness to compete. For example, in western cultures, adult men sometimes enter competition even though their performance level is way too low for success, i.e., they harm themselves by over-competitiveness. In contrast, adult females sometimes compete less than they could do successfully.

Another challenge in contest design, e.g. in sports, is that when competition takes place among workers with mixed abilities it may lead to a discouragement effect, which establishes that lower ability individuals often reduce effort competing against an individual they do not feel up to (e.g. it has been found that average golf players performed significantly worse when competing against a superstar like Tiger Woods). One solution suggested by the economic literature is to level the playing field between advantaged and disadvantaged individuals by favoring weaker individuals through bid-caps, asymmetric tie-breaking rules, or advances. In sports, asymmetric tie-breaking is already common, for instance, in the Champions League soccer playoffs “away goals” become the decisive factor in determining the winning team in case of a tie.

Contests are not only a well-established mechanism for incentivizing workers but also for encouraging innovation and advancing R&D. Elements of research and innovation contests can be found in the procurement of various goods and services. For instance, the construction of new buildings, proposals in a venture capital firm or TV shows for entertainment companies all flow through a similar innovation process that involves the solicitation of bids from multiple potential suppliers and the preparation of a pilot or a proposal. In other cases, e.g., in lobbying contests, it is often discussed whether investments are beneficial or not. Some authors have argued that investments into lobbying should be capped in order to soften competition among asymmetrically strong interest groups (e.g. the lobbying industry versus consumers’ interest groups). Of course, then the question arises whether such caps achieve the respective design goal or not.

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Also related topics are very welcome!

**Notes**
Participation will be limited to 12 students.

**Annotation**
For further questions, please contact Patrick Maus (Patrick.Maus@kit.edu).

**Workload**
About 90 hours
Literature

Morals and Social Behavior (Master)
2560554, SS 2019, 2 SWS, Language: English, Open in study portal

Description
For a long time, economists studied given markets and mechanisms to predict outcomes, future developments or generally the participants’ behavior. In contrast, Market Design uses theory, empirical and experimental work to design markets which incentivize their participants in a way that leads to a “desirable” outcome. In this, the designer can have different objectives, for example: Maximizing efficiency, welfare or minimizing negative externalities.
Prominent applications of Market Design include, quite topical, Germany’s auction of 5G mobile licenses and matching markets, where there are two large populations that need to be matched to one another (think of hospitals and interns, students and dorm rooms or kidney donors and receivers). In this seminar, we think about ways to either design new markets or how we could alter existing ones in a socially beneficial way. Alternatively, research ideas could focus on finding failures or shortcomings of ineffectively designed markets.

Notes
Participation will be limited to 12 students.

Annotation
For further questions, please contact David Huber (david.huber@kit.edu).

Workload
About 90 hours.

Topics on Political Economics (Bachelor)
2560140, WS 19/20, 2 SWS, Language: English, Open in study portal

Workload
About 90 hours.

Topics on Political Economics (Master)
2560142, WS 19/20, 2 SWS, Language: English, Open in study portal

Workload
About 90 hours.
6.308 Course: Seminar in Engineering Science Master (approval) [T-WIWI-108763]

**Responsible:** Fachvertreter ingenieurwissenschaftlicher Fakultäten

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101808 - Seminar Module

<table>
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<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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**Competence Certificate**
See German version.

**Prerequisites**
See module description.

**Recommendation**
None
### 6.309 Course: Seminar in Informatics A (Master) [T-WIWI-103479]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

<table>
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<td>Sure-Vetter, Färber, Nguyen, Weller</td>
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<td>2 SWS</td>
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<td>SS 2019 2595470</td>
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<td>2 SWS</td>
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<td>WS 19/20 2400125</td>
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<td>2 SWS</td>
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<td>Sure-Vetter, Acosta Deibe, Käfer, Heling</td>
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<td>WS 19/20 2512301</td>
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<td>3 SWS</td>
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<td>Zöllner</td>
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**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.
Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
Placeholder for seminars offered by the Institute AIFB.
Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.
The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Knowledge Discovery and Data Mining
2512300, SS 2019, 3 SWS, Language: English, Open in study portal

Description
The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Notes
The exact dates and information for registration will be announced at the event page.

Learning Content
Domains of interest include, but are not limited to:
- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:
- Mitchell, T.; Machine Learning

Data Science & Real-time Big Data Analytics
2513306, SS 2019, 2 SWS, Language: German/English, Open in study portal

Description
Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Seminar Service Science, Management & Engineering
2595470, SS 2019, 2 SWS, Language: German, Open in study portal

Learning Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
See the KSRI website for more information about this seminar: www.ksri.kit.edu
Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
The student will receive the necessary literature for his research topic.

Security and Privacy Awareness
2400125, WS 19/20, 2 SWS, Open in study portal

Notes
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Dates:
- Kick-Off (with topic placing): 25.10.19, 11:30-13:00 Building 5.20 Room 1C-01
- Final version: 10.03.20
- Presentation: 25.03.20

Topics will be assigned at the Kick-Off.
Further information about the concrete topics will follow shortly.
ATTENTION: The seminar is only for MASTER students!

Linked Data and the Semantic Web
2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Notes
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as ‘Block-Seminar’.

Topics of interest include, but are not limited to:
- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

Real-World Challenges in Data Science and Analytics
2512311, WS 19/20, 3 SWS, Language: German/English, Open in study portal
Notes
In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on. During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results. During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs. The exact dates and information for registration will be announced at the course page.

Seminar Service Science, Management & Engineering
2595470, WS 19/20, 3 SWS, Language: German, Open in study portal

Notes
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Learning objectives:
The student

- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Recommendations:
Lecture eServices [2595466] is recommended.

Workload:
The total workload for this course is approximately 90 hours. For further information see German version.
6.310 Course: Seminar in Informatics B (Master) [T-WIWI-103480]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

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<td>Each term</td>
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**Events**

<table>
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<th>Semester</th>
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<th>Credits</th>
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<td>SS 2019</td>
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**Exams**

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**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.
Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
Placeholder for seminars offered by the Institute AIFB.
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.
The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Knowledge Discovery and Data Mining
2512300, SS 2019, 3 SWS, Language: English, Open in study portal

Description
The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Notes
The exact dates and information for registration will be announced at the event page.

Learning Content
Domains of interest include, but are not limited to:
- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:
- Mitchell, T.; Machine Learning

Data Science & Real-time Big Data Analytics
2513306, SS 2019, 2 SWS, Language: German/English, Open in study portal

Description
Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Seminar Service Science, Management & Engineering
2595470, SS 2019, 2 SWS, Language: German, Open in study portal Seminar (S)

Learning Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
See the KSRI website for more information about this seminar: www.ksri.kit.edu
Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
The student will receive the necessary literature for his research topic.

Security and Privacy Awareness
2400125, WS 19/20, 2 SWS, Open in study portal

Notes
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Dates:
- Kick-Off (with topic placing): 25.10.19, 11:30-13:00 Building 5.20 Room 1C-01
- Final version: 10.03.20
- Presentation: 25.03.20

Topics will be assigned at the Kick-Off.
Further information about the concrete topics will follow shortly.
ATTENTION: The seminar is only for MASTER students!

Linked Data and the Semantic Web
2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Notes
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as ‘Block-Seminar’.

Topics of interest include, but are not limited to:
- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

Real-World Challenges in Data Science and Analytics
2512311, WS 19/20, 3 SWS, Language: German/English, Open in study portal
Notes
In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.
During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.
During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master’s programs. The exact dates and information for registration will be announced at the course page.

Notes
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
See the KSRI website for more information about this seminar: www.ksri.kit.edu
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Learning objectives:
The student
- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Recommendations:
Lecture eServices [2595466] is recommended.

Workload:
The total workload for this course is approximately 90 hours. For further information see German version.
### Course: Seminar in Operations Research A (Master) [T-WIWI-103481]

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

<table>
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<th>Version</th>
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<td>Each term</td>
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**Events**

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<th>Event Title</th>
<th>Type</th>
<th>Credits</th>
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<td>2 SWS</td>
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<td>2550491</td>
<td>Seminar zur diskreten Optimierung</td>
<td>SWS</td>
<td>Block (B)</td>
<td>Nickel, Mitarbeiter</td>
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<td>2 SWS</td>
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<td>WS 19/20</td>
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<td>Seminar: Modern OR and Innovative Logistics</td>
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**Exams**

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**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

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**Learning Content**

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.
Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Seminar: Modern OR and Innovative Logistics
2550491, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.
6.312 Course: Seminar in Operations Research B (Master) [T-WIWI-103482]

**Responsible:**
Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:**
KIT Department of Economics and Management

**Part of:**
M-WIWI-101808 - Seminar Module

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**Events**

| SS 2019 | 2550132 | Seminar zur Mathematischen Optimierung (MA) | 2 SWS | Seminar (S) | Stein, Mohr, Neumann |
| SS 2019 | 2550473 | Seminar on Power Systems Optimization (Master) | 2 SWS | Seminar (S) | Rebennack, Assistenten |
| SS 2019 | 2550491 | Seminar zur diskreten Optimierung | SWS | Block (B) | Nickel, Mitarbeiter |
| WS 19/20 | 2550473 | Seminar on Power Systems Optimization (Master) | 2 SWS | Seminar (S) | Rebennack, Sinske |
| WS 19/20 | 2550491 | Seminar: Modern OR and Innovative Logistics | 2 SWS | Seminar (S) | Nickel, Mitarbeiter |

**Exams**

| SS 2019 | 00027 | Seminar in Operations Research B (Master) | Prüfung (PR) | Nickel |
| SS 2019 | 790018_SS2019 | Seminar in Operations Research A (Master) | Prüfung (PR) | Stein |
| SS 2019 | 7900252 | Seminar in Operations Research B (Master) | Prüfung (PR) | Nickel |

**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

*Below you will find excerpts from events related to this course:*

**Seminar zur diskreten Optimierung**

2550491, SS 2019, SWS, Language: German, [Open in study portal]

**Learning Content**

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.
Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Seminar: Modern OR and Innovative Logistics
2550491, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.
**6.313 Course: Seminar in Statistics A (Master) [T-WIWI-103483]**

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101808 - Seminar Module

<table>
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<td>7900250</td>
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**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates  
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods  
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**  
None.

**Recommendation**  
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**  
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

**Advanced Topics in Econometrics**  
2521310, SS 2019, 2 SWS, Language: English, Open in study portal

**Annotation**  
The course will be offered in English.
6.314 Course: Seminar in Statistics B (Master) [T-WIWI-103484]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101808 - Seminar Module

<table>
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**Events**

| SS 2019 | 2521310 | Advanced Topics in Econometrics | 2 SWS | Seminar (S) | Schienle, Chen, Görgen |

**Exams**

| SS 2019 | 7900250 | Data Mining and Applications (Projectseminar) | Prüfung (PR) | Nakhaeizadeh |

**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

**Advanced Topics in Econometrics**

2521310, SS 2019, 2 SWS, Language: English, Open in study portal

**Annotation**

The course will be offered in English.
### 6.315 Course: Seminar in Transportation [T-BGU-100014]

**Responsible:** Bastian Chlond  
Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**  
- M-BGU-101064 - Fundamentals of Transportation  
- M-BGU-101065 - Transportation Modelling and Traffic Management  
- M-WIWI-101808 - Seminar Module

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<td>Seminar in Transportation</td>
<td>Prüfung (PR)</td>
<td>Vortisch, Chlond</td>
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**Competence Certificate**

Seminar paper, appr. 10 pages, and presentation, appr. 10 min.

**Prerequisites**

The seminar is subject to approval. The approval must be applied for at the examination secretariat of the Department of Economics and Management. The application for admission is made via the corresponding engineering seminar form on the department's download page.

**Recommendation**

none

**Annotation**

none
6.316 Course: Seminar Mobility Services (Master) [T-WIWI-103174]

**Responsible:** Prof. Dr. Gerhard Satzger
Carola Stryja

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-BGU-101064 - Fundamentals of Transportation
- M-BGU-101065 - Transportation Modelling and Traffic Management

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<td>Each winter term</td>
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**Competence Certificate**
A final written exam will be conducted.

**Prerequisites**
None

**Annotation**
The course is not offered regularly.
6.317 Course: Seminar Production Technology [T-MACH-109062]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer  
Prof. Dr.-Ing. Gisela Lanza  
Prof. Dr.-Ing. Volker Schulze

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101808 - Seminar Module

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**Exams**

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</table>

**Competence Certificate**

alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**

none

**Annotation**

The specific topics are published on the homepage of the wbk Institute of Production Science.

*Below you will find excerpts from events related to this course:*

**Seminar Production Technology**

2149665, SS 2019, 1 SWS, Language: German, [Open in study portal]

**Description**

The specific topics are published on the homepage of the wbk Institute of Production Science.
**Notes**
In course of the seminar Production Technology current issues of the wbk main fields of research "Manufacturing and Materials Technology", "Machines, Equipment and Process Automation" as well as "Production Systems" are discussed. The specific topics are published on the homepage of the wbk Institute of Production Science.

**Learning Outcomes:**
The students...

- are in a position to independently handle current, research-based tasks according to scientific criteria.
- are able to research, analyze, abstract and critically review the information.
- can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

**Workload:**
regular attendance: 10 hours
self-study: 80 hours

**Learning Content**
In course of the seminar Production Technology current issues of the wbk main fields of research "Manufacturing and Materials Technology", "Machines, Equipment and Process Automation" as well as "Production Systems" are discussed.

**Workload**
regular attendance: 10 hours
self-study: 80 hours
6.318 Course: Seminar: Governance, Risk & Compliance [T-INFO-102047]

**Responsible:** Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101242 - Governance, Risk & Compliance

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Course: Seminar: Legal Studies I [T-INFO-101997]

**Responsible:** Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** M-WIWI-101808 - Seminar Module

**Type:** Examination of another type

**Credits:** 3

**Recurrence:** Each term

**Version:** 1

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Below you will find excerpts from events related to this course:

**Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung**

2400061, SS 2019, 2 SWS, [Open in study portal](#)

**Notes**

Registration via [https://portal.wiwi.kit.edu/ys/2708](https://portal.wiwi.kit.edu/ys/2708)
### Course: Seminar: Legal Studies II [T-INFO-105945]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-WIWI-101808 - Seminar Module

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<td>2400125</td>
<td>Security and Privacy Awareness</td>
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**Events**

- **Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung**  
  2400061, SS 2019, 2 SWS, [Open in study portal](https://portal.wiwi.kit.edu/ys/2708)

**Notes**

- **Registration via** [https://portal.wiwi.kit.edu/ys/2708](https://portal.wiwi.kit.edu/ys/2708)

**Security and Privacy Awareness**  
2400125, WS 19/20, 2 SWS, [Open in study portal](https://portal.wiwi.kit.edu/ys/2708)

**Notes**

Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

**Dates:**
- Kick-Off (with topic placing): 25.10.19, 11:30-13:00 Building 5.20 Room 1C-01
- Final version: 10.03.20
- Presentation: 25.03.20

Topics will be assigned at the Kick-Off.  
Further information about the concrete topics will follow shortly.  
**ATTENTION:** The seminar is only for MASTER students!
### 6.321 Course: Service Analytics A [T-WIWI-105778]

**Responsible:** Prof. Dr. Hansjörg Fromm  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101448 - Service Management  
M-WIWI-101470 - Data Science: Advanced CRM  
M-WIWI-101506 - Service Analytics  
M-WIWI-103117 - Data Science: Data-Driven Information Systems

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**Competence Certificate**  
The assessment consists of a written exam (60 min) according to §4(2), 1 of the examination regulations.

**Prerequisites**  
None

**Recommendation**  
The lecture is addressed to students with interests and basic knowledge in the topics of Operations Research, descriptive and inductive statistics.

*Below you will find excerpts from events related to this course:*  

**Service Analytics A**  
2595501, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Learning Content**  
Today’s service-oriented companies are starting to optimize the way services are planned, operated, and personalized by analyzing vast amounts of data from customers, IT-systems, or sensors. As the statistical learning and business optimization world continues to progress, skills and expertise in advanced data analytics and data and fact-based optimization become vital for companies to be competitive. In this lecture, relevant methods and tools will be considered as a package, with a strong focus on their inter-relations. Students will learn to analyze and structure large amounts of potentially incomplete and unreliable data, to apply multivariate statistics to filter data and to extract key features, to predict future behavior and system dynamics, and finally to formulate data and fact-based service planning and decision models.

More specifically, the lessons of this lecture will include:

- Co-Creation of Value Across Enterprises  
- Instrumentation, Measurement, Monitoring of Service Systems  
- Descriptive, predictive, and prescriptive Analytics  
- Usage Characteristics and Customer Dynamics  
- Big Data, Dimensionality Reduction, and Real-Time Analytics  
- System Models and What-If-Analysis  
- Robust Mechanisms for Service Management  
- Industry Applications of Service Analytics

**Tutorials**  
Students will conduct lecture accompanying, guided exercises throughout the semester.
Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
- An Introduction to Statistical Learning with Applications in R, James, G. et al., Springer, 2013.

Paper:
- Business Intelligence and Analytics: from Big Data to Big Impact, Chen, H. et al., MIS quarterly, 2012.

Further readings will be provided in the lecture.
**6.322 Course: Service Design Thinking [T-WIWI-102849]**

**Responsible:** Prof. Dr. Gerhard Satzger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101503 - Service Design Thinking

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**Exams**  
| SS 2019 | 7900217 | Service Design Thinking | Prüfung (PR) | Satzger |

**Competence Certificate**  
Alternative exam assessment.

**Prerequisites**  
The course is compulsory and must be examined.

**Recommendation**  
This course is held in English – proficiency in writing and communication is required.  
Our past students recommend to take this course at the beginning of the masters program.

**Annotation**  
Due to practical project work as a component of the program, access is limited.  
The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June.  
For more information on the application process and the program itself are provided in the module component description and the program's website (http://sdt-karlsruhe.de).  
Furthermore, the KSRI conducts an information event for applicants every year in May.  
This module is part of the KSRI Teaching Program „Digital Service Systems“. For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.
6.323 Course: Service Innovation [T-WIWI-102641]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-101448 - Service Management
M-WIWI-102806 - Service Innovation, Design & Engineering

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Events

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Compétence Certificate
The assessment consists of an 1h written exam and of assignments during the course.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

Service Innovation
2595468, SS 2019, 2 SWS, Language: English, [Open in study portal]

Description
While innovation in manufacturing or agriculture can leverage a considerable body of research, experience and best practice, innovation in services has not reached the same level of maturity. In practice - while many organizations have a well-understood process for innovating in the product business - innovating in services is often still a fuzzy and complex undertaking.

In this lecture we will

- discuss the state of research
- compare product and service innovation
- understand how innovation diffusion works
- examine case studies of service innovation
- compare open vs. closed innovation
- learn how to leverage user communities to drive innovation and
- understand obstacles, and enablers and how to manage, incentivize and foster service innovation

Learning Content
While innovation in manufacturing can leverage a considerable body of research, experience and best practice, innovation in services has not reached the same level of maturity. In practice, while many organizations have a well-understood process for innovating in the product business, innovating in services is often still a fuzzy and complex undertaking. In this lecture we will discuss the state of research, compare product and service innovation and understand how innovation diffusion works. We examine case studies on service innovation, compare open vs. closed innovation and learn how to apply different innovation tools, methods and strategies (e.g. service design thinking as a human-centered approach to innovation or technology and strategic foresight, as methods supporting the generation of assumptions on the impact of technology).

Annotation
The credits have been changed from 5 to 4.5.
Workload
Total workload: approximately 136 hours
Attendance time: 30 hours
Self-study: 105 hours

Literature
6.324 Course: SIL Entrepreneurship Emphasis [T-WIWI-110287]

**Responsible:** Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105010 - Student Innovation Lab (SIL) 1

**Type**
Examination of another type

**Credits**
3

**Recurrence**
Each winter term

**Version**
1

**Competence Certificate**
Alternative exam assessment (§4(2), 3 SPO). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar. In addition, smaller, ungraded tasks are provided in the course to monitor progress.

**Prerequisites**
None

**Recommendation**
None
6.325 Course: SIL Entrepreneurship Project [T-WIWI-110166]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105010 - Student Innovation Lab (SIL) 1

Type: Examination of another type
Credits: 3
Recurrence: Each winter term
Version: 1

Competence Certificate
Alternative exam assessment (§4(2), 3 SPO). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar. In addition, smaller, ungraded tasks are provided in the course to monitor progress.

Prerequisites
None

Recommendation
None
6.326 Course: Simulation Game in Energy Economics [T-WIWI-108016]

Responsible: Dr. Massimo Genoese
Organisation: KIT Department of Economics and Management

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Exams

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Competence Certificate

Examination as written assignment and oral presentation (§4 (2), 1 SPO).

Prerequisites

None

Recommendation

Visiting the course "Introduction to Energy Economics"

Annotation

See German version.

Below you will find excerpts from events related to this course:

Simulation Game in Energy Economics

2581025, SS 2019, 2 SWS, Language: German, Open in study portal

Learning Content

- Introduction
- Agents and market places in the electricity industry
- Selected planning tasks of energy service companies
- Methods of modelling in the energy sector
- Agent-based simulation: The PowerACE model
- Simulation game: Simulation in energy economics (electricity and emission trading, investment decisions)

The lecture is structured in a theoretical and a practical part. In the theoretical part, the students are taught the basics to carry out simulations themselves in the practical part which comprises amongst others the simulation of the power exchange. The participants of the simulation game take a role as a power trader in the power market. Based on various sources of information (e.g. prognosis of power prices, available power plants, fuel prices), they can launch bids in the power exchange.

Workload

The total workload for this course is approximately 90 hours. For further information see German version.

Literature

Elective literature:

6.327 Course: Simulation of Stochastic Systems [T-WIWI-106552]

**Responsible:** Prof. Dr. Oliver Grothe
  Prof. Dr. Steffen Rebennack

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-103289 - Stochastic Optimization

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

**Prerequisites**
None.
6.328 Course: Site Management [T-BGU-103427]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-BGU-101884 - Lean Management in Construction
- M-BGU-101888 - Project Management in Construction

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**Events**

| SS 2019 | 6241807 | Bauleitung | 1 SWS | Lecture (V) | Steffek |

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
# 6.329 Course: Smart Energy Infrastructure [T-WIWI-107464]

**Responsible:** Dr. Armin Ardone  
Dr. Dr. Andrej Marko Pustisek  

**Organisation:** KIT Department of Economics and Management  

**Part of:** M-WIWI-101452 - Energy Economics and Technology

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<td>2581023</td>
<td>(Smart) Energy Infrastructure</td>
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<td>Lecture (V)</td>
<td>Each winter term</td>
<td>Ardone, Pustisek, Jochem</td>
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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None.

**Annotation**
6.330 Course: Smart Grid Applications [T-WIWI-107504]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101446 - Market Engineering
- M-WIWI-103720 - eEnergy: Markets, Services and Systems

### Type
- Written examination

### Credits
- 4.5

### Recurrence
- Each winter term

### Version
- 1

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### Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

### Prerequisites
None

### Recommendation
None

### Annotation
The lecture will be read for the first time in winter term 2018/19.
Course: Social Choice Theory [T-WIWI-102859]

**Responsibility:** Prof. Dr. Clemens Puppe

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101500 - Microeconomic Theory
- M-WIWI-101504 - Collective Decision Making

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**Events**

- **SS 2019** 2520537 Social Choice Theory 2 SWS Lecture (V) Puppe, Müller
- **SS 2019** 2520539 Übung zu Social Choice Theory 1 SWS Practice (Ü) Puppe, Müller

**Exams**

- **SS 2019** 7900239 Social Choice Theory Prüfung (PR) Puppe
- **SS 2019** 7900240 Social Choice Theory Prüfung (PR) Puppe

**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Below you will find excerpts from events related to this course:**

**Social Choice Theory**
2520537, SS 2019, 2 SWS, Language: English, [Open in study portal](#)

**Learning Content**
The course provides a comprehensive treatment of preference and judgement aggregation, including proofs of general results that have Arrow's famous impossibility theorem and Gibbard's oligarchy theorem as corollaries. The second part of the course is devoted to voting theory. Among other things, we prove the Gibbard-Satterthwaite theorem.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

**Main texts:**

**Secondary texts:**
6.332 Course: Sociotechnical Information Systems Development [T-WIWI-109249]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics  
M-WIWI-101628 - Emphasis in Informatics  
M-WIWI-101630 - Electives in Informatics

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Events

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Exams

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<td>Sunyaev</td>
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</table>

Competence Certificate

The alternative exam assessment consists of an implementation and a final thesis documenting the development and use of the application.

Prerequisites

None.

Below you will find excerpts from events related to this course:

Notes

The aim of this course is to provide a practical introduction into developing socio-technical information systems, such as web platforms, mobile apps, or desktop applications. Course participants will create (individually or in groups) software solutions for specific problems from various practical domains. The course tasks comprise requirements assessment, system design, and software implementation. Furthermore, course participants will gain insights into software quality assurance methods and software documentation.

Learning objectives:

- Independent and self-organized realization of a software development project
- Evaluation and selection of suitable development tools and methods
- Application of modern software development methods
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance
- Project documentation
- Presentation of project results in an comprehensible and structured form
6.333 Course: Software Quality Management [T-WIWI-102895]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Events
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Exams
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Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Prerequisites
None

Annotation
This course was formerly named "Software Technology: Quality Management".

Below you will find excerpts from events related to this course:

**Software Quality Management**
2511208, SS 2019, 2 SWS, Language: German, [Open in study portal]

Learning Content
This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

Annotation
This course was formerly named "Software Technology: Quality Management".

Workload
Lecture 30h
Exercise 15h
Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam 1h
Total: 150h
Literature

- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002
- Mauro Pezzè, Michal Young: Software testen und analysieren. Oldenbourg Verlag 2009

Further literature is given in lectures.
### Course: Spatial Economics [T-WIWI-103107]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101485 - Transport Infrastructure Policy and Regional Development  
- M-WIWI-101496 - Growth and Agglomeration  
- M-WIWI-101497 - Agglomeration and Innovation

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**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**

None

**Recommendation**

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses "Economics I" [2600012], and "Economics II" [2600014]. In addition, an interest in quantitative-mathematical modeling is required. The attendance of the course "Introduction to economic policy" [2560280] is recommended.

**Annotation**

Due to the research semester of Prof. Dr. Ingrid Ott, the course is not offered in the winter term 2018/19.

Below you will find excerpts from events related to this course:

**Spatial Economics**

2561260, WS 19/20, 2 SWS, Language: English, [Open in study portal]

**Notes**

Geography, trade and development  
Geography and economic theory  
Core models of economic geography and empirical evidence  
Agglomeration, home market effect, and spatial wages  
Applications and extensions

**Learning Content**

Geography, trade and development  
Geography and economic theory  
Core models of economic geography and empirical evidence  
Agglomeration, home market effect, and spatial wages  
Applications and extensions

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
Steven Brakman, Harry Garretsen, Charles van Marrewijk (2009), The New Introduction to Geographical Economics
Further literature recommendations will be announced in the course of the lecture.
6.335 Course: Special Topics in Information Systems [T-WIWI-109940]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
        M-WIWI-101411 - Information Engineering
        M-WIWI-101506 - Service Analytics

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Exams
SS 2019 | 7900224 | Special Topics in Information Systems | Prüfung (PR) | Weinhardt

Competence Certificate
The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

Prerequisites
see below

Recommendation
None

Annotation
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in “Information Management and Engineering” so far. With this course students majoring in “Industrial Engineering and Management” and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.
# 6.336 Course: Specialization in Food Process Engineering [T-CIWVT-101875]

**Responsible:** Dr. Volker Gaukel  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-CIWVT-101119 - Specialization in Food Process Engineering

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## Events

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<td>Bröckel, Esper, Hirth, Karbstein, Kind, Müller, Nirschl, Sass, Türk</td>
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<td>22633</td>
<td>Microbiology for Engineers</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
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<td>2 SWS</td>
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<td>Lecture (V)</td>
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## Prerequisites

The Module “Principles of Food Process Engineering” must be passed.
6 COURSES


**Responsible:** apl. Prof. Dr. Wolf-Dieter Heller

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101638 - Econometrics and Statistics I
- M-WIWI-101639 - Econometrics and Statistics II

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**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

**Prerequisites**

None

**Recommendation**

Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

**Below you will find excerpts from events related to this course:**

**Statistische Modellierung von Allgemeinen Regressionsmodellen**

2521350, WS 19/20, 2 SWS, Open in study portal

**Annotation**

Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

**Workload**

The total workload for this course is approximately 135 hours (4.5 credits).

- regular attendance: 30 hours
- self-study: 65 hours
- exam preparation: 40 hours
### 6.338 Course: Stochastic Calculus and Finance [T-WIWI-103129]

**Responsible:** Dr. Mher Safarian  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101639 - Econometrics and Statistics II

<table>
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#### Events

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<td>Lecture (V)</td>
<td>Safarian</td>
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**Competence Certificate**

The assessment of this course consists of a written examination (§4(2), 1 SPOs, 180 min.) and of possible additional assignments during the course (§4 (3) SPO).

**Prerequisites**

None

**Annotation**

For more information see http://statistik.econ.kit.edu/

Below you will find excerpts from events related to this course:

**Stochastic Calculus and Finance**  
2521331, WS 19/20, 2 SWS, Language: English, Open in study portal

**Description**

The course will provide rigorous yet focused training in stochastic calculus and finance. The program will cover modern approaches in stochastic calculus and mathematical finance. Topics to be covered:


Learning Content
The course will provide rigorous yet focused training in stochastic calculus and finance. The program will cover modern approaches in stochastic calculus and mathematical finance. Topics to be covered:


Stochastic processes (Poisson-process, Brownian motion, martingales), stochastic Integral (Integral, quadratic und co-variation, Ito-formula), stochastic differential equation for price-processes, trading strategies, option pricing (Feynman-Kac), neutral risk rating (equivalent martingale measure, Girsanov theorem), term structure models

Workload
The total workload for this course is approximately 150 hours. For further information see German version.

Literature
To be announced in lecture.

Elective literature:
- An Introduction to Stochastic Integration (Probability and its Applications) by Kai L. Chung, Ruth J. Williams, Birkhaueser
- Methods of Mathematical Finance by Ioannis Karatzas, Steven E. Shreve, Springer 1998
**6.339 Course: Strategic Finance and Technology Change [T-WIWI-110511]**

**Responsible:** Prof. Dr. Martin Ruckes

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2

<table>
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**Events**

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**Competence Certificate**

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

**Prerequisites**

None

**Recommendation**

Attending the lecture "Financial Management" is strongly recommended.
Course: Strategic Management of Information Technology [T-WIWI-102669]

Responsible: Thomas Wolf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each summer term

**Version**
- 2

### Events

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<tr>
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</tr>
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**Competence Certificate**

Please note that the exam for first writers will be offered for the last time in winter semester 2019/2020. A last examination possibility exists in the summer semester 2020 (only for repeaters).

The assessment of this course is a written (60 min.) or (if necessary) oral examination according (30 min.) to §4(2) of the examination regulation.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Strategic Management of Information Technology**

2511602, SS 2019, 2 SWS, Language: German, Open in study portal

**Learning Content**

The following topics will be covered: strategic planning of ICT, architecture of ICT, overall planning of ICT, outsourcing, operation and controlling of ICT.

**Literature**

### 6.341 Course: Strategic Transport Planning [T-BGU-103426]

**Responsible:** Volker Waßmuth  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-BGU-101064 - Fundamentals of Transportation  
- M-BGU-101065 - Transportation Modelling and Traffic Management

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#### Events

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#### Exams

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
**Course: Strategy and Management Theory: Developments and “Classics” [T-WIWI-106190]**

**Responsible:** Prof. Dr. Hagen Lindstädt  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-103119 - Advanced Topics in Strategy and Management

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<td>2577921</td>
<td>Strategy and Management Theory: Developments and “Classics” (Master)</td>
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</table>

**Competence Certificate**

The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a conclusion meeting. Details on the design of the performance review will be announced during the lecture.

**Prerequisites**

None

**Recommendation**

Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

**Annotation**

This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

Below you will find excerpts from events related to this course:

**Notes**

This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

**Learning Content**

In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

**Workload**

The total workload for this course is approximately 90 hours.

- Lecture: 15 hours
- Preparation of lecture: 75 hours
- Exam preparation: n/a
### 6.343 Course: Supplement Enterprise Information Systems [T-WIWI-110346]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101472 - Informatics  
- M-WIWI-101628 - Emphasis in Informatics  
- M-WIWI-101630 - Electives in Informatics

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<td>Each term</td>
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**Competence Certificate**  
The assessment of this course is a written examination (60 min.) or (if necessary) oral examination (30 min.) according to §4(2) of the examination regulation.

**Prerequisites**  
None
6.344 Course: Supplement Software- and Systemsengineering [T-WIWI-110372]

**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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<td>Each term</td>
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</table>

**Competence Certificate**
The assessment consists of an 1h written exam in the first week after lecture period.

**Prerequisites**
None

**Annotation**
This course can be used in particular for the acceptance of external courses whose content is in the broader area of software and systems engineering, but cannot assigned to another course of this topic.
### 6.345 Course: Supplementary Claim Management [T-BGU-103428]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101888 - Project Management in Construction

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#### Prerequisites
None

#### Recommendation
None

#### Annotation
None
6.346 Course: Supply Chain Management [T-MACH-105181]

**Responsible:** Dr.-Ing. Knut Alicke  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101280 - Logistics in Value Chain Networks

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**Competence Certificate**

The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**Prerequisites**

none
6 COURSES

Course: Supply Chain Management in the Automotive Industry [T-WIWI-102828]

### Responsible
- Tilman Heupel
- Hendrik Lang

### Organisation
- KIT Department of Economics and Management

### Part of
- M-WIWI-101412 - Industrial Production III
- M-WIWI-101471 - Industrial Production II

### Events

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<td>SS 2019</td>
<td>7981957</td>
<td>Supply Chain Management in the Automotive Industry</td>
<td>Prüfung (PR)</td>
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</table>

### Competence Certificate
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

### Prerequisites
None

### Recommendation
None

Below you will find excerpts from events related to this course:

### Learning Content
- Automotive industry significance
- The automotive supply chain
- Adding value structures of the automotive supply chain and mastering of the production systems as factors of success in the SCM
- Strategic procurement logistics
- Risk management
- Quality engineering and management in the automotive supply chain
- Cost engineering and management in the automotive supply chain
- Purchasing (Supplier selection, contract management)
- Performance measurement of the supply chain / organization

### Annotation
None.

### Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.

### Literature
Will be announced in the course.
Course: Supply Chain Management with Advanced Planning Systems [T-WIWI-102763]

**Responsible:** Claus J. Bosch  
Dr. Mathias Göbelt  

**Organisation:** KIT Department of Economics and Management  

**Part of:**  
M-WIWI-101412 - Industrial Production III  
M-WIWI-101471 - Industrial Production II

**Type:** Written examination  
**Credits:** 3.5  
**Recurrence:** Each summer term  
**Version:** 1

**Events**

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**Exams**

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</table>

**Competence Certificate**

The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Supply Chain Management with Advanced Planning Systems**  
2581961, SS 2019, 2 SWS, Language: English, Open in study portal

**Learning Content**

1. **Introduction to Supply Chain Management**  
1.1. Supply Chain Management Fundamentals  
1.2. Supply Chain Management Analytics

2. **Structure of Advanced Planning Systems**

3. **SAP SCM**  
3.1. Introduction / SCM Solution Map  
3.2. Demand Planning  
3.3. Supply Network Planning  
3.4. Production Planning and Detailed Scheduling  
3.5. Deployment  
3.6. Transportation Planning and Vehicle Scheduling  
3.7. [Optional] Global Available to Promise

4. **SAP SCM in Practice**  
4.1. Success Stories  
4.2. SAP Implementation Methodology

**Annotation**

This lecture has 3.5 Credits since summer term 2014.
Workload
The total workload for this course is approximately 105 hours. For further information see German version.

Literature
will be announced in the course
6.349 Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-102832 - Operations Research in Supply Chain Management

**Type**: Written examination  
**Credits**: 4,5  
**Recurrence**: Each summer term  
**Version**: 3

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<td>Taktisches und operatives SCM</td>
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**Competence Certificate**
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester. Prerequisite for admission to examination is the successful completion of the online assessments.

**Prerequisites**
Prerequisite for admission to examination is the successful completion of the online assessments.

**Recommendation**
None

**Annotation**
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.

*Below you will find excerpts from events related to this course:*

### Taktisches und operatives SCM
2550486, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Description**
Since the classical work ‘Theory of the Location of Industries’ of Weber from 1909, the determination of an optimal location of a new facility with respect to existing customers is strongly connected to strategic logistics planning. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning allows an efficient flow of materials and leads to lower costs and increased customer service.

Subject of the course is an introduction to the most important terms and definitions in location planning as well as the presentation of basic quantitative location planning models. Furthermore, specialized location planning models for Supply Chain Management will be addressed as they are part in many commercial SCM tools for strategic planning tasks.

**Learning Content**
The lecture covers basic quantitative methods in location planning in the context of strategic Supply Chain Planning. Besides the discussion of several criteria for the evaluation of the locations of facilities, the students are acquainted with classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models). The exercises accompanying the lecture offer the possibility to apply the considered models to practical problems.

**Annotation**
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.
Elective Literature

- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
### 6.350 Course: Tax Law I [T-INFO-101315]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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<td>Dreier, Matz</td>
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### 6.351 Course: Tax Law II [T-INFO-101314]

**Responsible:** Detlef Dietrich  
Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101216 - Private Business Law

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### 6.352 Course: Technical Conditions Met [T-WIWI-106623]

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101453 - Applied Strategic Decisions

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**Competence Certificate**
This module element is intended to record the Bachelor-examination “Introduction to Game Theory”. In the master module M-WIWI-101453 "Applied Strategic Decisions", this means that the obligatory course “Advanced Game Theory” is not required.

**Prerequisites**
None
6.353 Course: Technologies for Innovation Management [T-WIWI-102854]

**Responsible:** Dr. Daniel Jeffrey Koch  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101507 - Innovation Management  
M-WIWI-101507 - Innovation Management

<table>
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<td>Technologien für das Innovationsmanagement</td>
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<td>Block (B)</td>
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**Competence Certificate**
Presentation and individual paper (ca. 15 pages) as alternative exam assessment.

**Prerequisites**
None

**Recommendation**
Prior attendance of the course Innovationsmanagement: Konzepte, Strategien und Methoden is recommended.

Below you will find excerpts from events related to this course:

**Technologien für das Innovationsmanagement**

2545106, WS 19/20, 2 SWS, Open in study portal

**Learning Content**
The seminar "Technologies for Innovation Management" will focus on the early phase or fuzzy front end in innovation management. Technologies can be of great importance here, above all in the supply of information. In globally distributed R & D organizations, it is necessary to collect as much information as possible on new technological developments in the early phase of the innovation process. Information and communication technologies can be supported.

**Literature**
Will be announced in the first session.
6.354 Course: Technology Assessment [T-WIWI-102858]

**Responsible:** Dr. Daniel Jeffrey Koch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

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</table>

**Competence Certificate**
Alternative exam assessment.

**Prerequisites**
None

**Recommendation**
Prior attendance of the course Innovation Management is recommended.

**Annotation**
See German version.
**6.355 Course: Telecommunication and Internet Economics [T-WIWI-102713]**

**Responsible:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101406 - Network Economics
- M-WIWI-101409 - Electronic Markets

<table>
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**Events**

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<td>Übung zu Telekommunikations- und Internetökonomie</td>
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**Exams**

| SS 2019 | 7900276 | Telecommunication and Internet Economics | Prüfung (PR) | Mitusch |

**Competence Certificate**

Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

**Prerequisites**

None

**Recommendation**

Basic knowledge and skills of microeconomics from undergraduate studies (bachelor's degree) are expected.

Particularly helpful but not necessary: Industrial Economics. Prior attendance of the lecture „Competition in Networks“ [26240] or "Industrial Organisation" is helpful in any case but not considered a formal precondition. The english taught course "Communications Economics" is complementary and recommendet for anyone interested in the sector.

*Below you will find excerpts from events related to this course:*

**Telecommunication and Internet Economics**

<table>
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**Learning Content**

Among the network sectors the telecommunication and internet sector is the most dynamic one and the one with and highest variety of phenomena. Problems of natural monopoly still exist in some parts. But there is also competition, not only at the service level but also at the infrastructural level. Both levels are characterized by (vertical) quality differentiations and by high technology dynamics. What should the regulation of this sector look like? How should the mutual network access prices of two telecommunication providers be regulated and how can regulators set incentives for infrastructure investments?

The internet is a free market par excellence, because everybody can open internet businesses without high entry costs. Why then can a company like ebay dominate the market for internet-auction platforms so strongly? The causes of market concentration on the internet will be analyzed. So will be the economic implications of the Next Generations Networks.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**


Further literature will be provided during the lecture.
## 6.356 Course: Telecommunications Law [T-INFO-101309]

**Responsible:** Prof. Dr. Nikolaus Marsch  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

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### Events

| SS 2019 | 24632 | Telekommunikationsrecht | 2 SWS | Lecture (V) | Hermestrüwer |

### Exams

| SS 2019 | 7500085 | Telecommunications Law | Prüfung (PR) | Marsch |

Economics Engineering M.Sc.  
Module Handbook as of 01.10.2019
6.357 Course: Tendering, Planning and Financing in Public Transport [T-BGU-101005]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-BGU-101064 - Fundamentals of Transportation
- M-BGU-101065 - Transportation Modelling and Traffic Management

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**Competence Certificate**
oral exam, appr. 20 min.

**Prerequisites**
none

**Recommendation**
none

**Annotation**
none
6.358 Course: Theory of Endogenous Growth [T-WIWI-102785]

**Responsible:** Prof. Dr. Ingrid Ott

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101478 - Innovation and Growth
- M-WIWI-101496 - Growth and Agglomeration

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**Competence Certificate**

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

**Prerequisites**

None

**Recommendation**

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

**Annotation**

Due to the research semester of Prof. Dr. Ingrid Ott, the course is not offered in the winter term 2018/19.

*Below you will find excerpts from events related to this course:*

**Theory of endogenous growth**

2561503, WS 19/20, 2 SWS, Language: German, [Open in study portal](https://openstudyportal)

**Learning Content**

- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
Excerpt:

6.359 Course: Topics in Experimental Economics [T-WIWI-102863]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101505 - Experimental Economics

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Competence Certificate
The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

Annotation
The course is offered in summer 2020 for the next time, not in summer 2018.
**6.360 Course: Trademark and Unfair Competition Law [T-INFO-101313]**

**Responsible:** Dr. Yvonne Matz  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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</table>
**6.361 Course: Traffic Engineering [T-BGU-101798]**

**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101065 - Transportation Modelling and Traffic Management

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**Exams**

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101065 - Transportation Modelling and Traffic Management

<table>
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<th>Simulation von Verkehr</th>
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| Exams  | SS 2019 | 8240101800 | Traffic Flow Simulation | Prüfung (PR) | Vortisch |

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 6.363 Course: Traffic Management and Transport Telematics [T-BGU-101799]

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**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101065 - Transportation Modelling and Traffic Management

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
6.364 Course: Transport Economics [T-WIWI-100007]

**Responsible:** Prof. Dr. Kay Mitusch  
Dr. Eckhard Szimba

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101406 - Network Economics  
M-WIWI-101468 - Environmental Economics  
M-WIWI-101485 - Transport Infrastructure Policy and Regional Development

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**Exams**

| SS 2019 | 7900275 | Transport Economics | Prüfung (PR) | Mitusch |

**Competence Certificate**
The assessment is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Below you will find excerpts from events related to this course:

**Transport Economics**

2560230, SS 2019, SWS, Language: German, [Open in study portal](#)

**Learning Content**
The course shall provide an overview of transport economics. It will be demonstrated, using new microeconomic models, which impacts regulation and pricing in transport have on the economic actions of individuals and logisticans and which benefits and costs apply. The following topics will be discussed:

- demand and supply in transport
- empirical analysis of transport demand
- assessment of transport infrastructure projects
- external effects in transport
- transport policy
- cost structures of transport infrastructure
- Project evaluation from the perspective of the public sector

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
Will be announced in the lecture.
(for literature to prepare the lecture - see additional literature)

Literature:
# 6.365 Course: Transportation Data Analysis [T-BGU-100010]

**Responsible:** Dr.-Ing. Martin Kagerbauer  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101065 - Transportation Modelling and Traffic Management

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
6.366 Course: Transportation Systems [T-BGU-106610]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101064 - Fundamentals of Transportation

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**Events**

| SS 2019 | 6200406 | Transportation Systems     | 2 SWS   | Lecture (V) | Vortisch |

**Exams**

| SS 2019 | 8230106610 | Transportation Systems | Prüfung (PR) | Vortisch |

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
6.367 Course: Tunnel Construction and Blasting Engineering [T-BGU-101846]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101110 · Process Engineering in Construction

<table>
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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
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6.369 Course: Turnkey Construction II - Trades and Technology [T-BGU-103431]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-BGU-101884 - Lean Management in Construction
- M-BGU-101888 - Project Management in Construction

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**Exams**

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**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
Course: Valuation [T-WIWI-102621]

**Responsible:** Prof. Dr. Martin Ruckes  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101480 - Finance 3  
M-WIWI-101482 - Finance 1  
M-WIWI-101483 - Finance 2  
M-WIWI-101510 - Cross-Functional Management Accounting

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**Events**

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**Exams**

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</table>

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

![Lecture (V)](2530212, WS 19/20, 2 SWS, Language: English, Open in study portal)

**Description**

Firms prosper when they create value for their shareholders and stakeholders. This is achieved by investing in projects that yield higher returns than their according cost of capital. Students are told the basic tools for firm and project valuation as well as ways to implement these tools in order to enhance a firm's value and improve its investment decisions. Among other things, the course will deal with the valuation of firms and individual projects using discounted cash flow and relative valuation approaches and the valuation of flexibility deploying real options.

**Learning Content**

**Topics:**

- Projections of cash flows
- Estimation of the cost of capital
- Valuation of the firm
- Mergers and acquisitions
- Real options

**Literature**

Elective Literature

Course: Virtual Engineering I [T-MACH-102123]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101283 - Virtual Engineering A

<table>
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**Competition Certificate**
Written examination 90 min.

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Virtual Engineering I**

**Description**

Media:
Lecture notes

**Learning Content**

The lecture communicates IT aspects required for understanding virtual product development processes. For this purpose, the focus is set on systems used in industry supporting the process chain of Virtual Engineering:

- Product Lifecycle Management is an approach for managing product related data across the entire lifecycle of the product, beginning with the concept phase until disassembling and recycling.
- CAx-systems for virtual product development allow modeling digital products regarding design, construction, manufacturing and maintenance.
- Validation systems enable the analysis of products regarding statics, dynamics, safety and manufacturing feasibility.

The objective of the lecture is to clarify the relationship between construction and validation operations by applying virtual prototypes and VR/AR/MR visualization techniques in combination with PDM/PLM-systems. This is taught by introducing each particular system in applied exercises.

**Exercises Virtual Engineering I**

**Learning Content**

In this module, the practical application of different CAx software systems is exemplarily conducted in small groups, the main focus being the CAD systems CATIA V5 (DASSAULT SYSTEMES) and NX 5 (Siemens PLM Software).

**Workload**

Regular attendance: 31,5 hours, self-study: 10,5 hours
Literature
Exercise notes
6.372 Course: Virtual Engineering II [T-MACH-102124]

- **Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101281 - Virtual Engineering B

### Type
- **Written examination**
- **Credits**: 4
- **Recurrence**: Each summer term
- **Version**: 2

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**Competence Certificate**
- Written examination 90 min.

**Prerequisites**
- None

*Below you will find excerpts from events related to this course:*

**Virtual Engineering II**
- **2122378, SS 2019, 2 SWS, Language: German/English, Open in study portal**
- **Lecture (V)**

**Description**
- Media:
  - Lecture notes

**Learning Content**
- The lecture presents the IT aspects required for understanding virtual product development processes:
  - Corresponding models can be visualized in Virtual Reality Systems, from individual parts to complete assemblies.
  - Virtual Prototypes combine CAD-data and information about properties of components and assemblies for immersive visualization, functionality tests and functional validation in VR/AR/MR environments.
  - Integrated Virtual Product Development explains product development processes from the point of view of Virtual Engineering.

- The objective of this lecture is to clarify the relationship between construction and validation operations by using virtual prototypes and VR/AR/MR visualization techniques in combination with PDM/PLM-systems. This will be achieved by introducing each particular IT-system with practical-oriented exercises.
6.373 Course: Virtual Engineering Lab [T-MACH-106740]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101281 - Virtual Engineering B
- M-MACH-101283 - Virtual Engineering A

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**Competence Certificate**

Assessment of another type (graded), procedure see webpage.
### 6.374 Course: Virtual Training Factory 4.X [T-MACH-106741]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101281 - Virtual Engineering B  
M-MACH-101283 - Virtual Engineering A

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**Competence Certificate**  
Assessment of another type (graded), procedure see webpage.
Course: Warehousing and Distribution Systems [T-MACH-105174]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101263 - Introduction to Logistics
- M-MACH-101278 - Material Flow in Networked Logistic Systems
- M-MACH-101280 - Logistics in Value Chain Networks
- M-MACH-104888 - Advanced Module Logistics

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**Competence Certificate**
The assessment consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Warehousing and distribution systems**

2118097, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Description**
- **Media:**
  - presentations, black board

**Learning Content**
- Introduction
- Yard management
- Receiving
- Storage and picking
- Workshop on cycle times
- Consolidation and packing
- Shipping
- Added Value
- Overhead
- Case Study: DCRM
- Planning of warehouses
- Case study: Planning of warehouses
- Distribution networks
- Lean Warehousing

**Annotation**
none

**Workload**
- regular attendance: 21 hours
- self-study: 99 hours
Literature

ARNOLD, Dieter, FURMANS, Kai (2005)
Materialfluss in Logistiksystemen, 5. Auflage, Berlin: Springer-Verlag

ARNOLD, Dieter (Hrsg.) et al. (2008)
Handbuch Logistik, 3. Auflage, Berlin: Springer-Verlag

Warehouse Science

GUDEHUS, Timm (2005)
Logistik, 3. Auflage, Berlin: Springer-Verlag

FRAZELLE, Edward (2002)
World-class warehousing and material handling, McGraw-Hill

MARTIN, Heinrich (1999)
Praxiswissen Materialflußplanung: Transport, Hanshaben, Lagern, Kommissionieren, Braunschweig, Wiesbaden: Vieweg

WISER, Jens (2009)
Der Prozess Lagern und Kommissionieren im Rahmen des Distribution Center Reference Model (DCRM); Karlsruhe: Universitätsverlag

A comprehensive overview of scientific papers can be found at:

ROODBERGEN, Kees Jan (2007)
Warehouse Literature
### Course: Water Chemistry and Water Technology I [T-CIWVT-101900]

**Responsible:** Prof. Dr. Harald Horn  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-CIWVT-101121 - Water Chemistry and Water Technology I

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<td>WS 19/20</td>
<td>22622</td>
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<td>Practice (Ü)</td>
<td>Horn, und Mitarbeiter</td>
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#### Exams

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**Prerequisites**  
T-CIWVT-103351 - Wasserchemisches Praktikum must be passed.
**T 6.377 Course: Water Chemistry and Water Technology II [T-CIWVT-101901]**

**Responsible:** Prof. Dr. Harald Horn  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-CIWVT-101122 - Water Chemistry and Water Technology II

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**Exams**

| WS 19/20        | 7232003  | Water Chemistry and Water Technology II | Prüfung (PR) | Horn, Abbt-Braun |

**Prerequisites**

The module "Water Chemistry and Water Technology I" must be passed.
# 6.378 Course: Web Science [T-WIWI-103112]

**Responsible:** Prof. Dr. York Sure-Vetter  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101472 - Informatics  
- M-WIWI-101628 - Emphasis in Informatics  
- M-WIWI-101630 - Electives in Informatics

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**Competition Certificate**  
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation. The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**  
None

**Annotation**  

*Below you will find excerpts from events related to this course:*

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</table>
Notes
The lecture provides insights into the analysis of social networks and the used metrics. Thereby, in particular, web phenomena and the available technologies are considered.

Web Science is the emergent study of the people and technologies, applications, processes and practices that shape and are shaped by the World Wide Web. Web Science aims to draw together theories, methods and findings from across academic disciplines, and to collaborate with industry, business, government and civil society, to develop our knowledge and understanding of the Web: the largest socio-technical infrastructure in human history.

The lecture provides an introduction to basic concepts of Web Science. Essential theoretical foundations, phenomena and approaches are presented and explained.

This course aims to provide students with a basic knowledge and understanding about the structure and analysis of selected web phenomena and technologies. Topics include the small world problem, network theory, social network analysis, graph search and technologies/standards/architectures.

Learning objectives:
The students

- look critically into current research topics in the field of Web Science and learns in particular about the topics small-world-problem, network theory, social network analysis, bibliometrics, as well as link analysis and search.
- apply interdisciplinary thinking.
- train the application of technological approaches to social science problems.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

Exercises to Web Science
2511313, WS 19/20, 1 SWS, Language: English, Open in study portal

Notes
The exercises are related to the lecture Web Science.

Multiple exercises are held that capture the topics, held in the lecture Web Science and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

This course aims to provide students with a basic knowledge and understanding about the structure and analysis of selected web phenomena and technologies. Topics include the small world problem, network theory, social network analysis, graph search and technologies/standards/architectures.

Learning objectives:
The students

- look critically into current research topics in the field of Web Science and learns in particular about the topics small-world-problem, network theory, social network analysis, bibliometrics, as well as link analysis and search.
- apply interdisciplinary thinking.
- train the application of technological approaches to social science problems.
6.379 Course: Wildcard Key Competences Seminar 1 [T-WIWI-104680]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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6.380 Course: Wildcard Key Competences Seminar 2 [T-WIWI-104681]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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6.381 Course: Wildcard Key Competences Seminar 3 [T-WIWI-104682]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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6.382 Course: Wildcard Key Competences Seminar 4 [T-WIWI-104683]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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6.383 Course: Wildcard Key Competences Seminar 5 [T-WIWI-104684]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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# Course: Wildcard Key Competences Seminar 6 [T-WIWI-104685]

**Organisation:** University  
**Part of:** M-WIWI-101808 - Seminar Module

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6.385 Course: Wildcard Key Competences Seminar 8 [T-WIWI-105956]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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### 6.386 Course: Wildcard Seminar Module Master [T-WIWI-110215]

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<td>M-WIWI-101808 - Seminar Module</td>
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<td>see Annotations</td>
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Competence Certificate
In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Annotation
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the summer term 2018.

Below you will find excerpts from events related to this course:

Workshop Business Wargaming - Analyzing Strategic Interactions
2577912, SS 2019, 2 SWS, Language: German, Open in study portal

Notes
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

Learning Content
In this course, students simulate and analyze real-life conflict situations using Business Wargaming methods. The students will be able to understand the underlying structure and dynamics of various conflicts, this includes making own conclusions as well as deriving strategic recommendations.

Workload
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a
Learning Content
In this lecture, current economic trends will be discussed from a perspective of competition analysis and corporate strategies. Using appropriate frameworks, the students will be able to analyze collectively selected case studies and derive business strategies.

Annotation
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

Workload
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a
**Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]**

**Responsible:** Prof. Dr. Hagen Lindstädt  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-103119 - Advanced Topics in Strategy and Management

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<th>7900122</th>
<th>Workshop Current Topics in Strategy and Management</th>
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<th>Lindstädt</th>
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**Competence Certificate**
The evaluation of the performance takes place through the active participation in the discussion rounds; an appropriate preparation is expressed here and a clear understanding of the topic and framework becomes recognizable. Further details on the design of the performance review will be announced during the lecture.

**Prerequisites**
None

**Recommendation**
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

**Annotation**
This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed. The course is planned to be held for the first time in the winter term 2017/18.

**Below you will find excerpts from events related to this course:**

**Workshop aktuelle Themen Strategie und Management (Master)**
2577923, SS 2019, 2 SWS, Language: German, [Open in study portal]

**Notes**
This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

**Learning Content**
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

**Workload**
The total workload for this course is approximately 90 hours.
Lecture: 15 hours  
Preparation of lecture: 75 hours  
Exam preparation: n/a
6.389 Course: X-ray Optics [T-MACH-109122]

**Responsible:** Dr. Arndt Last  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101291 - Microfabrication  
M-MACH-101292 - Microoptics

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**Events**

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<td>X-ray Optics</td>
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**Exams**

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<td>X-ray Optics</td>
<td>Prüfung (PR)</td>
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**Competence Certificate**
oral exam (about 20 min)

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**X-ray Optics**

2141007, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**

The lecture covers general principles of optics as well as basics, functioning and application of reflective, refractive and diffractive X-ray optical elements and systems. Selected X-ray analytical imaging methods and the necessary optical elements are discussed including their potentials and limitations.

**Annotation**

Lecture dates will be fixed in agreement with the students, see institutes website.

A visit at synchrotron ANKA is possible if requested.

**Workload**

lecture times plus assignment to review

**Literature**

M. Born und E. Wolf  
Principles of Optics, 7th (expanded) edition  
Cambridge University Press, 2010

A. Erko, M. Idir, T. Krist und A. G. Michette  
Modern Developments in X-Ray and Neutron Optics  
Springer Series in Optical Sciences, Vol. 137  
Springer-Verlag Berlin Heidelberg, 2008

D. Attwood  
Soft X-Rays and Extreme Ultraviolet Radiation: Principles and Applications  
Cambridge University Press, 1999