

**Modulhandbuch**  
**Studiengang Master of Science Infrastructure Planning**  
**Prüfungsordnung: 903-2017**

Wintersemester 2017/18  
Stand: 19. Oktober 2017

Universität Stuttgart  
Keplerstr. 7  
70174 Stuttgart

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## 100 Advanced Modules

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|---------------------|-------|----------------------------------|
| Zugeordnete Module: | 15160 | Water and Power Supply           |
|                     | 19120 | Sanitary Engineering             |
|                     | 34420 | Regional and Urban Planning II   |
|                     | 50330 | Regional and Urban Planning I    |
|                     | 50510 | Statistics and GIS               |
|                     | 50540 | Transport Planning and Modelling |
|                     | 72740 | Environmental Aspects            |
|                     | 79210 | Case Study                       |

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**Modul: 15160 Water and Power Supply**

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| 2. Modulkürzel:                                     | 021410105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr. Sabine-Ulrike Gerbersdorf                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 9. Dozenten:                                        | Ralf Minke<br>Sabine-Ulrike Gerbersdorf                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 11. Empfohlene Voraussetzungen:                     | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 12. Lernziele:                                      | <p><b>Power Demand, Supply and Distribution:</b><br/>The students,</p> <ul style="list-style-type: none"><li>• know the German, European and worldwide energy markets related to demand, supply and its distribution capabilities</li><li>• are aware of that non-renewable energy sources are strictly limited and time-scales for conversion of energy markets long</li><li>• have an idea about the relations between energy, politics, social changes and influences on environment</li><li>• have a basic knowledge about present energy conversion systems, theoretical limits of efficiencies, and the potential to enhance applied technology</li><li>• have a basic understanding about where and how energy is provided and distributed</li><li>• comprehend the balance between load and supply in electrical grids and the resulting necessity for control energy.</li></ul> <p><b>Water Demand, Supply and Distribution:</b><br/>The students,</p> <ul style="list-style-type: none"><li>• know the German and worldwide water systems related to demand, supply and its distribution capabilities</li><li>• have an overview on the water supply situation all over the world.</li><li>• recognize the different possibilities and levels of water supply</li><li>• have an idea of the relations between water, politics, social changes and influences on environment.</li></ul> |                |                |
| 13. Inhalt:                                         | <p><b>Power Demand, Supply and Distribution:</b></p> <ul style="list-style-type: none"><li>• Energy demand, energy supply</li><li>• Energy generation<ul style="list-style-type: none"><li>- overview of different types of power plants</li><li>- renewable energy</li><li>- thermal power plants (conventional and nuclear)</li></ul></li><li>• Areas of application of different power plants</li><li>• Emission control techniques</li><li>• Cooling of thermal power plants<ul style="list-style-type: none"><li>- methods</li><li>- water resources aspects</li></ul></li><li>• Energy transport and energy storage</li><li>• Net techniques</li><li>• Energy market<ul style="list-style-type: none"><li>- trade</li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |

- politics
- law
- social changes due to energy supply

**Water Demand, Supply and Distribution:**

- Water supply and water distribution: necessity, basic requirements, elements, hydrological cycle
- Water demand calculation: water consumption, water demand, consumer groups, losses, forecasting, design periods
- Water collection: Selection of source, groundwater withdrawal, springwater tapping, surface water intakes, rainwater harvesting, seawater desalination, recycling of treated sewage, drinking water protection areas
- Water transmission and distribution: necessity, hydraulic basics, dimensioning and calculation of branched and closed loop systems.
- Pumps and pumping stations: necessity, types, hydraulics for pumping design, pumping stations and pressure boosters
- Water storage: necessity, types and functions of tanks and reservoirs
- Case study: planning and design of a water supply system for a small town

|                                      |                                                                                                                                                                               |       |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 14. Literatur:                       | Lecture notes can be downloaded from the internet.<br>Hints are given for additional literature from the internet as well as libraries.                                       |       |
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 151602 Vorlesung Water Demand, Supply and Distribution</li> <li>• 151601 Vorlesung Energy Demand, Supply and Distribution</li> </ul> |       |
| 16. Abschätzung Arbeitsaufwand:      | Time of attendance:                                                                                                                                                           | 45 h  |
|                                      | Private Study:                                                                                                                                                                | 135 h |
| 17. Prüfungsnummer/n und -name:      | 15161 Water and Power Supply (PL), Schriftlich, 120 Min.,<br>Gewichtung: 1                                                                                                    |       |
| 18. Grundlage für ... :              |                                                                                                                                                                               |       |
| 19. Medienform:                      |                                                                                                                                                                               |       |
| 20. Angeboten von:                   | Wasserbau und Wassermengenwirtschaft                                                                                                                                          |       |

**Modul: 19120 Sanitary Engineering**

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| 2. Modulkürzel:                                     | 021220012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr.-Ing. Klaus Fischer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 9. Dozenten:                                        | Klaus Fischer<br>Harald Schönberger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 12. Lernziele:                                      | <p>The students have detailed knowledge about waste avoidance procedures in household and industry. Waste avoidance includes the ecology - oriented daily shopping, the substitution of contaminated materials in the industrial production as well as the Zero Emission Society. In the case of unavoidable waste fractions, the students acquire the competence to establish collection and transportation systems for these wastes, within the logistic, economic and legal frame. Main emphasis is given to the collection of recyclables. The students know the relevant factors which influence the waste amount and waste composition in general and in particular within the separate collection of recyclables. The students are acquainted with the state of the art of recycling technologies for separate collected paper, glass, metal and plastic including the pretreatment process.</p> <p>They have knowledge of the aerobic and anaerobic treatment and utilization of separate collected biowaste. Not avoided and recycled waste has to be treated before disposing off e.g. in a landfill site. The students possess a general knowledge of the mechanical and biological treatment technology as well as of the thermal waste treatment. They are able to evaluate the different treatment and recycling processes from an ecological and economic point of view. The students have knowledge about the most important components of the urban drainage and the basic treatment processes of wastewater. Thus they are able to compare different systems in dependence of changing boundary conditions and assess the effectiveness and pros and cons of the systems, e.g. concerning impacts on the environment, economical and operational aspects. They obtain an understanding for system connections between the urban drainage system and the wastewater treatment system as well as between the urban water system and the environment.</p> |                |                |
| 13. Inhalt:                                         | <p>Solid Waste Management:<br/>Waste generation and waste composition<br/>National and international regulations for waste<br/>Waste avoidance<br/>Collection and transport of waste<br/>Separate collection of recyclables<br/>Sorting of recyclables<br/>Recycling technologies for paper, glass, metal, plastic<br/>Biological treatment of waste</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |

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|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <p>Waste Disposal<br/>         Ecological indicator systems<br/>         Waste Water Technology:<br/>         Basics of urban drainage and municipal wastewater treatment<br/>         Quantity and Composition of Wastewater<br/>         Urban drainage systems<br/>         stormwater treatment<br/>         mechanical wastewater treatment<br/>         biological wastewater treatment<br/>         sludge treatment<br/>         natural close and ECOSAN systems</p> |
| 14. Literatur:                       | <p>Lecture Manuscripts Solid Waste Management<br/>         G. Tchobanoglous et. Al.: Handbook of solid waste management,<br/>         Biliteski, B. et.al.: Waste Management, Springer 1994 ISBN:<br/>         3-540-59210-5<br/>         Butler, D., Davies, J.W: .Urban drainage, Spon press London,<br/>         Henze, M., Harremoes, J., la Coour Jansen, J., Arvin, E:<br/>         Wastewater treatment. Springer Verlag Berlin</p>                                    |
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 191201 Vorlesung Solid Waste Management</li> <li>• 191202 Vorlesung Waste Water</li> <li>• 191203 Exkursion Sanitary Engineering</li> </ul>                                                                                                                                                                                                                                                                                          |
| 16. Abschätzung Arbeitsaufwand:      | <p>Time of attendance:<br/>         I Solid Waste Management, lecture: 2.0 SWS = 28 hours<br/>         II Waste Water: 2 SWS = 28 hours<br/>         excursion: 12 hours<br/>         exam: 2 hours<br/>         sum of attendance: 70 hours<br/>         self-study: 110 hours<br/>         total: 180 hours</p>                                                                                                                                                             |
| 17. Prüfungsnummer/n und -name:      | <ul style="list-style-type: none"> <li>• 19121 Solid Waste Management and Waste Water Technology (PL),<br/>             Schriftlich, 120 Min., Gewichtung: 1</li> <li>• V Vorleistung (USL-V), Schriftlich oder Mündlich</li> </ul>                                                                                                                                                                                                                                           |
| 18. Grundlage für ... :              | <p>Urban Drainage and Design of Wastewater Treatment Plants<br/>         Industrial Waste Water</p>                                                                                                                                                                                                                                                                                                                                                                           |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 20. Angeboten von:                   | <p>Abfallwirtschaft und Abluft</p>                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Modul: 34420 Regional and Urban Planning II

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Jörn Birkmann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |
| 9. Dozenten:                                        | Astrid Ley<br>Jörn Birkmann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 11. Empfohlene Voraussetzungen:                     | prerequisite modules: Regional and Urban Planning I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 12. Lernziele:                                      | The students are acquainted with basic methods of analysis and assessment in spatial planning. The students are able to cope with function, prerequisites and methodical problems of the methods present-ed. The lectures demonstrate the usage of planning instruments and methods based on planning cases from Germany and other countries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 13. Inhalt:                                         | <p>The course Regional Planning II deals with the following planning methods:</p> <ul style="list-style-type: none"> <li>• Indicator-based monitoring and evaluation methods</li> <li>• Multi-criteria decision analysis (e.g. cost-benefit analysis, utility value analysis, analytic hierarchy process)</li> <li>• Methods of impact assessment</li> <li>• Techniques of demand forecast and land suitability analysis</li> <li>• Hazard and vulnerability analysis (climate change adaptation)</li> </ul> <p>The course Urban Planning II gives an overview on:</p> <ul style="list-style-type: none"> <li>• Levels of spatial planning in urban areas</li> <li>• Urban development planning</li> <li>• Urban analysis</li> <li>• Urban renewal</li> <li>• Urban planning instruments</li> <li>• Land use planning and implementation planning</li> <li>• Legal framework</li> </ul> |                |                |
| 14. Literatur:                                      | Skript Regional and Urban Planning II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 344201 Vorlesung Regional Planning II</li> <li>• 344202 Vorlesung Urban Planning II</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Time of attendance: approx. 45 hours<br>Private Study: approx. 120 hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 17. Prüfungsnummer/n und -name:                     | <ul style="list-style-type: none"> <li>• 34421 Regional Planning II (LBP), , Gewichtung: ,5</li> <li>• 34422 Urban Planning II (LBP), , Gewichtung: ,5</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 19. Medienform:                                     | Optional                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 20. Angeboten von:                                  | Raumentwicklungs- und Umweltplanung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |

## Modul: 50330 Regional and Urban Planning I

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021100010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Jörn Birkmann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 9. Dozenten:                                        | Jörn Birkmann<br>Astrid Ley                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 12. Lernziele:                                      | The students understand the major challenges, objectives, strategies and instruments in spatial planning and urban development in Europe as well as in developing and countries in transition. The students are acquainted with the legal framework of comprehensive and sector planning and know the capabilities and limits of public planning as "positive" and "negative" planning.                                                                                                                                                                                                                                                                                                                                                                            |                |                |
| 13. Inhalt:                                         | <p>The course Regional Planning I covers the following topics:</p> <ul style="list-style-type: none"> <li>• International Planning studies</li> <li>• Overview on current planning issues</li> <li>• Basic Terms of Spatial Planning</li> <li>• Strategies in Spatial Planning</li> <li>• Instruments of Spatial Planning</li> <li>• Performance of Plans, Assessing Plans</li> </ul> <p>The course Urban Planning I provides an overview on the origin of planned urban development, starting in Greece and the Roman Empire, passing through all important periods up to the 21st century. The second part introduces urbanisation processes in third world countries, planned and unplanned urban conglomerations, including Mega Cities and Global Cities.</p> |                |                |
| 14. Literatur:                                      | <p>Berke, P.R. et al. (2006): Urban Land Use Planning. Urbana/ Chicago: University of Illinois Press</p> <p>Birkmann et al. (2010): Adaptive urban governance: nes challenges for the second generation of urban adaptation studies to climate change In: Sustainability science 5</p> <p>Hall, P. (2002): Urban and Regional Planning. New York: Routledge</p>                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 503301 Lecture Regional Planning I</li> <li>• 503302 Lecture Urban Planning I</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | <p>Time of attendance: approx. 45 hours</p> <p>Private Study: approx.135 hours</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 17. Prüfungsnummer/n und -name:                     | 50331 Regional and Urban Planning I (LBP), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 19. Medienform:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 20. Angeboten von:                                  | Raumentwicklungs- und Umweltplanung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |

## Modul: 50510 Statistics and GIS

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| 2. Modulkürzel:                                     | 021430002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr. Johannes Riegger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 9. Dozenten:                                        | Johannes Riegger<br>Volker Walter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 11. Empfohlene Voraussetzungen:                     | Basic computer knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 12. Lernziele:                                      | <p>Lecture/Exercises A: <b>"Statistics and Information Processing "</b><br/>           Basic knowledge in descriptive statistics and their applications. Skills in information processing like data base management and spreadsheet calculations. This comprises design and handling of relational databases as well as spreadsheet calculations for statistical analyses and simulations.</p> <p>Lecture/Exercises B: <b>"Introduction to GIS"</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 13. Inhalt:                                         | <p>Content Lecture/Exercises A: "Statistics and Information Processing"</p> <ul style="list-style-type: none"> <li>• Database design, generation and management</li> <li>• Use of database operations for statistics</li> <li>• Descriptive statistics</li> <li>• Random variables, probability distributions</li> <li>• Discrete distributions</li> <li>• Continuous distributions</li> <li>• Spreadsheet calculations for statistical analyses and simulations</li> </ul> <p>Content Lecture/Exercises B: "Introduction to GIS"</p> <ul style="list-style-type: none"> <li>• Definition and Examples</li> <li>• GIS Components</li> <li>• Data Acquisition Techniques Overview</li> <li>• Photogrammetry and Remote Sensing</li> <li>• Secondary Data Acquisition</li> <li>• Data Modelling</li> <li>• Data Analysis</li> <li>• GIS Data Presentation / Cartography</li> </ul> |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>• J. Riegger: Script of the Lecture, Manuals: Excel, Access</li> <li>• Volker Walter:</li> </ul> <p>Script of the Lecture, Podcasts</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 505102 Vorlesung Introduction to GIS</li> <li>• 505101 Vorlesung Statistics and Information Processing</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Sum 180h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 17. Prüfungsnummer/n und -name:                     | 50511 Statistics and GIS (PL), Schriftlich, 150 Min., Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 19. Medienform:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |

20. Angeboten von: Hydrologie und Geohydrologie

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## Modul: 50540 Transport Planning and Modelling

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|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021320011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Markus Friedrich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 9. Dozenten:                                        | Markus Friedrich<br>Ullrich Martin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 12. Lernziele:                                      | <p>The students understand the main characteristics of various transport systems and modes, including slow modes, car, public transport, inland waterways and air transport. They are familiar with the fundamental concepts of transport planning and modelling considering the specific situation in developing countries.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                |
| 13. Inhalt:                                         | <p>The lectures and exercises cover the following topics:</p> <ul style="list-style-type: none"> <li>• introduction to transportation planning</li> <li>• transportation planning process</li> <li>• data collection and surveys</li> <li>• land use and travel demand#</li> <li>• travel demand forecasts</li> <li>• trip distribution and mode choice</li> <li>• traffic assignment and supply analysis</li> <li>• road network planning</li> <li>• public transport planning</li> <li>• railway planning (special aspects of railway transport, structure of tracks, planning of routes)</li> <li>• railway operation (basic terms of railway operation, basics of spacing trains, determination of capacity, aspects of scheduling)</li> <li>• inland waterways (special aspects of inland navigation, structure of waterways, planning of waterways)</li> <li>• airports (special aspects of aviation, structure of aerodromes, planning of airports)</li> <li>• transport policy concepts</li> </ul> <p>The exercises on transport modelling introduce the students to software for travel demand forecasting models:</p> <ul style="list-style-type: none"> <li>• building a network model (nodes, links, public transport lines, centroids), calculating indicator matrices (skims) describing the service quality</li> <li>• trip generation from land-use data,</li> <li>• trip distribution and mode choice,</li> <li>• assignment for private and public transport,</li> <li>• methods to analyse a transport network (node flows, selected link analysis),</li> <li>• data transfer to and from GIS via shapefiles.</li> </ul> |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>• Friedrich, M.: Transport Planning and Modelling, Reader</li> <li>• Martin, U: Script of the Lecture</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |

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|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <ul style="list-style-type: none"> <li>• Ben-Akiva, M., Lerman, St.: Discrete Choice Analysis: Theory and Application to Travel Demand. The MIT Press, Cambridge Massachusetts, London, 1987.</li> <li>• Ort, zar, J. D., Willumsen, L. G: Modelling Transport, Wiley, Chichester, 1990.</li> <li>• Armstrong, J. H.: Railroad - What it is, what it does</li> <li>• Cescotti, R.: Aerospace Dictionary with Aerospace Definitions</li> <li>• Elms, C. P.(ed.): Dictionary of Public Transport</li> <li>• Mehlhorn, G. (ed.): Verkehr - Straße, Schiene, Luft</li> <li>• Pahl, J: Railway Operation and Control</li> <li>• Lattermann, E.: Wasserbau-Praxis Band 2</li> <li>• Vuchic, V.: Urban Public Transportation</li> </ul> |
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 505402 Übung Transport Planning</li> <li>• 505403 Übung Transport Modelling</li> <li>• 505401 Vorlesung Transport Planning and Modelling</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 16. Abschätzung Arbeitsaufwand:      | <p>Attendance time lecture: 28h<br/> Attendance time exercise: 28h<br/> Excursion: 32h<br/> Self study time: 92h<br/> Total: 180h</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17. Prüfungsnummer/n und -name:      | 50541 Transport Planning and Modelling (PL), Schriftlich, 120 Min.,<br>Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 20. Angeboten von:                   | Verkehrsplanung und Verkehrsleittechnik                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Modul: 72740 Environmental Aspects

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|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 011000801                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr. Hans-Georg Schwarz-von Raumer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 9. Dozenten:                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 12. Lernziele:                                      | <p>The students have basic knowledge about basic environmental aspects in infrastructure planning concerning soils, species and biotopes, air quality and hydro systems. They know how to include environmental aspects in spatial planning and to assess environmental impacts of strategies and projects. They are aware and have gained skills in</p> <ul style="list-style-type: none"> <li>• ecological evaluation methods (e.g. land suitability) and</li> <li>• Environmental Impact Assessment</li> </ul> <p>The students have first experiences in project exercises.</p>                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 13. Inhalt:                                         | <p>A: Lecture "Ecological aspects of infrastructure planning" Introduction to the environment factors and goods: geological resources, species and biotopes, ecosystem functioning, Air quality, hydrosystems, impact of land use systems (especially agriculture and urbanisation, ecological landscape design.</p> <p>B: Seminar "Environmental impact assessment" In the seminar students have the task to prepare a presentation and a paper about:</p> <ul style="list-style-type: none"> <li>• Structuring and evaluation of environmental impacts of strategies and projects</li> <li>• Legislative aspects</li> <li>• Modelling and evaluation methods</li> <li>• Tools for impact modelling</li> <li>• Case study examples</li> </ul> <p>Alternatively the students work on case study exercises covering strategic regional and urban planning as well as road, housing, industrial, water, sports, tourism and other infrastructure projects</p> |                |                |
| 14. Literatur:                                      | Information will be provided during the lectures Additional material can be downloaded from ILIAS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 727401 Vorlesung Ecological aspects of infrastructure planning</li> <li>• 727402 Seminar Environmental impact assessment</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 16. Abschätzung Arbeitsaufwand:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 17. Prüfungsnummer/n und -name:                     | 72741 Environmental Aspects (LBP), , Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 19. Medienform:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |

20. Angeboten von: Landschaftsplanung und Ökologie

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## Modul: 79210 Case Study

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|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021320013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 12 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Markus Friedrich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 9. Dozenten:                                        | Manfred Wacker<br>Anette Gangler<br>Richard Junesch<br>Markus Friedrich<br>Marion Aschmann<br>Jörn Birkmann<br>Astrid Ley                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 12. Lernziele:                                      | The students will gain insight into an integrated approach to infrastructure planning, covering the following topics: <ul style="list-style-type: none"> <li>• Regional Development Planning</li> <li>• Urban Planning and Design</li> <li>• Transport</li> <li>• Ecology</li> <li>• Socio-Economic Aspects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 13. Inhalt:                                         | The students practice integrated infrastructure planning skills and apply theoretical knowledge in a real life situation. They gain experience in data processing and analysis by developing a conceptual framework for use in an integrated planning process. The students will work in groups with data on the study area, which will be located in the Stuttgart Region. Topic specific planning guidelines will be developed, as well as scenario specific visions and land use plans. An interdisciplinary team of lecturers will be available for the students during the whole working period. The students have to fulfil the following deliverables: <ul style="list-style-type: none"> <li>• Analysis of the existing situation / fundamentals (phase 0)</li> <li>• Objectives, Planning Guidelines and Spatial Concept (phase 1)</li> <li>• Large Scale Planning (phase 2)</li> <li>• Urban Master Plan and Implementation Plan (phase 3)</li> <li>• Final Report, including several maps</li> </ul> |                |                |
| 14. Literatur:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 792101 Vorlesung Case Study</li> <li>• 792102 Übung Case Study</li> <li>• 792103 Präsentation Case Study</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Sum 360h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                |
| 17. Prüfungsnummer/n und -name:                     | <ul style="list-style-type: none"> <li>• 79211 Case Study (BSL), , Gewichtung: 1</li> <li>• V Case Study (USL-V),</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 19. Medienform:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |

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| 20. Angeboten von: | Verkehrsplanung und Verkehrsleittechnik |
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## 200 Specialization Modules

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| Zugeordnete Module: | 19310 | Urban Drainage and Design of Wastewater Treatment Plants |
|                     | 19360 | Water Quality and Treatment                              |
|                     | 23870 | Building Materials                                       |
|                     | 36450 | Special Aspects of Urban Water Management                |
|                     | 50160 | Applied GIS                                              |
|                     | 50340 | Regional and Urban Planning III                          |
|                     | 50560 | Project Planning and Financing                           |
|                     | 50580 | Methodological Aspects of Infrastructure Planning        |
|                     | 50600 | Traffic Engineering and Road Construction                |
|                     | 50610 | Public Transport & Railway Operation                     |
|                     | 50620 | Hydraulic Structures                                     |
|                     | 50630 | Tendering, Contracting and Project Management            |
|                     | 50640 | Ecological Design and Landscape Planning                 |
|                     | 50650 | Planning and Design of Water Supply Facilities           |
|                     | 68510 | Empirical Studies: Methodology and Applications          |

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## Modul: 19310 Urban Drainage and Design of Wastewater Treatment Plants

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| 2. Modulkürzel:                                     | 021210251                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr.-Ing. Ulrich Dittmer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                |
| 9. Dozenten:                                        | Harald Schönberger<br>Ulrich Dittmer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 11. Empfohlene Voraussetzungen:                     | Chemistry and Biology for Environmental Engineers<br>Sanitary Engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 12. Lernziele:                                      | <p>Advanced knowledge of processes and concepts for urban drainage and municipal wastewater treatment systems</p> <p>Basics of construction and dimensioning of different urban drainage systems, stormwater treatment facilities and wastewater treatment plants as a base for dimensioning and discussion of proved and innovative technologies</p> <p>Deeper understanding for system connections as base for a decisions during the planning process</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 13. Inhalt:                                         | <p>Design of sewer systems and stormwater treatment (Dr.- Ing. Ulrich Dittmer)</p> <p>principles of collection and disposal</p> <p>design of combined and separate sewer systems</p> <p>Sustainable urban drainage systems (SUDS) and low impact design(LID)</p> <p>Application of rainfall runoff models (computer exercise using U.S. EPA Stormwater Management Model)</p> <p>different techniques for treatment and retention</p> <p>design of treatment facilities</p> <p>Design of wastewater treatment plants (Prof. Dr.-Ing. Heidrun Steinmetz)</p> <p>Municipal wastewater treatment</p> <p>different techniques for advanced biological wastewater treatment (nitrogen and phosphorous removal)</p> <p>principles of process engineering</p> <p>design of biological wastewater treatment plants and the main important aggregates</p> <p>design of sludge treatment plants</p> <p>Seminar: feasibility studies (Prof. Dr.- Ing. Heidrun Steinmetz and external consultants)</p> <p>special examples for sanitation concepts for world wide application</p> <p>Ecological sanitation and resource orientated systems</p> <p>case studies</p> |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>Butler, D., Davies, J.W) .Urban drainage, Spon press London, US EPA: SWMM 5.0 users manual</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |

- Henze, M., Harremoes, J. la Coour Jansen, J., Arvin, E: Wastewater treatment. Springer Verlag Berlin
- Lens, P, Zeeman, G., Lettinga, G.: Decentralised Sanitation and reuse. IWA publishing, London
- Different German standards (DWA, Hennef)
- Lecture notes

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| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 193101 Vorlesung und Übung Design of Sewer System and Stormwater Treatment</li> <li>• 193104 Exkursion</li> <li>• 193102 Vorlesung und Übung Design of Wastewater Treatment Plants</li> <li>• 193103 Seminar Case Study</li> </ul>                                                                                                                                                     |
| 16. Abschätzung Arbeitsaufwand:      | <p>Time of attendance: approx. 70 hours (including 4*4hours for excursion) 1,5 SWS</p> <p>Private Study: approx. 110 hours</p> <p>Lecture 1 Presence time: 28 hours, self study 30 hours, project 0, Sum: <b>58 hours</b></p> <p>Lecture 2: Presence time: 28 hours, self study 30 hours, project 40, Sum: <b>58 hours</b></p> <p>Case study: Presence time: 14 hours, self study 10 hours, project 0, Sum: <b>25 hours</b></p> |
| 17. Prüfungsnummer/n und -name:      | 19311 Urban Drainage and Design of Wastewater Treatment Plants (PL), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                                                                       |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 20. Angeboten von:                   | Siedlungswasserbau und Wassergütemwirtschaft                                                                                                                                                                                                                                                                                                                                                                                    |

## Modul: 19360 Water Quality and Treatment

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| 2. Modulkürzel:                                     | 021210051                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Carsten Meyer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 9. Dozenten:                                        | Harald Schönberger<br>Carsten Meyer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 11. Empfohlene Voraussetzungen:                     | Knowledge in Sanitary Engineering, Water Supply and Hydraulics<br>Contents of Water and Power Supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 12. Lernziele:                                      | <ul style="list-style-type: none"> <li>• The students learn how to characterize and protect water bodies as well as to improve the water quality</li> <li>• Students understand the contribution of wastewater treatment to the preventive protection of receiving waters and they learn the basic methods of water quality management instruments</li> <li>• Students understand the necessity of water treatment as essential element of drinking water supply</li> <li>• Students learn the chemical, physical and biological background of water treatment technologies, their possibilities and boundaries and they are able to develop, design and dimension treatment schemes for different raw water qualities</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 13. Inhalt:                                         | <p>Water Quality Management:</p> <ul style="list-style-type: none"> <li>• Terms and introduction: environmental data from Germany</li> <li>• Characterisation and assessment of flowing waters, stagnant waters and groundwater</li> <li>• Water quality parameters, WHO drinking water guidelines, targets for drinking water and sanitation, description of water quality in relation to use</li> <li>• Improvement of water quality, reduction of pollution load, point pollutants and diffuse loads, improving the self-purification capacity of waters, technical helps, assessment of progress</li> <li>• Water quality management, the European Union Framework Directive, quality planning and maintenance, monitoring networks</li> </ul> <p>Water Treatment:</p> <ul style="list-style-type: none"> <li>• Water supply and water treatment: basic requirements, drinking water standards</li> <li>• Mechanical treatment: Screening, Sieving, Sedimentation, (Membrane)Filtration, Gas-Exchange, Flotation</li> <li>• Carbondioxide-Carbonate-Balance: relevance, chemical background</li> <li>• Deacidification: mechanical and chemical methods</li> <li>• Removal of iron, manganese and arsenic: methods</li> <li>• Decarbonization: chemical methods</li> <li>• Flocculation</li> <li>• Adsorption</li> <li>• Disinfection: chemical and physical methods</li> </ul> |                |                |

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|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14. Literatur:                       | <p>Lecture notes and material for exercises will be provided during the lecture. Hints are given for additional literature from the internet as well as libraries, e.g.</p> <ul style="list-style-type: none"> <li>• American Water Works Assoc.: Water Quality and Treatment, McGraw-Hill Inc., 1999</li> <li>• David A. Chin: Water-Quality Engineering in Natural Systems, John Wiley und Sons, Inc., 2006</li> <li>• Degremont: Water Treatment Handbook Vol. 1 und Vol. 2, Lavoisier Publishing 1991</li> <li>• C. Binnie and M. Kimber: Basic Water Treatment: Fourth Edition, IWA Publishing, 2009</li> <li>• Nicholas P. Cheremisinoff: Handbook of Water and Wastewater Treatment Technologies, Bitterworth und Heinemann, Boston Oxford Auckland Johannesburg Melbourne New Delhi, 2002</li> <li>• WHO Guidelines, 2006</li> <li>• Mutschmann, J, Stimmelmayer, F.: Taschenbuch der Wasserversorgung, Vieweg-Verlag</li> </ul> |
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 193601 Lecture Water Treatment</li> <li>• 193602 Lecture Water Quality Management</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 16. Abschätzung Arbeitsaufwand:      | <p>Time of attendance: ca. 42 h<br/> Private study: ca. 138 h<br/> 1) Lecture: presence time = 34,0, self study = 106,0, Sum = 140,0<br/> 2) Exercise: presence time = 8,0, self study = 32,0, Sum = 40,0<br/> Sum Lecture (140) + Sum Exercise (40) = 180,0</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 17. Prüfungsnummer/n und -name:      | 19361 Water Quality and Treatment (PL), Schriftlich, Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 20. Angeboten von:                   | Siedlungswasserbau und Wassergütemwirtschaft                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Modul: 23870 Building Materials

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|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021500235                                                                                                                                                                                                                                                                                                                            | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                 | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                    | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Jan Hofmann                                                                                                                                                                                                                                                                                                     |                |                |
| 9. Dozenten:                                        | Jan Hofmann                                                                                                                                                                                                                                                                                                                          |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                      |                |                |
| 11. Empfohlene Voraussetzungen:                     | None                                                                                                                                                                                                                                                                                                                                 |                |                |
| 12. Lernziele:                                      | The Student will know the properties of building materials and their proper application in practice.                                                                                                                                                                                                                                 |                |                |
| 13. Inhalt:                                         | <p>The following topics will be covered:</p> <ul style="list-style-type: none"> <li>• Mineral binding materials and mortars und plasters</li> <li>• Stones</li> <li>• Masonry</li> <li>• Concrete</li> <li>• Durability of concrete</li> <li>• Timber</li> <li>• Polymers</li> <li>• Steel</li> <li>• Corrosion of metals</li> </ul> |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>• Lecture notes</li> <li>• Transparencies</li> </ul>                                                                                                                                                                                                                                          |                |                |
| 15. Lehrveranstaltungen und -formen:                | • 238701 Vorlesung Building Materials                                                                                                                                                                                                                                                                                                |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | <p>Attendance time: 56 h</p> <p>Private study: 124 h (including a presentation - 20 minutes)</p>                                                                                                                                                                                                                                     |                |                |
| 17. Prüfungsnummer/n und -name:                     | 23871 Building Materials (PL), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                  |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                      |                |                |
| 19. Medienform:                                     | -                                                                                                                                                                                                                                                                                                                                    |                |                |
| 20. Angeboten von:                                  | Befestigungstechnik und Verstärkungsmethoden                                                                                                                                                                                                                                                                                         |                |                |

## Modul: 36450 Special Aspects of Urban Water Management

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|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021210006                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Ralf Minke                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 9. Dozenten:                                        | Ralf Minke<br>Ulrich Dittmer<br>Klaus Werner König                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                |
| 11. Empfohlene Voraussetzungen:                     | <p>Inhaltlich:<br/>Grundlegende Kenntnisse der Gesamtzusammenhänge der Siedlungswasser- und Wasserwirtschaft.<br/>Vertiefte Kenntnisse der Abwassertechnik, der Wassergütwirtschaft, der Wasserversorgung oder des allgemeinen Managements von Wasserressourcen.<br/>Formal:<br/>Wasserversorgungstechnik I oder<br/>Abwassertechnik I oder<br/>Waste Water Technology oder Water Quality and Treatment</p>                                                                                                                                                                   |                |                |
| 12. Lernziele:                                      | <p>Fachlich:<br/>Die Studierenden entwickeln ein Verständnis für Zusammenhänge über ihre Teildisziplin hinaus. Sie können bei Entscheidungen und Planungen zwischen konkurrierenden Belangen der Siedlungswasserwirtschaft, Wasserwirtschaft und anderer Infrastrukturbereiche fachlich fundiert abwägen.<br/>Methodisch:<br/>Die Studierenden können selbständig mit internationaler wissenschaftlicher Literatur zu ihrem jeweiligen Fachgebiet umgehen, Ergebnisse kritisch bewerten und so ein eigenes Bild des Standes der Wissenschaft erarbeiten und präsentieren.</p> |                |                |
| 13. Inhalt:                                         | <p>- Wechselwirkungen zwischen Teilbereichen der Siedlungswasserwirtschaft am Beispiel des Umgangs mit Regenwasser<br/>- Jährlich wechselnde Spezialthemen entsprechend dem wissenschaftlichen und technischen Fortschritt</p>                                                                                                                                                                                                                                                                                                                                                |                |                |
| 14. Literatur:                                      | <p>Gujer, W. Siedlungswasserwirtschaft, Springer Verlag GmbH<br/>Mutschmann, J, Stimmelmayer, F.: Taschenbuch der Wasserversorgung, Vieweg-Verlag<br/>Jeweils die aktuellen Auflagen<br/>Nationale und internationale Fachzeitschriften, z.B. GWF-Wasser/Abwasser, KA Abwasser, Abfall, Hrsg. und Verlag GFA, W.Sci.Tech., Wat. Res., Wasser und Abfall<br/>Diverse Merk- und Arbeitsblätter des DVGW und der DWA</p>                                                                                                                                                         |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 364503 Excursions</li> <li>• 364501 Scientific Seminar</li> <li>• 364502 Lecture Rainwater Harvesting and Management</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |
| 16. Abschätzung Arbeitsaufwand:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                |

17. Prüfungsnummer/n und -name: 36451 Special Aspects of Urban Water Management (Seminar presentation) (LBP), Schriftlich oder Mündlich, Gewichtung: 1

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18. Grundlage für ... :

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19. Medienform:

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20. Angeboten von: Siedlungswasserbau und Wassergütewirtschaft

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## Modul: 50160 Applied GIS

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|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 062300071                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr.-Ing. Li Zhang                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 9. Dozenten:                                        | Daniel Feldmeyer<br>Li Zhang<br>Hans-Georg Schwarz-von Raumer<br>Annette Schmitt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 11. Empfohlene Voraussetzungen:                     | Modul "Statistics and GIS"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                |
| 12. Lernziele:                                      | The students are able to evaluate different data sources, to carry through basic data acquisition and integrate different data into field and office GIS. They are able to apply spatial analysis techniques to real world GIS problems in environmental and regional planning (GIS-based modeling, network-, raster- and 3D-analysis). The students have the expertise and ability to manage small-scale GIS projects (data mining, analysis design, output delivery) within the planning workflow, from project definition to product delivery.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 13. Inhalt:                                         | <p>GIS-based Data Acquisition</p> <p>Lecture:</p> <ul style="list-style-type: none"> <li>• introduction</li> <li>• GIS hard- and software for primary data acquisition</li> <li>• coordinate systems, geodetic datum and projections</li> <li>• coordinate transformations and conversions</li> <li>• terrestrial positioning and laser scanning</li> <li>• satellite-based positioning (GNSS)</li> <li>• overview of other acquisition methods</li> <li>• additional topics of mapping</li> <li>• data import from various sources (e.g. Web)</li> <li>• Web-GIS (e.g. Open Street Map)integration of data into GIS</li> </ul> <p>Exercises :</p> <ul style="list-style-type: none"> <li>• terrestrial and satellite-based data acquisition (field project)</li> <li>• integration of measured data into GIS (computer lab)</li> <li>• integration of web-data into GIS (computer lab)</li> </ul> <p>GIS in Environmental and Regional Planning</p> <p>Application cases:</p> <ul style="list-style-type: none"> <li>• land suitability analysis for urban development</li> <li>• accessibility of infrastructure facilities</li> <li>• Evaluation of soil functions</li> <li>• Urban Heat Island modelling</li> <li>• Biotope Networks and animal movement</li> <li>• Flood risk</li> <li>• Development capacity studies</li> <li>• Site analysis for wind power</li> <li>• GIS-based E-government and community participation</li> </ul> <p>Tools and methods:</p> |                |                |

- Model builder
- Spatial Analyst
- Network Analyst
- Map Algebra
- Neighbourhood Analysis
- Regression Modelling
- Multi Criteria Evaluation
- analysis design
- project management

Workflow:

- Geoprocessing,
- remote sensing data integration,
- advanced visual communication

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|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14. Literatur:                       | GIS-based Data Acquisition : ILIAS - Elearning Modules, Chen, Y., Lee, Y.: Geographical Data Acquisition, Springer, Wien - New York, 2001.<br>GIS in Environmental and Regional Planning: ILIAS-Material, Exercise sheets, onlins-tutorial                                                                                        |
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 501604 Practical Training GIS in Environmental and Regional Planning</li> <li>• 501601 Lecture GIS-based Data Acquisition</li> <li>• 501602 Laboratory and Practical Training GIS-based Data Acquisition</li> <li>• 501603 Lecture GIS in Environmental and Regional Planning</li> </ul> |
| 16. Abschätzung Arbeitsaufwand:      | Summe: 180 h                                                                                                                                                                                                                                                                                                                      |
| 17. Prüfungsnummer/n und -name:      | 50161 Applied GIS (PL), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                      |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                                                                                                                                   |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                                                                                   |
| 20. Angeboten von:                   | Ingenieurgeodäsie und Geodätische Messtechnik                                                                                                                                                                                                                                                                                     |

## Modul: 50340 Regional and Urban Planning III

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|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021100012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Jörn Birkmann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 9. Dozenten:                                        | Anette Gangler<br>Jörn Birkmann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 12. Lernziele:                                      | <p>The students are able to analyze and present the development situation and problems or some specific topics related to the development of their own countries in a systematic way and to discuss development situations and problems or specific topics of other countries. They receive experience in analyzing, summarizing and presenting the aspects mentioned above in English language.</p> <p>The students are able to investigate housing standards and typologies and the housing demand and supply.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 13. Inhalt:                                         | <p><i>The course "Development Policy and Planning: A Seminar Conference" will be conducted as a series of (a) lectures, (b) consultations and (c) seminar meetings.</i></p> <p><i>a) Lectures provide an overview of development history and current issues concerning development policy and planning. Students will choose a topic of interest within this context and propose an agenda and outline for the self-study of this topic.</i></p> <p><i>b) Additional lectures on academic writing and presentation techniques as well as consultation hours will provide assistance for the preparation of a scientific paper on this topic.</i></p> <p><i>c) A conference program for seminar meetings will be set up for authors to present their work in smaller groups (plenary sessions). Students participating in a plenary session peer-review papers of presenters and participate in the discussion.</i></p> <p><i>The first part of the seminar Housing introduces housing typologies in Europe and Middle East. In the second part, participants portray the housing situation of their home countries with respect to typology, supply and demand, self-help models and spontaneous settlement patterns</i></p> |                |                |
| 14. Literatur:                                      | <p>OECD: Perspectives of global development, Paris, 2010</p> <p>Northey, M. and Jewinsky, J: Making sense: A student's guide to research and writing. Bon Mills, Ontario, 2007</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 503402 Seminar Housing</li> <li>• 503401 Lecture Development Policy and Planning</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Sum 180h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 17. Prüfungsnummer/n und -name:                     | 50341 Regional and Urban Planning III (PL), Schriftlich und Mündlich, Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |

19. Medienform:

20. Angeboten von:

Raumentwicklungs- und Umweltplanung

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## Modul: 50560 Project Planning and Financing

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|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 240903002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5. Moduldauer: | Zweisemestrig  |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Elke Schneider                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                |
| 9. Dozenten:                                        | Klaus-Peter Pischke                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 12. Lernziele:                                      | <p>Students know critical phases of a typical project cycle, they know how to plan, appraise, and evaluate infrastructure projects from the economic and financial point of view, they know different measures to calculate the return of a project in order to evaluate its worth, they know pros and cons of different ways to finance and operate infrastructure projects, solving problems based on real world case studies enhances their ability to evaluate projects themselves or to assess project proposals (e.g. feasibility studies) prepared by consultants.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 13. Inhalt:                                         | <p>A: Project Planning and Appraisal (SS)</p> <ul style="list-style-type: none"> <li>• Comprehensive introduction into planning and appraisal of infrastructure projects</li> <li>• Subject description</li> <li>• the project cycle: major aspects of the different phases</li> <li>• project planning</li> <li>• LogFrame analysis as a project planning tool</li> <li>• project appraisal (financial and economic analysis)</li> <li>• evaluation of project alternatives</li> <li>• case studies</li> </ul> <p>B: Project Financing, Implementation and Advanced Issues of Economic Analysis (WS)</p> <ul style="list-style-type: none"> <li>• Comprehensive introduction into financing, implementation, monitoring and ex-post evaluation of infrastructure projects</li> <li>• selected issues of advanced economic analysis of projects</li> <li>• Subject Description:</li> <li>• external and internal sources of financing</li> <li>• private sector participation for project financing and operation (BOT models)</li> <li>• selected issues in project implementation (implementation consultant, terms of reference, bidding procedures, contract of goods and services) project supervision, monitoring and ex-post evaluation</li> <li>• advanced issues of economic analysis of projects including case studies</li> </ul> |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>• Script,</li> <li>• Damodaran, Aswath: Corporate Finance -Theory and Practice</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 505601 Lecture A: Project Planning and Appraisal</li> <li>• 505602 Lecture B: Project Financing, Implementation and Final Evaluation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |

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| 16. Abschätzung Arbeitsaufwand: | Sum 180h Time of attendance: 56 h Private Study: 124 h Pos unit<br>presence time self study project Sum 1 Lecture A 28,0 62,0 0,0<br>90,0 2 Lecture B 28,0 62,0 0,0 90,0 Sum: 180,0 |
| 17. Prüfungsnummer/n und -name: | 50561 Project Planning and Financing (PL), Schriftlich, 120 Min.,<br>Gewichtung: 1                                                                                                  |
| 18. Grundlage für ... :         |                                                                                                                                                                                     |
| 19. Medienform:                 | Power Point Presentations, Black Board, Case Studies, Group<br>Discussions                                                                                                          |
| 20. Angeboten von:              | Wasser- und Umweltsystemmodellierung                                                                                                                                                |

## Modul: 50580 Methodological Aspects of Infrastructure Planning

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021100013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr.-Ing. Richard Junesch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 9. Dozenten:                                        | Marion Aschmann<br>Richard Junesch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                |
| 11. Empfohlene Voraussetzungen:                     | Basic notions of infrastructure planning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 12. Lernziele:                                      | <p>The students understand techniques for dealing with complex decision situations and gain insights in the decision-analysis process for both public and private decision-making with all related steps. Social aspects that may influence planning process or outcome will also be discussed. The students are acquainted with fundamental notions of demography as far as urban and regional planning is concerned. The students are able to apply basic methods of demographic analysis and forecasting.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
| 13. Inhalt:                                         | <p>The module consists of two courses: The lecture "Decision Analysis" will cover the following subjects:</p> <ul style="list-style-type: none"> <li>• Elements of Decision Problems</li> <li>• Structuring Decisions</li> <li>• Generating Objectives and Hierarchies</li> <li>• Generating Alternatives</li> <li>• Decision Making with Multiple Objectives</li> <li>• Risk and Uncertainty in Decision Situations</li> <li>• Collective Decision Making</li> <li>• Application to Infrastructure Planning</li> </ul> <p>The course Demographic Analysis and Forecasting will provide an overview of the most frequently appearing issues of demographic analysis and forecasting. It will consist of three main parts: Fundamental notions of (applied) demography and some of the methodical/conceptual problems linked with these notions. Selected fundamental approaches to analysing and forecasting natural growth (or decline) of population, will be presented and discussed critically. Examples of such analyses and forecasts will be calculated. Migration, as the most critical and most important aspect of population development under regional aspects, will constitute the main topic of the third part. Basic methods of analysing and forecasting migration will be presented and discussed with regard to their application on concrete cases.</p> |                |                |
| 14. Literatur:                                      | <p>Lecture notes, see <a href="http://www.ivr.uni-tuttgart.de/vwl/studium_und_lehre/sommer/Decision_Analysis.html">http://www.ivr.uni-tuttgart.de/vwl/studium_und_lehre/sommer/Decision_Analysis.html</a> as well as the literature listed (see website)</p> <ul style="list-style-type: none"> <li>• Rowland, Donald (2003): Demographic Methods and Concepts. Oxford, New York, Oxford University Press</li> <li>• Davis, H. Craig (1994): Demographic projection techniques for regions and smaller areas, Vancouver, University of British Columbia Press</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |

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| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"><li>• 505801 Lecture Decision Analysis</li><li>• 505802 Lecture Demographic Analysis and Forecasting</li><li>• 505803 Exercise Demographic Analysis and Forecasting</li></ul> |
| 16. Abschätzung Arbeitsaufwand:      | Time of attendance: approx. 45 hours<br>Private Study: approx.135 hours                                                                                                                                         |
| 17. Prüfungsnummer/n und -name:      | 50581 Methodological Aspects of Infrastructure Planning (PL),<br>Schriftlich, 120 Min., Gewichtung: 1                                                                                                           |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                 |
| 19. Medienform:                      | Presentations, Exercises with spreadshed calculations                                                                                                                                                           |
| 20. Angeboten von:                   | Raumentwicklungs- und Umweltplanung                                                                                                                                                                             |

## Modul: 50600 Traffic Engineering and Road Construction

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|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021320012                                                                                                                                                                                                                                                                                                                                                       | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                            | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 5                                                                                                                                                                                                                                                                                                                                                               | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Markus Friedrich                                                                                                                                                                                                                                                                                                                           |                |                |
| 9. Dozenten:                                        | Markus Friedrich<br>Jürgen Holzwarth                                                                                                                                                                                                                                                                                                                            |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 12. Lernziele:                                      | The students are familiar with basic traffic control measures for private and public transport and understand the fundamental methods for analyzing the capacity of signalized and unsignalized road intersections. They have a basic knowledge on how to design and construct urban and rural roads and know approaches for financing the road infrastructure. |                |                |
| 13. Inhalt:                                         |                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>Friedrich, M.: Traffic Engineering, Reader</li> <li>Holzwarth, J.: Road Design and Construction, Reader</li> </ul>                                                                                                                                                                                                       |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>506001 Lecture Traffic Engineering</li> <li>506002 Exercise Traffic Engineering</li> <li>506003 Lecture Road Design and Construction</li> </ul>                                                                                                                                                                          |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Attendance time lecture: 50h<br>Attendance time exercise: 14h<br>Self study time: 116h<br>Total: 180h                                                                                                                                                                                                                                                           |                |                |
| 17. Prüfungsnummer/n und -name:                     | 50601 Traffic Engineering and Road Construction (PL), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                      |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 19. Medienform:                                     |                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 20. Angeboten von:                                  | Verkehrsplanung und Verkehrsleittechnik                                                                                                                                                                                                                                                                                                                         |                |                |

## Modul: 50610 Public Transport & Railway Operation

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|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 020400734                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr.-Ing. Ullrich Martin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 9. Dozenten:                                        | Ullrich Martin<br>Martin Will                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 12. Lernziele:                                      | <p><b>Part 1:</b> To get to know the role of rail-bounded transport, the development of railway and public transport, the planning and decision-making process for infrastructure investment, basic principles of vehicle movements, and railway operation and control. In addition, students can deepen the understanding in practice from the concrete cases.</p> <p><b>Part 2:</b> The student will be acquainted with the basic knowledge of railway infrastructure and vehicles, including also the maintenance of rails, accessories and rolling stocks. They will get to know the manifoldness of construction of railways in developed and developing countries, and will be able to compare different transport systems and their variants. The advantages and the disadvantages of them will be concluded as well.</p>                                                                                                                                                                                                                      |                |                |
| 13. Inhalt:                                         | <p><b>Part 1</b> : Introduction</p> <ul style="list-style-type: none"> <li>• Historical Development of Railways</li> <li>• Public Transportation System</li> <li>• General Aspects of Safety</li> </ul> <p>Evaluation of Projects</p> <ul style="list-style-type: none"> <li>• Necessity</li> <li>• Methods</li> <li>• Example (with Exercise)</li> </ul> <p>Dynamics of Vehicle Movements</p> <ul style="list-style-type: none"> <li>• Physical Basics</li> <li>• Resistances</li> <li>• Grade-Speed Diagram</li> <li>• Running Time Calculation (with Exercise)</li> </ul> <p>Operation and Control</p> <ul style="list-style-type: none"> <li>• Interlocking Principles</li> <li>• Design of Schedules (with Exercise)</li> <li>• Capacity Research (with Exercise)</li> <li>• Traffic Control (with Exercise)</li> </ul> <p>Part 2: Infrastructure</p> <ul style="list-style-type: none"> <li>• Components of Infrastructure</li> <li>• Construction of Tracks</li> <li>• Construction of Routes</li> <li>• Construction of Facilities</li> </ul> |                |                |

- Electrification
- Infrastructure Maintenance
- Route Study (Exercise)

#### Rolling Stock

- Types of Vehicles
- Elements of Vehicles
- Arrange Trains
- Maintenance

#### Special Aspects and Comparison

- High Speed Railway Systems
- Specific of Body-Tilting Technique
- Specific of Maglev Systems
- Comparison

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| 14. Literatur:                       | <ul style="list-style-type: none"> <li>• Script of the Lecture</li> <li>• Armstrong, J. H.: Railroad - What it is, what it does</li> <li>• Bonnett, D. F.: Practical Railway Engineering</li> <li>• Eisenbahn- Bau- und Betriebsordnung (EBO) - German law</li> <li>• Elms, C. P.(ed.): Dictionary of Public Transport</li> <li>• Pacht, J.: Railway Operation and Control (Overview)</li> <li>• Pacht, J.: Glossary of Railroad Operatin and Control</li> </ul> |
| 15. Lehrveranstaltungen und -formen: | • 506101 Lecture Public Transport & Railway Operation                                                                                                                                                                                                                                                                                                                                                                                                            |
| 16. Abschätzung Arbeitsaufwand:      | Sum 180h                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 17. Prüfungsnummer/n und -name:      | 50611 Public Transport & Railway Operation (PL), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                            |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 20. Angeboten von:                   | Schienenbahnen und Öffentlicher Verkehr                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Modul: 50620 Hydraulic Structures

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| 2. Modulkürzel:                                     | 021410106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5. Moduldauer: | Zweisemestrig  |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Univ.-Prof. Dr. Silke Wieprecht                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 9. Dozenten:                                        | Silke Wieprecht<br>Daniel Stolz<br>Kristina Terheiden                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 12. Lernziele:                                      | <p><b>Advanced Studies in Hydraulic Structures:</b> The students,</p> <ul style="list-style-type: none"><li>• Know about the basic features of hydraulic structures</li><li>• have an overview what are the main components and know how to arrange them in order to ensure a satisfying operation</li><li>• are able to dimension all parts of different hydraulic structures</li><li>• are aware of implicating river works into an overall context of a fluvial system and know how to act and to evaluate in spatial and temporal interrelation</li><li>• are able to realize the economic and ecologic significance of hydraulic structures as dams, reservoirs and hydro power plants</li></ul> <p><b>Case Study in Hydraulic Structures :</b> The students,</p> <ul style="list-style-type: none"><li>• are able to use of the gained theoretical knowledge with the help of a practical example</li><li>• are aware of the technical relations and their effects on non-technical areas of interest</li><li>• can give a well-founded argumentation of chosen estimations and are able to present their own results</li><li>• can give a convincing presentation</li><li>• are able to assess objectively different planning alternatives</li></ul> |                |                |
| 13. Inhalt:                                         | <p><b>Advanced Studies in Hydraulic Structures :</b> The course deals with main structural components of hydraulic engineering schemes such as weirs, dams, hydro power plants, pipelines and ancillary works. The main features as hydraulic and structural dimensioning are treated. The application of structural power plants, reservoirs and river development works is discussed. Conventional engineering methods as well as approaches with improved environmental compatibility are taken into consideration.</p> <p><b>Case Study in Hydraulic Structures :</b> The case study uses the content of the lecture "Advanced Studies in Hydraulic Structures". In working groups of 3 to five students a real hydraulic structures will be planned and completely dimensioned. There are hydraulic calculations to be carried out as hydraulic capacity of spillway, dimensioning of stilling basin, hydrological and sedimentological calculations. As well the stabilities of the structures itself has to be checked. Additionally an analysis of the demand of potentially</p>                                                                                                                                                                    |                |                |

provided electricity, drinking water or irrigation water, resp. is required. The intermediate results will be presented by the groups. Every student has to deliver at least one presentation. Finally a poster for the final presentation and assessment has to be designed. This is the basis for the development of the assessment criteria for the different alternatives.

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| 14. Literatur:                       | Lecture notes can be downloaded from the internet. Additional detailed information for the case study will be provided during the lectures.                                                             |
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"> <li>• 506201 Lecture and Practice Advanced Studies in Hydraulic Structures</li> <li>• 506202 Lecture and Presentation Case Study in Hydraulic Structures,</li> </ul> |
| 16. Abschätzung Arbeitsaufwand:      | Sum 180h                                                                                                                                                                                                |
| 17. Prüfungsnummer/n und -name:      | 50621 Hydraulic Structures (LBP), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                  |
| 18. Grundlage für ... :              |                                                                                                                                                                                                         |
| 19. Medienform:                      |                                                                                                                                                                                                         |
| 20. Angeboten von:                   | Wasserbau und Wassermengenwirtschaft                                                                                                                                                                    |

## Modul: 50630 Tendering, Contracting and Project Management

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| 2. Modulkürzel:                                     | 240903003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr.-Ing. Gerd Maurer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 9. Dozenten:                                        | Gerd Maurer<br>Ibrahim Al-Hammad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 12. Lernziele:                                      | Basic understanding of Construction Management of Infrastructure Projects: Tendering, Cost Estimation, International Contracting, Scheduling and Project Management                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 13. Inhalt:                                         | <p>The lectures and exercises cover the following topics:<br/>Construction Management, Cost Calculation of Construction, Procedures of Cost Estimation, Tendering Procedure, International Contracts, Contractual Conditions, FIDIC Contract Conditions, Scheduling Techniques, Bar Chart, Network Planning<br/>Including exercises and an holistic case study project regarding the Tendering, Contracting and Execution process of a realistic Waste Water treatment plant.<br/>The case study will be discussed in class. Assignments regarding the case study project have to be prepared by the students and presented after submittal.</p> |                |                |
| 14. Literatur:                                      | <p>FIDIC "red book": Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer and<br/>FIDIC yellow book: Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Plant and for Building and Engineering Works Designed by the Contractor</p>                                                                                                                                                                                                                                                                                                                                  |                |                |
| 15. Lehrveranstaltungen und -formen:                | • 506301 Lecture Tendering, Contracting & Project Management                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Sum 168h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                |
| 17. Prüfungsnummer/n und -name:                     | 50631 Tendering, Contracting and Project Management (PL), Schriftlich, 120 Min., Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                |
| 19. Medienform:                                     | Powerpoint, Black Board, Computer<br>webbased databases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 20. Angeboten von:                                  | Wasser- und Umweltsystemmodellierung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |

## Modul: 50640 Ecological Design and Landscape Planning

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| 2. Modulkürzel:                                     | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6. Turnus:     | Wintersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Jan Dieterle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 9. Dozenten:                                        | Antje Stokman                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                |
| 12. Lernziele:                                      | Students understand the major challenges, objectives, strategies and instruments for planning and designing urban landscapes in Europe as well as in developing countries. Basic notions of ecological infrastructure systems and their role for the urban landscape. Innovative and interdisciplinary approaches to ecological design and landscape planning are introduced, contextualized and considered in their application through selected international best practice examples.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 13. Inhalt:                                         | This course presents the basic principles of landscape ecological theory applied to urban environments as well as the basic principles of landscape planning. The course will give an overview on actual environmental challenges related to the urban environment and explores the concepts and themes important to the contemporary practice of ecological design and planning - drawing on knowledge from the fields of ecology, engineering and landscape architecture. It will introduce different theories that try to re-center landscape planning and design around the goal of creating sustainable urban environments and cultural landscapes. Responding to contemporary urban and infrastructure development challenges, this course brings together a series of innovative concepts and theories to discuss different methods, models and measures of ecological design of combined landscape and infrastructure systems for the 21st century. |                |                |
| 14. Literatur:                                      | <ul style="list-style-type: none"> <li>• Von Seggern, H., Werner, J., Grosse-Bächle, L. 2008: Creating knowledge. Innovation strategies in designing urban landscapes. Jovis Berlin</li> <li>• Margolis, L., Alexander, R. 2007: Living Systems. Birkhäuser, Basel.</li> <li>• Rottle, N., Yocom, K. 2011: Ecological Design. Basics Landscape Architecture. Ava Acedemia, Lausanne</li> <li>• Steiner, F. R. 2008: The Living Landscape: An Ecological Approach to Land-scape Planning. Island Press, New York.</li> <li>• Waldheim, C. 2006: The Landscape Urbanism Reader. Princeton Architectural Press, New York.</li> </ul>                                                                                                                                                                                                                                                                                                                           |                |                |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 506402 Seminar Ecosystem Design and ecological engineering</li> <li>• 506401 Lecture Introduction urban ecology and design</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | Sum 180h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| 17. Prüfungsnummer/n und -name:                     | 50641 Ecological Design and Landscape Planning (LBP), Schriftlich, Gewichtung: 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                |

18. Grundlage für ... :

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19. Medienform:

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20. Angeboten von: Landschaftsplanung und Ökologie

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## Modul: 50650 Planning and Design of Water Supply Facilities

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|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 021210052                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Ralf Minke                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 9. Dozenten:                                        | Ralf Minke                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 11. Empfohlene Voraussetzungen:                     | Knowledge in Sanitary Engineering, Water Supply and Hydraulics<br>Contents of Water and Power Supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                |
| 12. Lernziele:                                      | <p>The students,</p> <ul style="list-style-type: none"> <li>• Are able to plan and design centralised water supply systems as a part of rural and urban infrastructure.</li> <li>• Are able to calculate dimensions of all elements of centralised water supply systems.</li> <li>• Are able to calculate costs of all elements of centralised water supply systems.</li> <li>• have an idea of the relations between water, politics, social changes and influences on environment and on planning process.</li> <li>• Are able to design in detail all elements of centralised water supply systems.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 13. Inhalt:                                         | <ul style="list-style-type: none"> <li>• Planning process as function of topografical, economical, social, environmental boundaries.</li> <li>• Water demand calculation: water consumption, water demand, consumer groups, losses, forecasting, design periods.</li> <li>• Water collection: Selection of source, groundwater withdrawal, springwater tapping, surface water intakes, rainwater harvesting, seawater desalination, recycling of treated sewage, drinking water protection areas, details of planning and design.</li> <li>• Water transmission and distribution: necessity, hydraulic basics, dimensioning and calculation of branched and closed loop systems, details of planning and design.</li> <li>• Pumps and pumping stations: necessity, types, hydraulics for pumping design, pumping stations and pressure boosters, details of planning and design.</li> <li>• Water storage: necessity, types and functions of tanks, water towers and reservoirs, details of planning and design.</li> <li>• Cost calculation: Cost functions for different facilities, Calculation process, calculation of water tariff.</li> </ul> |                |                |
| 14. Literatur:                                      | <p>Lecture notes can be downloaded from the internet.</p> <ul style="list-style-type: none"> <li>• Karamouz, Mohammad et al.: Urban Water Engineering and Management. Boca Raton: CRC Press, 2010. ISBN 978-1-4398-1310-2</li> <li>• Mutschmann, J, Stimmelmayer, F.: Taschenbuch der Wasserversorgung, Vieweg-Verlag</li> </ul> <p>Hints are given for additional literature from the internet as well as libraries.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |

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|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15. Lehrveranstaltungen und -formen: | <ul style="list-style-type: none"><li>• 506503 Excursions to planning area and water supply company</li><li>• 506502 Case Study Planning and design of water supply facilities</li><li>• 506501 Lecture Planning and design of water supply facilities</li></ul> |
| 16. Abschätzung Arbeitsaufwand:      | Sum180h                                                                                                                                                                                                                                                          |
| 17. Prüfungsnummer/n und -name:      | 50651 Planning and Design of Water Supply Facilities (LBP),<br>Schriftlich, Gewichtung: 1                                                                                                                                                                        |
| 18. Grundlage für ... :              |                                                                                                                                                                                                                                                                  |
| 19. Medienform:                      |                                                                                                                                                                                                                                                                  |
| 20. Angeboten von:                   | Siedlungswasserbau und Wassergütewirtschaft                                                                                                                                                                                                                      |

## Modul: 68510 Empirical Studies: Methodology and Applications

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|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| 2. Modulkürzel:                                     | 100 410 103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5. Moduldauer: | Einsemestrig   |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 6. Turnus:     | Sommersemester |
| 4. SWS:                                             | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7. Sprache:    | Englisch       |
| 8. Modulverantwortlicher:                           | Dr. Marion Aschmann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 9. Dozenten:                                        | Marion Aschmann<br>Manfred Wacker                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 12. Lernziele:                                      | <p>By means of a small project the students learn to set up, conduct and analyse the results of a survey regarding transportation behaviour.</p> <p>By this the previously gained theoretical and methodological skills are applied and implemented.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                |
| 13. Inhalt:                                         | <p>The module consists of a theoretical and a practical unit. The theoretical part provides the students with an overview regarding research design and methodology with a special focus on quantitative social science methodology (survey design). Subsequently the students are introduced to the precise topic "transportation planning" in order to derive the specific research question for the practical phase.</p> <p>During the practical phase the students set up the research design and implement it correspondingly. After the data collection phase results need to be analysed and documented.</p> <p>By means of the module students are enabled to conduct empirical research projects, especially surveys, which supports the preparation of their respective Masters theses.</p> |                |                |
| 14. Literatur:                                      | <p>Lecture slides</p> <p>Diekmann, A. (2012): Empirische Sozialforschung, 6. Aufl., Reinbek 2012</p> <p>Forschungsgesellschaft für Straßen- und Verkehrswesen: Empfehlungen für Verkehrserhebungen (EVE), FGSV-Nr. 125, Köln 2012.</p> <p>Schnell, R., Hill, P.B., Esser, E. (2013): Methoden der empirischen Sozialforschung, 10. überarb. Auflage, München 2013</p>                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                |
| 15. Lehrveranstaltungen und -formen:                | • 685101 Seminar Empirical Studies: Methodology and Applications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |
| 16. Abschätzung Arbeitsaufwand:                     | <p>Präsenzzeit: 35 Stunden</p> <p>Selbststudiumszeit: 145 Stunden</p> <p>Summe: 180 Stunden</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 17. Prüfungsnummer/n und -name:                     | <p>68511 Empirical Studies: Methodology and Applications (LBP ) (LBP), , Gewichtung: 1</p> <p>Report on concept, data collection and evaluation</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| 19. Medienform:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |

20. Angeboten von:

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## 400 German as a foreign language

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Zugeordnete Module: 19150 German as a Foreign Language

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## Modul: 19150 German as a Foreign Language

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| 2. Modulkürzel:                                     | SZ                                                                                                                                                                                                                                        | 5. Moduldauer: | Einsemestrig     |
| 3. Leistungspunkte:                                 | 6 LP                                                                                                                                                                                                                                      | 6. Turnus:     | Unregelmäßig     |
| 4. SWS:                                             | 8                                                                                                                                                                                                                                         | 7. Sprache:    | Weitere Sprachen |
| 8. Modulverantwortlicher:                           | John Nixon                                                                                                                                                                                                                                |                |                  |
| 9. Dozenten:                                        |                                                                                                                                                                                                                                           |                |                  |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                           |                |                  |
| 11. Empfohlene Voraussetzungen:                     |                                                                                                                                                                                                                                           |                |                  |
| 12. Lernziele:                                      |                                                                                                                                                                                                                                           |                |                  |
| 13. Inhalt:                                         |                                                                                                                                                                                                                                           |                |                  |
| 14. Literatur:                                      |                                                                                                                                                                                                                                           |                |                  |
| 15. Lehrveranstaltungen und -formen:                | <ul style="list-style-type: none"> <li>• 191501 Seminar German as a Foreign Language I</li> <li>• 191502 Seminar German as a Foreign Language II</li> </ul>                                                                               |                |                  |
| 16. Abschätzung Arbeitsaufwand:                     |                                                                                                                                                                                                                                           |                |                  |
| 17. Prüfungsnummer/n und -name:                     | <ul style="list-style-type: none"> <li>• 19151 German as a Foreign Language I (BSL), Schriftlich oder Mündlich, Gewichtung: 1</li> <li>• 19152 German as a Foreign Language II (BSL), Schriftlich oder Mündlich, Gewichtung: 1</li> </ul> |                |                  |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                           |                |                  |
| 19. Medienform:                                     |                                                                                                                                                                                                                                           |                |                  |
| 20. Angeboten von:                                  | Sprachenzentrum                                                                                                                                                                                                                           |                |                  |

## 401 Deutschkenntnisse ausreichend

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## Modul: 81000 Master's Thesis Infrastructure Planning

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| 2. Modulkürzel:                                     | 240903001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5. Moduldauer: | Einsemestrig                      |
| 3. Leistungspunkte:                                 | 30 LP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6. Turnus:     | Wintersemester/<br>Sommersemester |
| 4. SWS:                                             | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7. Sprache:    | Englisch                          |
| 8. Modulverantwortlicher:                           | Elke Schneider                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                                   |
| 9. Dozenten:                                        | Depending on the topic. The first examiner has to be a full professor of the University of Stuttgart or a member of the senior academic staff who is an authorized examiner according to the legal statutes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                                   |
| 10. Zuordnung zum Curriculum in diesem Studiengang: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                                   |
| 11. Empfohlene Voraussetzungen:                     | The topic of the Master Thesis can be handed out only the moment at least 72 credit points have been acquired already by the candidate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                                   |
| 12. Lernziele:                                      | The candidate shall be capable of dealing with a problem from the context of infrastructure planning within a given time frame on the basis of scientific methods, He/she should also be able to present the results in an appropriate form both in writing and orally. The candidate should be capable of developing a suitable concept for the thesis including the selection of appropriate scientific methods as well as a realistic project schedule for the treatment of the selected topic. Effective scientific work shall be implemented throughout the thesis working period, the candidate shall learn how to discuss a scientific topic in the field of infrastructure planning by discussing his topic with two different academic supervisors. |                |                                   |
| 13. Inhalt:                                         | The candidate shall be capable of dealing with a problem from the context of infrastructure planning within a given time frame on the basis of scientific methods, He/she should also be able to present the results in an appropriate form both in writing and orally. The candidate should be capable of developing a suitable concept for the thesis including the selection of appropriate scientific methods as well as a realistic project schedule for the treatment of the selected topic. Effective scientific work shall be implemented throughout the thesis working period, the candidate shall learn how to discuss a scientific topic in the field of infrastructure planning by discussing his topic with two different academic supervisors. |                |                                   |
| 14. Literatur:                                      | Recent literature on the topic of the scientific problem, project reports, interviews with representatives of institutions concerned with a project, data available or collected throughout the Master's thesis working period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                                   |
| 15. Lehrveranstaltungen und -formen:                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                                   |
| 16. Abschätzung Arbeitsaufwand:                     | The candidate should work independently on the selected topic and should take appointments with the examiner for academic discussions on the topic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                                   |
| 17. Prüfungsnummer/n und -name:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                                   |
| 18. Grundlage für ... :                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                                   |

19. Medienform:

20. Angeboten von:

Wasser- und Umweltsystemmodellierung

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