# Protection and Use of Riverine Systems

**Relevance for ResEngin curriculum**
- compulsory

**Administration**
- ResEngin Office
- res.eng@bgu.uka.de

**Validity**
- from Oct 01, 2010
- [Status: 15.03.11]

## Term(s) offered
- 2nd term (Summer term Apr-Sep)

## Duration | Cycle
- 1 term; every other year

## Language of instruction
- English

## Prerequisites
- Bachelor

## Module coordinator
- KÄMPF, Dr.rer.nat. Charlotte; IWG-WK

## Learning outcomes
- Description [see p. 2.]
- Reference list [see p. 3.]

## Basis for module(s)
- M 7 Integrated Projects
- M MSc Masterarbeit

## Intersection with module(s)
- M2 Waste & Waste Water Technologies
- MT1c Numerical Water Management Planning Tools

### Lecture courses

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Credits</th>
<th>Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>19627</td>
<td>Ecology (ecosystems dev, methodology) (lecture, excursion)</td>
<td>3.0 CP</td>
<td>2 WCH</td>
</tr>
<tr>
<td>19628</td>
<td>Integrated Water Management (lecture)</td>
<td>3.0 CP</td>
<td>2 WCH</td>
</tr>
<tr>
<td>19629</td>
<td>Urban Water Supply &amp; Sanitation Systems (lecture, excursion)</td>
<td>3.0 CP</td>
<td>2 WCH</td>
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</table>

**SUM**
- 9.0 CP
- 6 WCH

## Workload specification

- (30 work hours → 1 CP acc. to ECTS)
- **Lecture Phase:** Contact hours 63 h
  Self instruction hours 126 h
- **Exam Phase:** Self instruction hours 81 h

## Module examination(s)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Scope</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>&quot;Aquatic Ecosystems&quot; report</td>
<td>2.500 words</td>
<td>6.0/9.0 CP</td>
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<tr>
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<td>60 min</td>
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## Lecturers

- FUCHS, Dr.-Ing. Stephan; IWG-SWW
- KÄMPF, Dr.rer.nat. Charlotte; IWG-WK
- LEHMANN, Dr.-Ing. Boris; IWG-WK

## Individual lecture courses

- Descriptions + Recommended background knowledge [see pp. 4.]

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Module 5: “Protection and Use of Riverine Systems” (cont.)

Module topic

Ecology as interdisciplinary pivotal disciplinary field among natural sciences and engineering disciplines for the description and management of natural and human-made ecosystems; e.g., unit processes used in different configurations for several water treatment purposes. For problem solving in the field of water resources engineers need to adapt measures to geographic, social, political frame conditions.

Learning outcomes

Disciplinary knowledge

- **concepts, theories & definitions**
  Aut-/synecology, nutrient types, nutrient cycles, niche/habitat/biotope/zonobiom; biosystems, hierarchical community organization, system theory, autoregulation, feed-back systems, ecosystem types, bioindicators, key species, carrying capacity.
  Typology of water resources (lakes, rivers, coastal waters); system theory, planning theories, legal framework for water resources use (local, regional, supranational); ecosystem services.
  Origin, characteristics and quality standards of urban water (potable, waste and storm water).

- **subject matter (factual data, examples)**
  Physicochemical characteristics of the abiotic environment; structure and dynamics of ecosystems with a focus on aquatic ecosystems.
  Water resources and water resources management in various climatic zones; use of aquatic ecosystems, emphasizing managed wetlands, high dams, flood control vs. flood protection measures, and (e.g., Aral Sea, Everglades, Elbe).
  Public water quality standards set by different institutions; sources for drinking water, quality requirements and demand for potable water; water distribution and collection systems; water treatment systems.

- **methods & procedures**
  Applied ecology, management concepts in view of sustainability such as; transfer of natural processes into controlled technical systems, assessment methods.
  Flood protection measures, assessment methods, adaptive management, transfer of principles to complex individual river units, restoration measures.
  Working principles of water treatment (requirements, physical processes, chemical processes); wastewater treatment strategies; storm water collection and treatment, urban water management.

Professional skills

- To analyze and solve land and water resources management problems from an ecological perspective; i.e. considering relationships in complex systems. To communicate effectively as engineers with experts of other disciplines on ecosystem interactions and functions in oral and written mode.

- To gain expertise in data analysis for a specific development project; making suggestions / recommendations for optimization. To manage aquatic ecosystems management of river basins in context of urbanization and drought.


Personal competence

- Bringing together two strands of knowledge: biology & water resources engineering.
- Writing and speaking on the course subject to various audiences (subject matter experts, governmental officials, the public).
- Written and verbal skills in waste water treatment processes.
Module 5: “Protection and Use of Riverine Systems” (cont.)

**Literature/ Course material**


Module 5
Protection and Use of Riverine Systems

Course

Ecology
(ecosystems development, methodology)

<table>
<thead>
<tr>
<th>KIT Lecture ID</th>
<th>19627</th>
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</thead>
<tbody>
<tr>
<td>Relevance</td>
<td>compulsory</td>
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<tr>
<td>Prerequisites</td>
<td>Bachelor</td>
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<tr>
<td>Term(s)</td>
<td>2nd term (summer)</td>
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<td>Language</td>
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<tr>
<td>Training mode</td>
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</table>

**Workload specification**

| LECTURE PHASE | Contact (based on 2 WCH) | 21.0 h |
| Self instruction | 42.0 h |
| EXAM PHASE | Self instruction | 27.0 h |

**Contact**
charlotte.kaempf@kit.edu

**Lecturer(s)**
FUCHS, Dr.-Ing. Stephan; IWG-SWW
KÄMPF, Dr.rer.nat. Charlotte; IWG-WK

**Course topic**
Ecology as interdisciplinary pivotal disciplinary field among natural sciences and engineering disciplines for the description and management of ecosystems.

**Recommended background knowledge**
biology (various metabolic types), chemistry (nutrients in gaseous and aqueous phase).

**Learning outcomes**

**Disciplinary knowledge**
- concepts, theories & definitions
  aut-/syneocology, nutrient types, nutrient cycles, niche/habitat/biotope/zenobiom; bisystems, hierarchical community organization, system theory, autoregulation, feedback systems, ecosystem types, bioindicators, key species, carrying capacity.
- subject matter (factual data, examples)
  physicochemical characteristics of the abiotic environment; structure and dynamics of ecosystems with a focus on aquatic ecosystems.
- methods & procedures
  applied ecology, management concepts in view of sustainability such as; transfer of natural processes into controlled technical systems, assessment methods.

**Professional skills**
To analyze and solve land and water resources management problems from an ecological perspective; i.e. considering relationships in complex systems.
To communicate effectively as engineers with experts of other disciplines on ecosystem interactions and functions in oral and written mode.

**Personal competence**
Bringing together two strands of knowledge: biology & water resources engineering.

**Assessment specification**
written ---
oral ---
other report (2.500 words) = partial module exam “Aquatic ecosystems” together with LV Integrated Water Management

* WCH = Weekly Contact Hours
Module 5

Protection and Use of Riverine Systems

Course

Integrated Water Management

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<td>3 CP ⇒ 90.0 h</td>
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<td><strong>EXAM PHASE</strong></td>
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<tbody>
<tr>
<td><a href="mailto:charlotte.kaempf@kit.edu">charlotte.kaempf@kit.edu</a></td>
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</table>

Lecturer(s)

KÄMPF, Dr.rer.nat. Charlotte; IWG-WK,
LEHMANN, Dr.-Ing. Boris; IWG-WK

Course topic

Problem solving in the field of water resources, need for the adaptation of measures to geographic, social, political frame conditions.

Recommended background knowledge

river hydraulics, river morphology.

Learning outcomes

**Disciplinary knowledge**

- **concepts, theories & definitions**
  - typology of water resources (lakes, rivers, coastal waters); system theory, planning theories, legal framework for water resources use (local, regional, supranational) ecosystem services.
- **subject matter (factual data, examples)**
  - water resources and water resources management in various climatic zones; use of aquatic ecosystems, emphasizing managed wetlands, high dams, flood control vs. flood protection measures, and (e.g., Aral Sea, Everglades, Elbe).
- **methods & procedures**
  - flood protection measures, assessment methods, adaptive management, transfer of principles to complex individual river units, restoration measures.

**Professional skills**

To gain expertise in data analysis for a specific development project; making suggestions / recommendations for optimization. To manage aquatic ecosystems management of river basins in context of urbanization and drought.

**Personal competence**

Writing and speaking on the course subject to various audiences (subject matter experts, governmental officials, the public).

Assessment specification

written ---
oral ---
other report (2,500 words) = partial module exam "Aquatic ecosystems" together with LV Ecology

* WCH = Weekly Contact Hours
Module 5

Protection and Use of Riverine Systems

Course

Urban Water Supply & Sanitation Systems

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<td>English</td>
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<tr>
<td>Training mode</td>
<td>Lecture, 2 WCH *</td>
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**Workload specification**

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<tr>
<td>Contact (based on 2 WCH)</td>
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<tr>
<td>Self instruction</td>
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</table>

**Contact**

stephan.fuchs@kit.edu

Lecturer(s)

FUCHS, Dr.-Ing. Stephan; IWG-SWW

Course topic

Unit processes used in different configurations for several water treatment purposes. The course provides solid information about the dependency of water supply and waste water management, which both are prerequisites for a secure and healthy development of developing countries.

Recommended background knowledge
soil science and biology of plants.

Learning outcomes

**Disciplinary knowledge**
- **concepts, theories & definition**
  origin, characteristics and quality standards of urban water (potable, waste and storm water).
- **subject matter (factual data, examples)**
  public water quality standards set by different institutions; sources for drinking water, quality requirements and demand for potable water; water distribution and collection systems; water treatment systems.
- **methods & procedures**
  working principles of water treatment (requirements, physical processes, chemical processes); wastewater treatment strategies; storm water collection and treatment, urban water management.

**Professional skills**

**Personal competence**
Written and verbal skills in waste water treatment processes.

**Assessment specification**

written 60 min = partial module exam "Urban Water Engineering"
oral ---
other ---

* WCH = Weekly Contact Hours
## Infrastructure Engineering and Management

### RESE M 6

<table>
<thead>
<tr>
<th>Relevance for ResEngin curriculum</th>
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### Term(s) offered

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<td>1 term; every other year</td>
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### Language of instruction

English

### Prerequisites

Bachelor

### Module coordinator

Roos, Dr.-Ing. Dr.h.c. (Sofia) Ralf, Ord., ISE [Modulverantwortlicher]

### Learning outcomes

Description see p. 2.

### Literature / Course materials

Reference list see p. 3.

### Basis for module(s)

M 7 Integrated Projects
M MSc Masterarbeit

### Intersection with module(s)

n.a.

### Lecture courses (training mode)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Weekly Contact Hours</th>
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<tr>
<td>19630</td>
<td>Construction Management (lecture)</td>
<td>1.5 CP</td>
<td>1 WCH</td>
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<tr>
<td>19631</td>
<td>Facility Management (lecture)</td>
<td>1.5 CP</td>
<td>1 WCH</td>
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<tr>
<td>19623</td>
<td>Road Infrastructure Management (lecture, excursion)</td>
<td>3.0 CP</td>
<td>2 WCH</td>
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**SUM** 6.0 CP 4 WCH

### Workload specification

(30 work hours → 1 CP acc. to ECTS)

<table>
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<tr>
<th>Phase</th>
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### Module examination(s)

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<td></td>
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### Lecturers (in alphabetic order)

- BAHR, Dr.-Ing. Carolin; TMB
- HESS, Dr.-Ing. Rainer; Durth Roos Consulting GmbH
- LENNERTS, Dr.-Ing. Kunibert, Univ.-Prof.; TMB
- ROOS, Dr.-Ing. Dr.h.c. (Sofia) Ralf, Ord.; ISE

### Individual lecture courses

Descriptions + Recommended background knowledge see pp. 4.
Module 6: “Infrastructure Engineering and Management” (cont.)

Module topic

Various roles of stakeholders in the field of Facility Management, holistic thinking over complete building life cycle. Those who provide road infrastructures will need to consider life cycle aspects and long-term management.

Learning outcomes

Disciplinary knowledge

- **concepts, theories & definitions**
  Management and project management, risk in management projects, relations between cost, time and quality.
  Technical, infrastructural and commercial principles of Facility Management; Public Private Partnership (PPP).
  Permission and design process for road infrastructures, vehicle road interaction and consequences for the structural design, quality assurance.

- **subject matter (factual data, examples)**
  Project management in civil construction.
  International definitions of FM, FM Associations, regulations and guidelines of FM; technical Facility Management; benchmarking in real estate management; contracting; sustainability in Real Estate Management.
  Planning, geometric design, structural design and construction of road infrastructures with special attention to recycled materials.

- **methods & procedures**
  Project phases, project organization; cost management, quality management.
  Economic comparison, different management methods, company organizations, strategic Facility Management—a management discipline for building-related secondary processes that supports all primary processes—the real estate life cycle incl. lifecycle costs of a building (office, hospital, school etc.).
  Institutional organization and implementation of road maintenance and pavement management systems including infrastructure assessment.

Professional skills

- To gain expertise in analytic project thinking.
- To gain expertise in analyzing processes and optimizing strategies for various secondary processes, as well as in cost minimization and reduction of resource consumption.
- To analyze complex interrelationships and life cycle approach for the management of road infrastructures. To gain advanced expertise in road construction and technical infrastructure assessment combined with competence in infrastructure management. To handle the life cycle of road infrastructures.

Personal competence

- Collaborative engineering. To get ready for work in interdisciplinary teams. Time management.
Module 6: “Infrastructure Engineering and Management” (cont.)

Literature/ Course material


Richtlinien für die Standardisierung des Oberbaus von Verkehrsflächen (RStO 2001)
Forschungsgesellschaft für Straßen- und Verkehrswesen (FGSV) Nr. 499
FGSV-Verlag

Richtlinien für die Anlage von Stadtstraßen (RASt 2006)
Forschungsgesellschaft für Straßen- und Verkehrswesen (FGSV) Nr. 200
FGSV-Verlag, ISBN 978-3-939715-21-4

Richtlinien für integrierte Netzgestaltung (RIN 2008)
Forschungsgesellschaft für Straßen- und Verkehrswesen (FGSV) Nr. 121

Richtlinien für die Anlage von Autobahnen (RAA 2008)
Forschungsgesellschaft für Straßen- und Verkehrswesen (FGSV) Nr. 202
FGSV-Verlag, ISBN 978-3-939715-51-1


## Module 6

### Course

**Construction Management**

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<tbody>
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<td>Bachelor</td>
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<th>Training mode</th>
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<tr>
<td>English</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.5 CP</td>
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### Workload specification

**LECTURE PHASE**
- Contact (based on 1 WCH) 10.5 h
- Self instruction 21.0 h

**EXAM PHASE**
- Self instruction 13.5 h

### Contact

xxxx

<table>
<thead>
<tr>
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<th>Course topic</th>
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<tr>
<td>N.N.; TMB</td>
<td>Learning about a time- and cost-efficient use of resources in projects.</td>
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</table>

**Recommended background knowledge**

n.a.

### Learning outcomes

#### Disciplinary knowledge

- **concepts, theories & definitions**
  - management and project management, risk in management projects, relations between cost, time and quality.
- **subject matter (factual data, examples)**
  - project management in civil construction.
- **methods & procedures**
  - project phases, project organization; cost management, quality management.

#### Professional skills

- To gain expertise in analytic project thinking.

#### Personal competence

- Collaborative engineering. To get ready for work in interdisciplinary teams. Time management.

### Assessment specification

- **written** 120 min = module exam “Infrastructure Engineering & Mgmt.” together with LV Road Infrastructure Mgmt & LV Facility Mgmt.
- **oral** ---
- **other** ---

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*WCH = Weekly Contact Hours*
**Course Topic**

Different roles of stakeholders in the area of Facility Management, holistic thinking over complete building life cycle.

**Recommended background knowledge**

Fundamentals of facility management.

**Disciplinary knowledge**

- **concepts, theories & definitions**
  technical, infrastructural and commercial principles of Facility Management; Public Private Partnership (PPP),

- **subject matter (factual data, examples)**
  international definitions of FM, FM Associations, regulations and guidelines of FM; technical Facility Management; benchmarking in real estate management; contracting; sustainability in Real Estate Management.

- **methods & procedures**
  economic comparison, different management methods, company organizations, strategic Facility Management—a management discipline for building-related secondary processes that supports all primary processes—the real estate life cycle incl. lifecycle costs of a building (office, hospital, school etc.).

**Professional skills**

To gain expertise in analyzing processes and optimizing strategies for various secondary processes, as well as in cost minimization and reduction of resource consumption.

**Personal competence**

n.a.

**Assessment specification**

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<thead>
<tr>
<th>Type</th>
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<tbody>
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<tr>
<td>other</td>
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= module exam “Infrastructure Engineering & Mgmt.” together with LV Road Infrastr. Mgmt & LV Construction Mgmt

* WCH = Weekly Contact Hours
# Module 6

## Course

**Infrastructure Engineering and Management**

### Road Infrastructure Management

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<td><strong>Training mode</strong></td>
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<td><strong>Workload</strong></td>
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<thead>
<tr>
<th><strong>LECTURE PHASE</strong></th>
<th><strong>EXAM PHASE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact (based on 2 WCH)</td>
<td>Self-instruction</td>
</tr>
<tr>
<td>21.0 h</td>
<td>42.0 h</td>
</tr>
<tr>
<td>Self-instruction</td>
<td>27.0 h</td>
</tr>
</tbody>
</table>

**Workload**
- **LECTURE PHASE**: Contact based on 2 WCH
- **EXAM PHASE**: Self-instruction

**Contact**
matthias.zimmermann@kit.edu

### Lecturer(s)
Roos, Dr.-Ing. Dr.h.c. (Sofia) Ralf, Ord.; ISE
Hess, Dr.-Ing. Rainer; Durth Roos Consulting GmbH

### Course topic
Life cycle aspects and management needs in providing road infrastructures.

### Recommended background knowledge
- Fundamentals of applied mathematics, mechanics, economics.

### Learning outcomes

#### Disciplinary knowledge
- **concepts, theories & definitions**
  - permission and design process for road infrastructures, vehicle road interaction and consequences for the structural design, quality assurance.
- **subject matter (factual data, examples)**
  - planning, geometric design, structural design and construction of road infrastructures with special attention to recycled materials.
- **methods & procedures**
  - institutional organization and implementation of road maintenance and pavement management systems including infrastructure assessment.

#### Professional skills
To analyse complex interrelationships and life cycle approach for the management of road infrastructures. To gain advanced expertise in road construction and technical infrastructure assessment combined with competence in infrastructure management. To handle the life cycle of road infrastructures.

### Personal competence
n.a.

### Assessment specification
- **written**: 120 min = module exam “Infrastructure Engineering & Mgmt.” together with LV Construction Mgmt. & LV Facility Mgmt.
- **oral**: ---
- **other**: ---

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* WCH = Weekly Contact Hours
# Integrated Projects

**RESE M 7**

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<th>Administration</th>
<th>Contact</th>
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<tr>
<td></td>
<td></td>
<td>ResEngin Office</td>
<td><a href="mailto:res.eng@bgu.uka.de">res.eng@bgu.uka.de</a></td>
</tr>
</tbody>
</table>

**Term(s) offered**

3rd term (Winter term Oct-Mar)

**Duration | Cycle**

1 term; every other year

**Language of instruction**

English / German

**Prerequisites**

Bachelor

**Module coordinator**

Fuchs, Dr.-Ing. Stephan; IWG-SWW [Modulverantwortlicher]

**Learning outcomes**

Description see p. 2.

**Literature / Course materials**

Reference list see p. 3.

**Basis for module(s)**

M MSc Masterarbeit

**Intersection with module(s)**

M 5 Protection & Use of Riverine Systems

M T1c Numerical Water Mgmt. Tools; M T3c Road Construction Mgmt.

## Lecture courses

(Training mode)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>19610</td>
<td>Socio-Economic Aspects of Dev. Planning</td>
<td>3.0 CP</td>
<td>2 WCH</td>
</tr>
<tr>
<td></td>
<td>(lecture, excursion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19621</td>
<td>Assessment of Development Planning</td>
<td>3.0 CP</td>
<td>2 WCH</td>
</tr>
<tr>
<td></td>
<td>(lecture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>196xx</td>
<td>Project Planning</td>
<td>3.0 CP</td>
<td>2 WCH</td>
</tr>
<tr>
<td></td>
<td>(seminar, excursion, limited seats)</td>
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</table>

SUM 9.0 CP 6 WCH

**Workload specification**

(30 work hours → 1 CP acc. to ECTS) 9 x 30 h 270 h

**Lecture Phase:**

Contact hours 63 h

Self instruction hours 84 h

Team work 49 h

**Exam Phase:**

Self instruction hours 54 h

Group report 20 h

**Module examination(s)**

(mode | scope | weighting)

“Socio-Economic Aspects of Dev. Planning”

written | 60 min | 3.0/9.0 CP

“Planning of Development Projects”

report | 2.500 words | 6.0/9.0 CP

**Lecturers**

(in alphabetic order)

- Breitschopf, Dr.sc.agr. Barbara; FhG ISI
- Fuchs, Dr.-Ing. Stephan; IWG-SWW
- Kämpf, Dr.rer.nat. Charlotte; IWG-WK
- Ostertag, Dr.rer.pol. Katrin; FhG ISI
- Walz, PD Dr.rer.pol. Rainer; FhG ISI

**Individual lecture courses**

Descriptions + Recommended background knowledge see pp. 4.
Module 7: “Integrated Projects” (cont.)

Module topic

Strategic tools that help structuring the process of development planning and help assessing the socio-economic impact of development planning. Differences in project assessment depend on the respective policy frame work (EU vs. U.S.A, developing countries vs. transition countries). The complexity of planning processes intersecting societal domains of policy makers, engineers, planners, and local stakeholders.

Learning outcomes

Disciplinary knowledge

- **concepts, theories & definitions**
  Economic concepts and assessment: utility and costs, determination of values and opportunity costs of action, coordination principles of (economic) actions.
  Environmental management in general (introductory historical overview); from nature preservation to strategic environmental assessment and social impact assessment, decision theory (cultural/ bounded rationality, dilemma situations).
  Planning processes for sustainable development (context: local, regional frame conditions), interdisciplinary approach, transdisciplinary approach.

- **subject matter (factual data, examples)**
  Path dependency and structural change for economic development, technology development and diffusion, absorptive capacity of technologies in developing countries; economic aspects of natural resources use: natural resources as an economic good; depletion, carrying capacity and external effects as economic characteristics of natural resources.
  Governmental framework: laws, policies and institutional arrangements; public participation.
  Guidelines, laws and policies of site development and environment protection.

- **methods & procedures**
  Strategic planning tools: procedure and stages of development planning, indicator systems, valuation of external costs, cost-benefit analysis, scenario analysis of natural resource use.
  Impact assessment techniques: matrices, GIS-supported approaches, multi-criteria-decision methods; EIA project management: compensation, mitigation, monitoring, auditing.
  Real and specific planning assignment; to identify the given problems and conflicts and to develop an approach to an integrated solution; Gantt charts.

Professional skills

- To apply economic concepts relevant for development planning and natural resource use: economic principles of development planning, investment criteria, cost-benefit analysis.
- To handle legal regulations for the anticipated impact of development concepts and the environment (ecosystems, socio-economic domain, and public sphere) on the national and supranational level.
- To identify resulting problems, point out appropriate solutions. To evaluate co-operatively planning alternatives and to define an integrated solution to the given task. To handle the interrelation between a project’s objective and potential solutions whose impact may extend far beyond the delineation of the (original) planning area.

Personal competence

- To contribute to decision making steps with excellent communication skills among involved parties. To contribute as professionals to the realization of national and supranational development goals through EIA processes.
- To organize an interdisciplinary team, time management for teams, evaluation of various solution approaches. Documentation of planning variants in maps and reports, presentation at different stages of the work process.
Module 7: “Integrated Projects” (cont.)

Literature/ Course material


Lecture notes

1. “Assessment of Development Planning” updated script on relevant illustrations, web information, online glossaries.
2. “Project Planning”: The students will design a plan for a new development area (residential or commercial area). They take into account all disciplinary knowledge acquired during the 1st and 2nd semester. The students will be handed primary field data, which they will need for the engineering design, but not any specific secondary information.
### Course

**Course Topic**

**Socio-Economic Aspects of Development Planning**

<table>
<thead>
<tr>
<th>KIT Lecture ID</th>
<th>Relevance</th>
<th>Prerequisites</th>
<th>Term(s)</th>
<th>Language</th>
<th>Training mode</th>
<th>Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>19610</td>
<td>compulsory</td>
<td>Bachelor</td>
<td>3rd term (winter)</td>
<td>English</td>
<td>Lecture, 2 WCH *</td>
<td>3.0 CP ⇒ 90.0 h</td>
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</table>

**Workload specification**

**LECTURE PHASE**
- Contact (based on 2 WCH) 21.0 h
- Self instruction 42.0 h

**EXAM PHASE**
- Self-instruction 27.0 h

**Contact**

rainer.walz@isi.fraunhofer.de

**Lecturer(s)**

BREITSCHOPF, Dr.sc.agr. Barbara; FhG ISI, OSTERTAG, Dr.rer.pol. Katrin; FhG ISI
WALZ, PD Dr.rer.pol. Rainer; FhG ISI

**Course Topic**

Strategic tools that help structuring the process of development planning and help assessing the socio-economic impact of development planning. Understanding of social, financial, institutional, organisational and economic aspects of development and the interferences, analysing impacts on other sectors and fields as well as costs and benefits of projects, elaborating country/project specific guidelines for development planning.

**Recommended background knowledge**

n.a.

**Learning outcomes**

**Disciplinary knowledge**

- **concepts, theories & definitions**
  - economic concepts and assessment: utility and costs, determination of values and opportunity costs of action, coordination principles of (economic) actions.
- **subject matter (factual data, examples)**
  - path dependency and structural change for economic development, technology development and diffusion, absorptive capacity of technologies in developing countries; economic aspects of natural resources use: natural resources as an economic good; depletion, carrying capacity and external effects as economic characteristics of natural resources.
- **methods & procedures**
  - strategic planning tools: procedure and stages of development planning, indicator systems, valuation of external costs, cost-benefit analysis, scenario analysis of natural resource use.

**Professional skills**

To learn about. To apply economic concepts relevant for development planning and natural resource use: economic principles of development planning, investment criteria, cost-benefit analysis.

**Personal competence**

n.a.

**Assessment specification**

written 60 min = partial module exam “Socio-Econ. Aspects of Dev. Planning”
oral ---
other ---

* WCH = Weekly Contact Hours
Module 7

Course

Assessment of Development Planning (EIA, SEA, TA)

<table>
<thead>
<tr>
<th>KIT lecture ID</th>
<th>19621</th>
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<tbody>
<tr>
<td>Relevance</td>
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<td>Term(s)</td>
<td>3rd term (winter)</td>
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<td>Language</td>
<td>English</td>
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<tr>
<td>Training mode</td>
<td>Lecture, 2 WCH *</td>
</tr>
<tr>
<td>Workload</td>
<td>3.0 CP ⇒ 90.0 h</td>
</tr>
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</table>

**Lecturer(s)**

KÄMPF, Dr.rer.nat. Charlotte; IWG-WK

**Course topic**

Differences in project assessment depending on policy framework (EU vs. U.S.A, developing countries vs. transition countries).

Recommended background knowledge planning procedures.

**Learning outcomes**

**Disciplinary knowledge**

- **concepts, theories & definitions**
  environmental management in general (introductory historical overview); from nature preservation to strategic environmental assessment and social impact assessment, decision theory (cultural/ bounded rationality, dilemma situations).

- **subject matter (factual data, examples)**
  governmental framework: laws, policies and institutional arrangements; public participation.

- **methods & procedures**
  impact assessment: matrices, GIS-supported approaches, multi-criteria-decision methods; EIA project management: compensation, mitigation, monitoring, auditing.

**Professional skills**

To handle legal regulations for the anticipated impact of development concepts and the environment (ecosystems, socio-economic domain, and public sphere) on the national and supranational level.

**Personal competence**

To contribute to decision making steps with excellent communication skills among involved parties. To contribute as professionals to the realization of national and supranational development goals through EIA processes.

**Assessment specification**

written ---
oral ---
other report+ pres. = partial module exam "Planning of Dev. Cooperation" (2.500 words) together with LV Project Planning

* WCH = Weekly Contact Hours
Module 7

Integrated Projects

Course

Project Planning

<table>
<thead>
<tr>
<th>KIT lecture ID</th>
<th>196XX</th>
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<tbody>
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<tr>
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<td>3rd term (winter)</td>
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<td>English / German</td>
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<tr>
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<td>Workload</td>
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**Workload specification**

<table>
<thead>
<tr>
<th>LECTURE PHASE</th>
<th>Team work</th>
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<tr>
<td>Contact (based on 2 WCH)</td>
<td>21.0 h</td>
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<tr>
<td>Team work</td>
<td>49.0 h</td>
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<table>
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<tbody>
<tr>
<td>Group report</td>
<td>20.0 h</td>
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</table>

**Contact**

stephan.fuchs@kit.edu

**Lecturer(s)**

FUCHS, Dr.-Ing. Stephan; IWG-SWW

**Course topic**

The complexity of planning processes interweaving policy makers, engineers, planners, and local stakeholders.

**Recommended background knowledge**

Fundamentals of applied mathematics, mechanics, economics.

**Learning outcomes**

**Disciplinary knowledge**

- **concepts, theories & definitions**
  planning processes for sustainable development (context: local, regional frame conditions), interdisciplinary approach, transdisciplinary approach.

- **subject matter (factual data, examples)**
  guidelines, laws and policies of site development and environment protection.

- **methods & procedures**
  real and specific planning assignment; to identify the given problems and conflicts and to develop an approach to an integrated solution; Gantt charts.

- **critical awareness of**

**Professional skills**

To identify resulting problems, point out appropriate solutions. To evaluate cooperatively planning alternatives and to define an integrated solution to the given task. To handle the interrelation between a project’s objective and potential solutions whose impact may extend far beyond the delineation of the (original) planning area.

**Personal competence**

To organize an interdisciplinary team, time management for teams, evaluation of various solution approaches. Documentation of planning variants in maps and reports, presentation at different stages of the work process.

**Assessment specification**

- written ---
- oral ---
- report+ pres. = partial module exam "Planning of Dev. Cooperation" (2.500 words) together with LV Assessment of Dev. Planning

* WCH = Weekly Contact Hours