# Gewässergüte
(Fresh Water Quality Assessment)

**Relevance for ResEngin curriculum**
Compulsory elective

**Administration**
Inst. f. Wasser & Gew. entw.
Siedlungswasserkforschung

**Contact**
stephan.fuchs@kit.edu

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**Term(s) offered**
2nd (Summer Apr–Sept) + 3rd (Winter Oct–Mar)

**Duration | Cycle**
2 terms; every year

**Language of instruction**
German

**Prerequisites**
Bachelor, German language proficiency at DSH level

**Module coordinator**
Fuchs, Dr.-Ing. Stephan; IWG-SWW

**Learning outcomes**
Description see p. 2.

**Literature / Course materials**
Reference list see p. 3.

**Basis for module(s)**
Not applicable

**Intersection with module(s)**

- M 2 Waste and Waste Water Technologies
- M 5 Protection and Use of Riverine Systems
- M 7 Integrated Projects

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**Lecture courses**
(training mode)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gewässerökologisches Praktikum (labcourse, excursion)</td>
<td>2.0 CP</td>
<td>1 week</td>
</tr>
<tr>
<td>Stoffstromanalysen / Wassergüte (lecture)</td>
<td>3.0 CP</td>
<td>2 WCH</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td><strong>5.0 CP</strong></td>
<td><strong>2 WCH + 1 week</strong></td>
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**Workload specification**
(30 work hours → 1 CP acc. to ECTS)

- **Lecture Phase:**
  - Contact hours: 31.5 h
  - Self instruction hours: 42.0 h
  - Excursion: 24.0 h
  - Exam Preparation: 20.0 h

- **Exam Phase:**
  - Self instruction hours: 32.0 h

**Module examination(s)**
(mode | scope | weighting)

- “Gewässerökologisches Praktikum”
  - Report | 2,000 words | 2.0/5.0 CP

- “Gewässergüte”
  - Oral | 30 min | 3.0/5.0 CP

**Lecturers**
(in alphabetic order)

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

**Individual lecture courses**
Descriptions + Recommended background knowledge see pp. 4.
Module T2c: “Fresh Water Quality Assessment” (cont.)

Module topic

Complexity of interactions between abiotic and biotic components of aquatic ecosystems and their relevance for technical systems; relevant causal mechanism operating and controlling aquatic ecosystems.

Learning outcomes

**Disciplinary knowledge**
- **concepts, theories & definitions**
  Functional relation in aquatic ecosystems, food and energy web, river continuum concept, sprobic index.
  Natural and anthropogenic water; nutrient and pollutant cycles; river basin, water body, EU-Water Framework Directive.
- **subject matter (factual data, examples)**
  Longitudinal profile of rivers, daily variation of physico/chemical parameters, oxygen balance of the flowing and stagnat waters, interaction of sediments and water, interstitial chemistry in sediment profiles, assessment of water quality of the river Neckar and its affluents.
  Balance of nutrient and pollutrant input into European river basins; nutrient and pollutant loads in European rivers.
- **methods & procedures**
  Water and sediment sampling, chemical analysis, biological assessment.
  Methodology for the assessment of emissions related to different kind and intensity of land use (urbanization, agricultural and industrial production); data collection and analysis and aggregation; data acquisition; monitoring stategies; instruments of material flux analysis.

**Professional skills**
- Application of water and sediment sampling, chemical analysis, biological assessment.
- System thinking, decision making, problem identification and problem solving.

**Personal competence**
- Field methods.
Module T2c: “Fresh Water Quality Assessment” (cont.)

**Literature/ Course material**


### Module T2c

**Gewässergüte**
(Fresh Water Quality Assessment)

### Course

**Gewässerökologisches Praktikum**
(Field Course on Fresh Water Quality)

<table>
<thead>
<tr>
<th><strong>KIT lecture ID</strong></th>
<th>xxxxx</th>
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<tbody>
<tr>
<td><strong>Relevance</strong></td>
<td>compulsory elective</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Bachelor, German proficiency (DSH level)</td>
</tr>
<tr>
<td><strong>Term(s)</strong></td>
<td>2nd term (summer)</td>
</tr>
<tr>
<td><strong>Language</strong></td>
<td>German</td>
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<tr>
<td><strong>Training mode</strong></td>
<td>Excursion, 1 week</td>
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<tr>
<td><strong>Workload</strong></td>
<td>2.0 CP ⇒ 60.0 h</td>
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#### Workload specification

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<thead>
<tr>
<th><strong>LECTURE PHASE</strong></th>
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<tbody>
<tr>
<td>Contact (based on 2 WCH)</td>
<td>10.5 h</td>
</tr>
<tr>
<td>Excursion</td>
<td>24.0 h</td>
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<tr>
<td>Exam Preparation</td>
<td>20.0 h</td>
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<table>
<thead>
<tr>
<th><strong>EXAM PHASE</strong></th>
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<tbody>
<tr>
<td>Self-instruction</td>
<td>5.0 h</td>
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<tr>
<td><a href="mailto:stephan.fuchs@kit.edu">stephan.fuchs@kit.edu</a></td>
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**Lecturer(s)**

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

**Course topic**

Complex interaction of abiotic and biotic components of aquatic ecosystems and their relevance for technical systems; relevant causal mechanism operating and controlling aquatic ecosystems.

**Recommended background knowledge**

Fundamentals of biology and chemistry

**Learning outcomes**

**Disciplinary knowledge**

- **concepts, theories & definitions**
  
  functional relation in aquatic ecosystems, food and energy web, river continuum concept, sprobic index.

- **subject matter (factual data, examples)**

  longitudinal profile of rivers, daily variation of physico/chemical parameters, oxygen balance of the flowing and stagnant waters, interaction of sediments and water, interstitial chemistry in sediment profiles, assessment of water quality of the river Neckar and its affluents.

- **methods & procedures**

  n.a.

**Professional skills**

Application of water and sediment sampling, chemical analysis, biological assessment.

**Personal competence**

Field methods.

**Assessment specification**

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<tbody>
<tr>
<td>written</td>
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<tr>
<td>oral</td>
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</tr>
<tr>
<td>other</td>
<td>group report = partial module exam “Gewässerökologisches Praktikum” (2.000 words)</td>
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* WCH = Weekly Contact Hours
### Course

**Module T2c**

**Gewässergüte**  
(Fresh Water Quality Assessment)

**Course**

**Stoffstromanalysen / Wassergütewirtschaft**  
(Material Flux Analysis in River Basins)

<table>
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<tr>
<td>Term(s)</td>
<td>3rd term (winter)</td>
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<td>Language</td>
<td>German</td>
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<tr>
<td>Training mode</td>
<td>Lecture, 2 WCH</td>
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<tr>
<td>Workload</td>
<td>3.0 CP =&gt; 90.0 h</td>
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<th>EXAM PHASE</th>
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<tbody>
<tr>
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<td>Self instruction</td>
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<tr>
<td>21.0 h</td>
<td>42.0 h</td>
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**Lecturer(s)**

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

**Course topic**

Stress on water quantity and quality due to urbanization and more intensive agricultural and industrial production in developing countries.

**Recommended background knowledge**

Fundamentals of Biology, Chemistry and Hydrology

**Learning outcomes**

**Disciplinary knowledge**

- concepts, theories & definitions  
  natural and anthropogenic water; nutrient and pollutant cycles; river basin, water body, EU-Water Framework Directive.

- subject matter (factual data, examples)  
  balance of nutrient and pollutant input into European river basins; nutrient and pollutant loads in European rivers.

- methods & procedures  
  methodology for the assessment of emissions related to different kind and intensity of land use (urbanization, agricultural and industrial production); data collection and analysis and aggregation; data acquisition; monitoring strategies; instruments of material flux analysis.

**Professional skills**

System thinking, decision making, problem identification and problem solving.

**Personal competence**

n.a.

**Assessment specification**

- written ---
- oral 30 min = partial module exam „Gewässergüte”
- other ---

* WCH = Weekly Contact Hours