### Numerische Modelle im Wasserbau
(Numerical Models in Hydraulic Engineering)

<table>
<thead>
<tr>
<th>Relevance for ResEngin curriculum</th>
<th>compulsory elective</th>
</tr>
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<tbody>
<tr>
<td><strong>Administration</strong></td>
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<td>Wasserwirtschaft &amp; Kulturtech.</td>
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<td><strong>Contact</strong></td>
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<td><a href="mailto:peter.oberle@kit.edu">peter.oberle@kit.edu</a></td>
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| **Term(s) offered**              | **3rd (Winter Oct.-Mar)** |
| **Duration | Cycle**                  | **1 term; every year** |
| **Language of instruction**      | **German**               |
| **Prerequisites**                | Bachelor, German language proficiency at DSH level |

| **Module coordinator**           | **OBERLE, Dr.-Ing. Peter; IWG-WK** [Modulverantwortlicher] |
| **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 1 Hydraulic & Environmental Engineering |
|                                  | MT1c Numerical Water Management Planning Tools |

| **Lecture courses**              | **19208 Numerische Modelle im Wasserbau** (lecture, labcourse) |
| **(training mode)**              | **5.0 CP 2+1 WCH** |
| **SUM**                          | **5.0 CP 3 WCH** |

| **Workload specification**       | **(30 work hours → 1 CP acc. to ECTS)** |
| **Lecture Phase:**               | **Contact hours** 21.0 h |
|                                  | **Self instruction** 42.0 h |
|                                  | **Lab work** 10.5 h |
|                                  | **Exam preparation** 31.5 h |
| **Exam Phase:**                  | **Self instruction** 45.0 h |

| **Module examination(s)**        | **"Numerische Modelle"** |
| **(mode | scope | weighting)**                 | **oral | 20 min | 5.0/5.0 CP** |

| **Lecturers**                    | **OBERLE, Dr.-Ing. Peter; IWG-WK** |

| **Individual lecture courses**   | **Descriptions + Recommended background knowledge** see p. 4. |
### Module T1d: “Numerical Models in Hydraulic Engineering” (cont.)

**Module topic**

Choice of appropriate modeling techniques and assessment of uncertainties in hydraulic simulations for regional and local planning projects as well as interpretation of computation results.

**Learning outcomes**

**Disciplinary knowledge**

- **concepts, theories & definitions**
  physical equations and numeric solution procedures.

- **subject matter (factual data, examples)**
  base data (topography, hydrologic boundary conditions); modeling techniques and calibration; hydraulic evaluation of measures in the river valley; automated operation of barrages in rivers.

- **methods & procedures**
  data preparation and visualization by the use of GIS technology (pre- and post-processing).

**Professional skills**

- Application of one- and multi-dimensional hydrodynamic numeric river-flow models.

**Personal competence**

- Work on small projects in a team.
Module T1d: “Numerical Models in Hydraulic Engineering” (cont.)

**Literature/ Course material**


- Malcherek, A. (2001). *Hydromechanik der Fließgewässer*. Bericht Nr. 61, Institut für Strömungsmechanik und Elektronisches Rechnen im Bauwesen der Universität Hannover, Universität Hannover, 382 S.

**Lecture notes**

- “Numerische Modelle im Wasserbau”
### Course: Numerische Modelle im Wasserbau
(Numerical Models in Hydraulic Engineering)

#### KIT lecture ID
19208/9

#### Relevance
compulsory elective

#### Prerequisites
- Bachelor,
- German proficiency
  (DSH level)

#### Term(s)
3rd term (winter)

#### Language
German

#### Training mode
- Lecture, 2 WCH *
- Labcourse, 1 WCH

#### Workload specification
- **5.0 CP** ⇒ **150 h**

#### Lecturer(s)
OBERLE, Dr.-Ing. Peter; IWG-WK

#### Course topic
Choice of appropriate modeling techniques; assessment of uncertainties in hydraulic simulations for regional and local planning projects and interpretation of computation results.

**Recommended background knowledge**
Fundamentals of engineering physics, mathematics and hydromechanics

#### Learning outcomes

**Disciplinary knowledge**
- concepts, theories & definitions
  - physical equations and numeric solution procedures.
- subject matter (factual data, examples)
  - base data (topography, hydrologic boundary conditions); modeling techniques and calibration; hydraulic evaluation of measures in the river valley; automated operation of barrages in rivers.
- methods & procedures
  - data preparation and visualization by the use of GIS technology (pre- and post-processing).

**Professional skills**
Application of one- and multi-dimensional hydrodynamic numeric river-flow models.

**Personal competence**
Work on small projects in a team.

#### Assessment specification
- **written ---**
- **oral 20 min** = module exam “Numerische Modelle”
- **other ---**

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* WCH = Weekly Contact Hours