MODULE: Environmental Fluid Mechanics II

Last update.23.11.2010

1	Modulname Module name	Environmental Fluid Mechanics II
2	Kürzel Identification code	021420013
3	Leistungspunkte (LP) Credit points (CP)	6
4	Semesterwochenstunden (SWS) Semester load	5
5	Moduldauer (Anzahl der Semester) Module duration (Number of terms)	1 Semester
6	Turnus Cycle	every 2nd semester
7	Sprache Language of instruction	English
8	Modulverantwortlicher Person in-charge of the module	Prof. Dr.-Ing. Rainer Helmig Institut für Wasserbau Lehrstuhl für Hydromechanik und Hydrosystemmodellierung Tel: 0711 / 685-64741 e-Mail: rainer.helmig@iws.uni-stuttgart.de
9	Dozenten Lecturers	Prof. Dr.-Ing. Rainer Helmig Jun.-Prof. Dr.-Ing. Wolfgang Nowak, M.Sc., Wolfgang.Nowak@iws.uni-stuttgart.de Dr. Sergey Oladyshkin, Sergey.Oladyshkin@iws.uni-stuttgart.de
10	Verwendbarkeit / Zuordnung zum Curriculum Applicability / Assignment to curriculum	WAREM (M.Sc), E, Elective, 2nd Semester, (SS)
11	Voraussetzungen/ Prerequisites	Recommended background knowledge: Mechanics of incompressible and compressible fluids, fundamentals of numerical methods in fluid mechanics, fundamentals of exchange and transport processes in technical and natural systems (e.g. groundwater and surface water, pipelines). Contents of Environmental Fluid Mechanics I
12	Lernziele Intended learning outcome	Students have the necessary grasp of hydrodynamic, physical and chemical processes and systems to be able to answer environmentally relevant questions concerning water and air quality in natural and technical systems.

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>13</td><td>Inhalt
Content</td><td>The lecture deals with the heat and mass budget of natural and technical systems. This includes transport processes in lakes, rivers and groundwater, heat and mass transfer processes between compartments as well as between various phases (sorption, dissolution), conversion of matter in aquatic systems and the quantitative description of these processes. In addition to classical single fluid phase systems, multiphase flow and transport processes in porous media will be considered. On the basis of a comparison of single- and multiphase flow systems, the various model concepts will be discussed and assessed.
In the accompanying exercises, example problems present applications, extend the lecture material and help prepare for the exam. Computer exercises improve the grasp of the problems and give insight into the practical application of what has been learned.</td></tr>
<tr><td>14</td><td>Literatur/Lernmaterialien
Literature/Learning Materials</td><td>Lecture notes: Fluidmechanics II, Helmig
Helmig, R.: Multiphase Flow and Transport Processes in the Subsurface. Springer, 1997</td></tr>
<tr><td>15</td><td>Lehrveranstaltungen und Lehrformen
Course units and teaching methods</td><td>Environmental Fluid Mechanics II, Lecture,
3 SWS, 3,6 LP
Environmental Fluid Mechanics II, Exercise,
2 SWS, 2,4 LP</td></tr>
<tr><td>16</td><td>Abschätzung des Arbeitsaufwandes
Estimation of workload</td><td>Time of attendance: ca. 60 h
Private Study: ca. 120 h
<table><tr><th>Pos</th><th>unit</th><th>presence time</th><th>self study</th><th>Sum</th></tr><tr><td>1</td><td>Lecture</td><td>36,0</td><td>72,0</td><td>108,0</td></tr><tr><td>2</td><td>Excercise</td><td>24,0</td><td>48,0</td><td>72,0</td></tr><tr><td></td><td></td><td></td><td></td><td>180,0</td></tr></table></td></tr>
<tr><td rowspan="2">17a</td><td>Studienleistungen (unbenotet)
Course achievements (without mark)</td><td>None</td></tr>
<tr><td>Prüfungsleistungen (benotet)
Examination load (with mark)</td><td></td></tr>
<tr><td>17b</td><td>Prüfungsleistungen (benotet)
Examination load (with mark)</td><td>Written examination , 120 min. (PL-S))</td></tr>
<tr><td>18</td><td>Grundlage für ...
Basis for ...</td><td></td></tr>
<tr><td>19</td><td>Medienform
Media</td><td>The underlying equations and model concepts are developed on the board. Films and experiments explain process interactions. Students receive an extensive collection of exercises for private study to extend the knowledge already gained.</td></tr>
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