Modulbezeichnung/ module notation	**12. Computational Fluid Dynamics II**
Modulniveau/ module level	Master
Studiensemester/ semester	2
Kürzel/ abbreviation	CFD II
Lehrveranstaltungen/ courses	12.1. Mathematics II
	12.2. 1 D-Models
	12.3. 2 D-Models
Modulverantwortlicher/ module responsible	12.4. 3 D-Models
Dozent(in)/ lecturer	Prof. Dr.-Ing. Gehard Böttge
	Prof. Dr.-Ing. Gehard Böttge Dr. math. Falk Heße Daniel Hesse, M.Eng. Dipl.-Ing. Michael Marek
Sprache/ language	english
Zuordnung zum Curriculum/ correlation to curriculum	Optional course
Lehrform/SWS/ teaching form/contact hours	6 SWS lecture and exercises
Arbeitsaufwand/ amount of work	180 h
Kreditpunkte/ credit points	6
Voraussetzungen nach Prüfungsordnung/ requirements	Bachelor degree
Empfohlene Voraussetzungen/ recommended requirements	Hydraulics, Fluid Mechanics and Physics, Mathematics for Engineers
Form der Prüfung/ form of exam	homework
Angestrebte Lernergebnisse/ target educational objective	The students are able to use computational models as an instrument for the prediction of hydraulic processes.
12.1: Mathematics II (Heße)	Within the scope of this module the students engage a range of advanced topics from CFD. This comprises solution techniquies for unsteady flow problems, i.e. different Euler and Runge-Kutta methods as well as classification schemes for Partial Differential Equations, i.e. elliptic, parabolic and hyperbolic PDE's. The latter issue will be connected to different flow regimes and the numerical solution techniques applicable for each type (Finite-Difference, Finite-Volume, Finite-Elements). The course itself contains both lectures and exercises, which are fully integrated into each other. The exercises themselves are both analytical and numerical, with the latter using the technical language Matlab.
12.2: 1 D-Models (Hesse)	Theoretical background of 1D- models using Bernoulli-Equation. Using of 1D- HEC-Ras software in a pratical application.

12.3: 2 D-Models (Böttge)	Theoretical background of Double-Averaged-Reynolds-Equation, Differentiation of 1D- and 2D-numerical model, Grid construction using SMS and RMA, Practical application.
12.4: 3 D-Models (Marek)	Theoretical Background: 3D-Navier-Stokes-Equations; Differentiation of 1D-, 2D-, and 3D-Numerical Models; Methods for Domain Discretization; Methods for Equation Discretization; Turbulence Modelling (RANS), Practical Application: Exercises using the Software SSIIM
Medienformen/ used media	Powerpoint presentation, White board, Computer
Literatur/ literature	