

MODULE COMPENDIUM *

Master Programme

Hydro Science and Engineering

Effective since March 2019

* This is no legally binding document. Only the German module descriptions are legally binding.

Module Number	Module Name	Professor in Charge
MHSE 1	Statistics	Dr. Petzold
Contents and qualification aims	<p>Descriptive statistics, discrete and continuous probability distributions, parameter estimation, statistical modelling, confidence intervals, hypothesis testing, parametric and nonparametric resampling tests, and introduction to variance analysis, correlation and regression analysis.</p> <p>Aims of qualification are the development of skills and abilities for problem-oriented work using statistical methods and operations including selected software.</p>	
Module character	<p>2 hours of lectures per week 1 hour of tutorial per week (partly as block course)</p>	
Prerequisite of attendance	<p>Basic knowledge of mathematics for engineers, in particular solving of equation systems, differential and integration calculus and probability methods, computer aided skills in spreadsheet calculation and basic knowledge of a programming environment</p>	
Applicability	<p>The module is compulsory for the Master Course Hydro Science and Engineering.</p>	
Prerequisite to achieve credit points	<p>Having passed the module exam. The module exam is a written examination (90 minutes).</p>	
Credit points and grades	<p>The module earns 5 cr. The grade for the examination equals the module grade.</p>	
Frequency of the module	<p>The module is offered annually in winter term.</p>	
Work load	<p>The work load is 150 hours.</p>	
Duration of the module	<p>The module takes one term.</p>	

Module Number	Module Name	Professor in Charge
MHSE02	Climatology and Hydrology	Prof. Bernhofer
Contents and qualification aims	<p>The module transports fundamentals on basic processes in the atmosphere and hydrosphere. Energy budget and water budget are physically analysed including radiation, precipitation, evapotranspiration, surface and subsurface runoff as well as relevant water and energy storages. The climate of the boundary layer is derived from site characteristics as well as radiation, energy and water balances. The boundary layer climate of several land use types is introduced exemplarily. Another main focus is the macro climate and its variability. The students critically analyse meteorological and hydrological information (data, forecasts and consulting) and are able to apply their knowledge for water supply management tasks like development, dimensioning, and management.</p> <p>The students have available the proficiency of relevant processes in atmosphere and hydrosphere, as well as of methods of observation and modelling. This implies basic principles, and estimation technologies for all components of the water cycle.</p>	
Module character	4 hours of lectures per week	
Prerequisite of attendance	Basic knowledge in physics and mathematics	
Applicability	The module is compulsory for the Master Course Hydro Science and Engineering.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of 2 written examinations (90 minutes each).	
Credit points and grades	The module earns 5 cr. The average of the grades for the examinations equals the module grade.	
Frequency of the module	The module is offered annually in winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE03	Geodesy	Prof. Wanninger
Contents and qualification aims	<p>The module provides an introduction to the various aspects of geodetic techniques including sensor technology and collection, administration, and visualization of spatial information in hydro science.</p> <p>The students know the most important geodetic techniques of data acquisition and data processing. They are able to select appropriate geodetic techniques for certain applications.</p>	
Module character	<p>2 hours of lectures per week 1 hour of tutorial per week</p>	
Prerequisite of attendance	Basic knowledge of mathematics, statistics, and physics.	
Applicability	The module is compulsory for the Master Course Hydro Science and Engineering.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam is a written examination (90 minutes).	
Credit points and grades	<p>The module earns 5 cr. The grade for the examination equals the module grade.</p>	
Frequency of the module	The module is offered annually in winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE04	Soils	Prof. Kalbitz
Contents and qualification aims	<p>The module focuses on basics of soil science with special emphasis on soil geology, hydrogeology, physical, chemical and biological soil properties, soil development and classification of soils as well as principles of the geologic and geotechnical relationships concerning unconsolidated and solid rock in deeper layers.</p> <p>The theoretical knowledge will be completed by regional and applied aspects for agriculture, forestry and water management.</p> <p>The students are proficient in fundamental aspects of soils to assess soils relating to their chemical and physical characteristics.</p>	
Module character	<p>2 hours of lectures per week 1 hour of practical training per week</p>	
Prerequisite of attendance	Basic knowledge in geology, physics and chemistry	
Applicability	The module is compulsory for the Master Course Hydro Science and Engineering.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam is a written examination (90 minutes).	
Credit points and grades	<p>The module earns 5 cr. The grade for the examination equals the module grade.</p>	
Frequency of the module	The module is offered annually in winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE05	Hydromechanics	Prof. Pohl
Contents and qualification aims	<p>The physical characteristics of water will be discussed, starting with the hydrostatics and the mainly steady hydrodynamics with emphasis on the principles of conservation of energy, mass and momentum, pipe hydraulics, open channel hydraulics.</p> <p>The students are able to answer hydromechanical questions in engineering:</p> <ul style="list-style-type: none"> - identification of hydromechanical problems in engineering - quantitative solution of hydromechanical problems - knowledge application for dimensioning and design of hydraulic structures and devices and to scientific problems 	
Module character	<p>2 hours of lectures per week 1 hour of tutorial per week</p>	
Prerequisite of attendance	<p>Knowledge in physics, higher mathematics</p>	
Applicability	<p>The module is compulsory for the Master Course Hydro Science and Engineering for students with a degree in natural sciences as hydrology, meteorology, geography, geology, chemistry, biology, and physics. The contents are coordinated to module MHSE06 - Hydraulic Engineering.</p>	
Prerequisite to achieve credit points	<p>Having passed the module exam. The module exam is a written examination (90 minutes).</p>	
Credit points and grades	<p>The module earns 5 cr. The grade for the examination equals the module grade.</p>	
Frequency of the module	<p>The module is offered annually in winter term.</p>	
Work load	<p>The work load is 150 hours.</p>	
Duration of the module	<p>The module takes one term.</p>	

Module Number	Module Name	Professor in Charge
MHSE06	Hydraulic Engineering	Prof. Stamm
Contents and qualification aims	<p>On the basis of knowledge about natural watercourses hydraulic structures for flood protection (levees, water retention reservoirs) and for use of water (weirs, dams, water power stations) are discussed with respect to water management, ecological and economic aspects. Environmentally friendly structures, sustainability and renewable energies are dealt with emphasis. In addition navigation engineering systems are introduced.</p> <p>The students have knowledge about the design, operation and calculation of hydraulic structures.</p>	
Module character	<p>2 hours of lectures per week 1 hour of tutorial per week 1 hour of practical training per week</p>	
Prerequisite of attendance	<p>Knowledge in physics and higher mathematics</p>	
Applicability	<p>The module is compulsory for the Master Course Hydro Science and Engineering for students with a degree in natural sciences as hydrology, meteorology, geography, geology, chemistry, biology, and physics.</p> <p>The content of the module is linked to module MHSE05 - Hydromechanics.</p>	
Prerequisite to achieve credit points	<p>Having passed the module exam. The module exam is a written examination (90 minutes). A positively evaluated term paper (30 hours) has to be handed-in.</p>	
Credit points and grades	<p>The module earns 5 cr. The grade for the written examination equals the module grade.</p>	
Frequency of the module	<p>The module is offered annually in winter term.</p>	
Work load	<p>The work load is 150 hours.</p>	
Duration of the module	<p>The module takes one term.</p>	

Module Number	Module Name	Professor in Charge
MHSE 07	Ecology	Prof. Roth
Contents and qualification aims	<p>Purpose and perception of ecology as a pure and applied science, its hierarchy of living systems and the ecosystem concept are introduced: physical and chemical determinants of biosphere and its parts; evolution and co-evolution of organisms and biosphere - effect of environmental conditions on individuals and populations as well as bioavailability and applicability of resources; demographic processes (growth, birth, death, migration, life cycles), intra- and inter-specific competition, coexistence and mutualism as well as interaction and regulation in food webs; fluxes of energy, matter and information between organisms, populations and ecosystems; biodiversity in different spatial and temporal scales; global change and sustainability in ecology</p> <p>The students have skills to understand causalities and effects due to fast changes of dynamic balances within populations, communities and the entire biosphere. They are able to identify capacities and limitations of control, utilisation, conservation, and regeneration of populations and ecosystems.</p>	
Module character	<p>2 hours of lectures per week 1 hour of tutorial per week 1 hour of practical training per week</p>	
Prerequisite of attendance	Advanced knowledge in physics, chemistry and biology	
Applicability	The module is one of 5 optional modules in the basic course of the Master Course Hydro Science and Engineering. Modules with the worth of 15 cr should be picked from the optional modules.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of a presentation and either a written examination (90 minutes) or a written term paper (50 hours).	
Credit points and grades	<p>The module earns 5 cr. The module grade is generated with 25% presentation and 75% written examination or term paper.</p>	
Frequency of the module	The module is offered annually in winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE 08	Hydrochemistry	Prof. Stolte
Contents and qualification aims	<p>Characteristics of water and aqueous solutions, absorption and desorption, acid-alkali-reactions, chemical precipitation, redox reactions, chelate formation, and coupled equilibrations</p> <p>The students have profound knowledge about the main hydrochemical processes within natural and technical cycles. They are able to apply physiochemical laws for basic hydrochemical computations.</p>	
Module character	<p>2 hours of lectures per week 1 hour of practical training per week</p>	
Prerequisite of attendance	Basic knowledge in chemistry	
Applicability	The module is one of 5 optional modules in the basic course of the Master Course Hydro Science and Engineering. Modules with the worth of 15 cr should be picked from the optional modules.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam is a written examination (90 minutes). Preparatory requirement to the exam is the protocol of the practical training.	
Credit points and grades	<p>The module earns 5 cr. The grade for the examination equals the module grade.</p>	
Frequency of the module	The module is offered annually in winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE09	Study Project Integrated Water Resources Management (IWRM)	Study Course Coordinator Prof. Bernhofer
Contents and qualification aims	<p>For water problems integrative solutions are needed with the participation of different technical disciplines (Integrated Water Resources Management IWRM). In the module problems out of possibly all disciplines of Hydro Science and Engineering are worked on. Therefore individual study projects might be supervised by more than one teacher. Additionally project management and presentation techniques are demonstrated as well as proper reporting.</p> <p>Students learn to act as a team and to solve a complex problem by proper handling of individual tasks. The task of the study project may be e.g. the restoration of the water supply of an urban area, the planning of a water management structure (dam, barrage), or the calculation of the water balance of a river catchment. The students are able to implement their knowledge in engineering and natural sciences. Scientific creativity to contribute to the project is encouraged. The complex application of the acquired knowledge is practised.</p> <p>Central qualification aims are the definition of a problem, the work on a defined problem and report on progress and final outcome by oral presentations and written reports. The students have skills to supervise projects self dependently and are prepared to hold other management functions.</p>	
Module character	1 hour of lectures per week, 1 hour of exercise course per week, 4 hours of practical training per week, self study	
Prerequisite of attendance	Basic knowledge in hydrosociences, civil engineering, and computer sciences; advanced knowledge in mathematics and statistics	
Applicability	The module is compulsory for the Master Course Hydro Science and Engineering.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of 2 presentations and the project work (100 hours).	
Credit points and grades	The module earns 10 cr. The module grade is calculated from the grades achieved for the presentations (25% each) and the project work (50%).	
Frequency of the module	The module is offered each semester.	
Work load	The work load is 300 hours.	
Duration of the module	The module takes one term.	

Module number	Module name	Professor in Charge
MWW26	Integrated Water Resources Management I	Prof. Krebs
Qualification aims	Students will learn how to analyse and evaluate complex problems of the management as well as of the optimization of water resources. Case studies are used to develop approaches that are adapted to regional conditions.	
Contents	<p>Integrated water resources management (IWRM) is a process which promotes the coordinated development and management of water, land and other related resources and the various impacts. It presupposes an interdisciplinary understanding of scientific, technical, economic, social and corresponding aspects.</p> <p>The module conveys concepts of the IWRM. In a series of lectures, the different methodological and thematic aspects of IWRM, action plans and case studies are presented in which water is a resource, a habitat and/or a landscape element. Approaches to system analysis and modelling of natural and technical water systems and their interactions are taught. But also social, economic, political and institutional framework conditions as well as approaches to capacity development are highlighted. By discussion sessions, a planning and management game as well as examples of use the mediated knowledge is applied and deepened.</p>	
Teaching and learning methods	3 hours of lectures per week and self-study The language of instruction is English.	
Prerequisite for attendance	Basic knowledge in hydrology, meteorology, ground water management, urban drainage and system analysis	
Applicability	The module is an optional module for the Master Courses Hydrology, Water Management, Hydrobiology, and Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the respective Examination Regulation.	
Prerequisite to achieve credit points	Having passed the module exam; it consists of a written examination (90 minutes).	
Credit points and grades	The module earns 5 cr. The module grade equals the grade of the written examination.	
Frequency of the module	The module is offered each summer term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module number	Module name	Professor in Charge
MWW27	Integrated Water Resources Management II	Prof. Krebs
Qualification aims	The students acquire the ability to analyse complex problems of the management and optimization of water resources. At the study tour they will learn about a water resource conflict from the perspective of the involved actors. For the exercise, the knowledge of modelling is developed, in addition, the knowledge about scientific writing is deepened and applied.	
Contents	<p>Integrated water resources management (IWRM) is a process which promotes the coordinated development and management of water, land and other related resources and the various impacts. Based on the knowledge of the module IWRM I (MWW26) the challenges and solutions of IWRM are demonstrated and applied.</p> <p>A study tour lasting several days addresses the effects of a water resource conflict from the perspective of various decision-makers and stakeholders. In doing so, a management and planning game resp. will deepen the understanding of the actors involved.</p> <p>In the exercise, a systematic approach is developed for a model-based decision-making process in IWRM. For this purpose, a simulation model for a water resource conflict is set up, calibrated and applied for the comparison of scenarios and action alternatives. On the basis of the modelling results, a separate sub-question is deepened as well as and evaluated and processed for the term paper as a scientific article.</p>	
Teaching and learning methods	2 hours of exercises per week, 2.1 hours of excursion (3 days) and self-study The language of instruction for the module in English.	
Prerequisite for attendance	The competencies acquired in or equivalent to the IWRM I module (MWW26) are assumed.	
Applicability	The module is an optional module for the Master Courses Hydrology, Water Management, Hydrobiology, and Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the respective Examination Regulation.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of a term paper (80 hours) and a report of the study tour (50 hours).	
Credit points and grades	The module earns 5 cr. The module grade is calculated from the grades achieved for the term paper (factor 4) and the report (factor 1).	
Frequency of the module	The module is offered annually in the winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Modul Number	Modul Name	Professor in Charge
MHSE 10	International Water Issues (Internationale Wasserprobleme)	Prof. Krebs
Qualification aims	The students get to know the situation of different countries and may reflect about their own experiences. Piece by piece they may develop a global view and learn to manage their knowledge and make decisions.	
Contents	The module improves the information and the knowledge exchange among the students. Professionals and scientists from academic institutions and consulting agencies present recent developments in water related issues. The students prepare term papers about water specific problems of their home countries and present the contents orally. The topics may concern the general aspects of the situation of water supply, i.e. the hydrologic regime, the type of climate including climate change, state of water supply, condition of waste water management, management of floods and water related natural damages (e.g. landslides, tsunamis). The students have the possibility to introduce projects and organisations where they participated or to which they contribute now.	
Teaching form	3 hours of seminar per week	
Pre-requisite of attendance	Basic knowledge in hydrosociences, regional water management and hydrology.	
Usage	The module is an optional module for the Master Course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Pre-requisite to achieve credit points	Having passed the module exam. The module exam consists of a seminar paper (20 hours) and a presentation.	
Credit points and marks	The module earns 5 cr. The module grade is calculated from the grades achieved for the seminar paper (40%) and the presentation (60%).	
Frequency of the module	The module is offered each summer semester.	
Workload	The workload is 150 hours.	
Duration of the module	The module takes 1 term.	

Module Number	Module Name	Professor in Charge
MHSE11	Circular Economy	Prof. Bilitewski
Contents and qualification aims	<p>Circular economy is a model of sustainable economic development which aims at environmental protection and prevention through conservation, reusing and recycling of resources, in order to minimize pollution from the source and reduce overall waste per unit output. Circular economy not only targets waste disposal, it also involves the transformation into sustainable economic activity of industrial organisation, urban infrastructure, environmental protection, technological paradigms, and social welfare distribution.</p> <p>The students improve their knowledge about the relevant mass fluxes. They are able to evaluate these fluxes using up to date evaluation techniques (e.g. ecological balances).The students possess system understanding of global change through integrative reflection of global mass flow of goods and quality of recycling.</p>	
Module character	<p>2 hours of lectures per week 1 hour of tutorial per week</p>	
Prerequisite of attendance	Basic knowledge in physics, chemistry and mathematics	
Applicability	The module is one of 17 optional modules for the Master Course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of a presentation and a term paper (60 hours).	
Credit points and grades	<p>The module earns 5 cr.</p> <p>The module grade is calculated from the grades achieved for the presentation (30%) and the term paper (70%).</p>	
Frequency of the module	The module is offered annually in summer term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE12	Watershed Management I	Dr. Lennartz
Contents and qualification aims	<p>The module will develop the students' competence for integrated watershed management. Using irrigation farming as an example the problem and the process of management will be introduced and discussed. Methods of data collection and analysis, of determination and forecast of supplies as well as methods to obtain water demand are introduced.</p> <p>The fundamentals of development and application of methods to dimension and simulate reservoirs and flood protection measures are explained. Need and concepts of integrated flood protection are discussed.</p> <p>Decision support systems are imparted to aggregate the single elements of watershed management.</p> <p>The students know the main procedures and tools for integrative watershed management (data acquisition, analysis, forecast, dimensioning, simulation) regarding balancing between demand and supply using typical control elements as dam and absorption reservoirs.</p>	
Module character	<p>2 hours of lecture per week 1 hour of tutorial per week</p>	
Prerequisite of attendance	Advanced knowledge in hydrology, hydraulic engineering, and statistics	
Applicability	The module is one of 17 optional modules for the Master Course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of a written examination (90 minutes).	
Credit points and grades	<p>The module earns 5 cr. The grade for the written examination equals the module grade.</p>	
Frequency of the module	The module is offered annually in summer term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE13	Urban Water I	Prof. Krebs
Contents and qualification aims	<p>The module overviews the systems of urban water management as well as methods for drawing of untreated water, water treatment and distribution. The main aspects of the module include dimensioning of water treatment reactors and distribution nets, and analysis and optimisation of operation and maintenance. Understanding of the basics and engineered realisation are weighted equally.</p> <p>One half-day excursion to water supply facilities is offered. The students are able to identify and implement important processes of the urban water system and to design and optimise plants of water supply.</p>	
Module character	<p>2 hours of lectures per week 2 hours of tutorial per week</p>	
Prerequisite of attendance	Basic knowledge in mathematics and hydromechanics	
Applicability	<p>The module is one of 17 optional modules for the Master Course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations. The skills acquired in this module are necessary to take part in module MHSE22 - Urban Water II.</p>	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of a written examination (90 minutes).	
Credit points and grades	<p>The module earns 5 cr. The grade for the written examination equals the module grade.</p>	
Frequency of the module	The module is offered annually in summer term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Module Number	Module Name	Professor in Charge
MHSE 24	Water Quality and Water Treatment	Prof. Stolte
Contents and qualification aims	The students get to know important water pollutants and their relevance for water quality. Physico-chemical procedures to remove these materials for drinking water processing are introduced. The module complements to the module Drinking Water Supply.	
Module character	2 hours of lectures per week 2 hours of practical training per week	
Prerequisite of attendance	Basic knowledge in chemistry, especially hydrochemistry The skills acquired in the module MHSE25 - Drinking Water Supply are necessary to take part in the module.	
Applicability	The module is one of 17 optional modules for the Master Course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Prerequisite to achieve credit points	Having passed the module exam. The module exam consists of a written examination (90 minutes). Preparatory requirement to the exam is a protocol of the practical training.	
Credit points and grades	The module earns 5 cr. The grade for the examination equals the module grade.	
Frequency of the module	The module is offered annually in winter term.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one term.	

Modul Number	Modul Name	Professor in Charge
MHSE25	Drinking Water Supply (Trinkwasserversorgung)	Prof. Lerch isi@mailbox.tu-dresden.de
Qualification aims	The students understand the mechanisms of important methods of drinking water treatment and distribution. They are able to compute and interpret the single steps and to dimension water distribution systems. The students know possible influences on water quality during water treatment, distribution and storage and they are able to evaluate disturbances of quality and to suggest adequate measures.	
Contents	Methods and processes of modern drinking water treatment as well as the development of constructions for drinking water distribution and their economical operation are content of the module.	
Teaching form	3 hours of lectures per week, 1 hour of practical training per week 0,5 hours excursion per week (1 half-day excursion) and self-study.	
Pre-requisite of attendance	<p>Knowledge in hydrochemistry as well as basics in natural science and engineering of water treatment and distribution are required. The skills acquired in the module MHSE24 - Water Quality and Water Treatment are necessary to take part in the module.</p> <p>Literature: Sigg & Stumm (2011): Aquatische Chemie; Benjamin (2002): Water Chemistry; Stumm & Morgan (1996): Aquatic Chemistry; Stevenson (1997): Water Treatment Unit Processes; Crittenden et al. (2012): MWH's Water Treatment: Principles and Design; Hendricks (2002): Fundamentals of Water Treatment Unit Processes: Physical, Chemical, and Biological; Anonymous (National Research Council, 2006): Drinking Water Distribution Systems, Assessing and Reducing Risks; Van Zyl (2014): Operation and Maintenance of Water Distribution Systems; Mays (1999): Water Distribution System Handbook.</p>	
Usage	The module is an optional modules for the Master Course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Pre-requisite to achieve credit points	Having passed the module exam. The module exam consists of a written examination (135 minutes).	
Credit points and marks	The module earns 5 cr. The grade for the written examination equals the module grade.	
Frequency of the module	The module is offered each winter semester.	
Workload	The workload is 150 hours.	
Duration of the module	The module takes 1 term.	

Module number	Module name	Professor in charge
MHSE 36	Internship Hydrosiences	Study Course Coordinator Prof. Bernhofer
Qualification aims	The students are able to execute tasks on their own and to put them into a bigger context. Thereby, they will also acquire basic knowledge of company or institute organisation.	
Contents	The students achieve subject-specific engineering and acquire scientific practice inside or outside of TU Dresden. Therefore, they work for at least 3 weeks e.g. in co-operating research institutes, agencies, water suppliers, associations or consulting offices in Germany or abroad or at an institute of TU Dresden.	
Teaching form	3 weeks of internship and self-study	
Pre-requisite of attendance	Good knowledge in general basics in hydro sciences	
Usage	The module is an optional module for the master course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Pre-requisite to achieve credit points	Successful students have to pass the module exam. The module exam consists of an internship protocol/report (30 hours).	
Credit points and marks	The module earns 5 cr. The module mark is identical to the mark of the written examination.	
Frequency of the module	The module is offered each semester.	
Work load	The work load is 150 hours.	
Duration of the module	The module takes one semester.	

Module number	Module name	Professor in charge
MHSE 27	Climate Systems and Climate Modelling	Prof. Bernhofer S. Fischer Dr. Goldberg
Contents and qualification aims	<p>The module imparts a deeper knowledge in processes and methods to describe the components of the climate system in models, including feedback mechanisms and the consideration of all spatial scales.</p> <p>The module covers the following topics:</p> <p>Components of the climate system (characteristics, dependency on scales, feedback mechanisms), description of these components (climate system part), building and application of climate models incl. utilization of respective models (climate modelling part)</p> <p>The students are able to understand the complex and scale-dependent relations between the individual components of the climate system. They will develop skills to describe characteristic phenomena of the climate system and to set-up and utilize selected climate models, regarding different conditions and scales.</p>	
Teaching form	Climate Systems: 2 hours a week, lecture Climate Modelling: 1 hour a week, lecture; 1 hour a week, tutorial	
Pre-requisite of attendance	Pre-requisite of attendance: basic knowledge in the physical processes of the atmosphere and hydrosphere, good knowledge in physics and mathematics, good English level.	
Usage	The module is an optional module for the master-study in Hydro-Science & Engineering.	
Pre-requisite to achieve credit points	Successful students have to pass the module exam, which consists of a written exam (90 minutes).	
Credit points and marks	The module earns 5 cr. The module mark is identical to the exam mark.	
Frequency of the module	The module is offered each winter semester.	
Work load	The student's work load is 150 hours.	
Duration of the module	The module is finished in one semester.	
Recommended literature	Kabat, P. (ed.), 2004: Vegetation, Water, Humans and the Climate. McGuffie, K., Henderson-Sellers, A., 2013: A Climate Modelling Primer. Oke, T.R., 1987: Boundary Layer Climates.	

Modul number	Modul name	Professor in charge
FOMT 2.3B	Communication und Conflict Management	Prof. Dr. J. Pretzsch
Qualification aims	The students are able to assess conflicts, select methods and tools for their handling, and apply them in the field. They are able to rely on ethical norms in problem handling and to lead communication processes in a democratic and participatory manner. The students are capable of guiding communication processes among stakeholder groups, as well as to conduct participatory surveys.	
Contents	Theories and concepts of verbal and nonverbal communication are introduced. Communication as social behaviour, conflicts as part of social systems and conflict solution, psychological dispositions and perception of human beings. Rhetorical rules and psychological patterns for purposeful actions and reactions when disputing about natural resources. Methods and instruments for pro-active situation-related interventions in on-going communication, negotiation, discourses and conflicts. Strategies for mediation, meta-plan moderation, as well as participation in the context of rural development. Communication with Rapid Rural Appraisal, Participatory Rural Appraisal and in field laboratories.	
Teaching form	2 hours of lecture per week, 1 hour of seminar per week, 1 hour project work per week, self-study	
Pre-requisite of attendance	Knowledge of natural forest and plantation management and nature conservation (Bachelor level). Literature: Moore, C. W. (2003) The mediation process. Updated and re-revised 3 rd ed., Jossey-Bass, San Francisco. Klebert, K. et al. (2000) Winning group results. Techniques for guiding group thought and decision making processes with the moderation method. 2 nd ed. Windmühle, Hamburg.	
Usage	The module is optional compulsory in the Master Course Tropical Forestry. The module is an optional module for the master course Hydro Science and Engineering whose election mode is regulated under section 27 subsection 3 of the Examination Regulations.	
Pre-requisite to achieve credit points	Successful students have to pass the module exam. The module exam consists of a project paper (1 week) and a written exam (90 minutes).	
Credit points and marks	The module earns 5 cr. The module grade results from average of the grades of the examination performances weighted as follows: project paper (67%) and the written examination performance (33%).	
Frequency of the module	The module is offered each winter semester.	
Work load	The work load is 150 hours.	

Duration of the module	The module takes one semester.
Literature	<p>Miall, H., et al. (2011) Contemporary conflict resolution: The prevention, management and transformation of deadly conflicts, 3rd ed. Polity Press. Cambridge.</p> <p>Wilkenfeld, J. et al. (2005) Mediating International Crisis. Routledge, New York.</p> <p>Bercovitch, J. (ed) (2002) Studies in international mediation: Essays in honor of Jeffrey Z. Rubin. Macmillian, New York.</p> <p>Kalyvas, S. (2006) The logic of violence in civil wars. Cambridge University Press, Cambridge.</p>