ECTS

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TECHNISCHE UNIVERSITÄT DRESDEN

ECTS Information Package

- English version -
- deutsche Fassung -

INFORMATION PACKAGE 1996/97

List of lectures

Dresden University of Technology
Faculty of Forestry, Geoscience and Hydroscience
Department of Hydrosciences

Fachrichtung Wasserwesen
Fakultät Forst-, Geo- und Hydrowissenschaften
D-01062 Dresden

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Redaktion:
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Dr. Karin Luckner
Dipl.-Ing. Constanze Fiedler

Dresden, June 1996

Preface

Initiated by the dean of education office this information booklet was prepared within the framework of the ECTS - studies as a guideline on studying about in Dresden especially for interested applicants from abroad.

By presenting this booklet the department of hydrosciences meets the wishes of many students and colleagues for a brief information on the courses of water management and hydrology.

The course of water management with its subcourses in municipal and industrial water engineering and in groundwater management (bath leading to the academic degree of a „Diplom - Ingenieur", i.e. graduated engineer) and the subcourse in hydrology (leading to the academic degree of a „Diplom - Hydrologe", i.e. graduated hydrologist) focuses on environmental issues like protection, management and regeneration of natural resources. Considering the increasing presence of extremely complicated ecotoxicological compounds in our environment the teaching of profound chemical and biological knowledge becomes more and more important. On the other hand education in the fields of water engineering and civil engineering provides the foundation of the studies. This unique course meets both, however the education in traditional subjects of civil engineering has been diminished in order to increase the teaching in natural sciences.

Since the foundation of the course of water management at the department of hydrosciences in 1988 565 students enrolled in this course, 232 of them will have finished their 10 - semester - studies successfully before summer 1996.

The graduated students of this course find a broad field of professional activities as consulting engineers, in research institutions and in different industrial branches but also in municipal enterprises of water management and in local authorities.

It is my wish that this booklet may serve for many students and colleagues as a useful guideline.

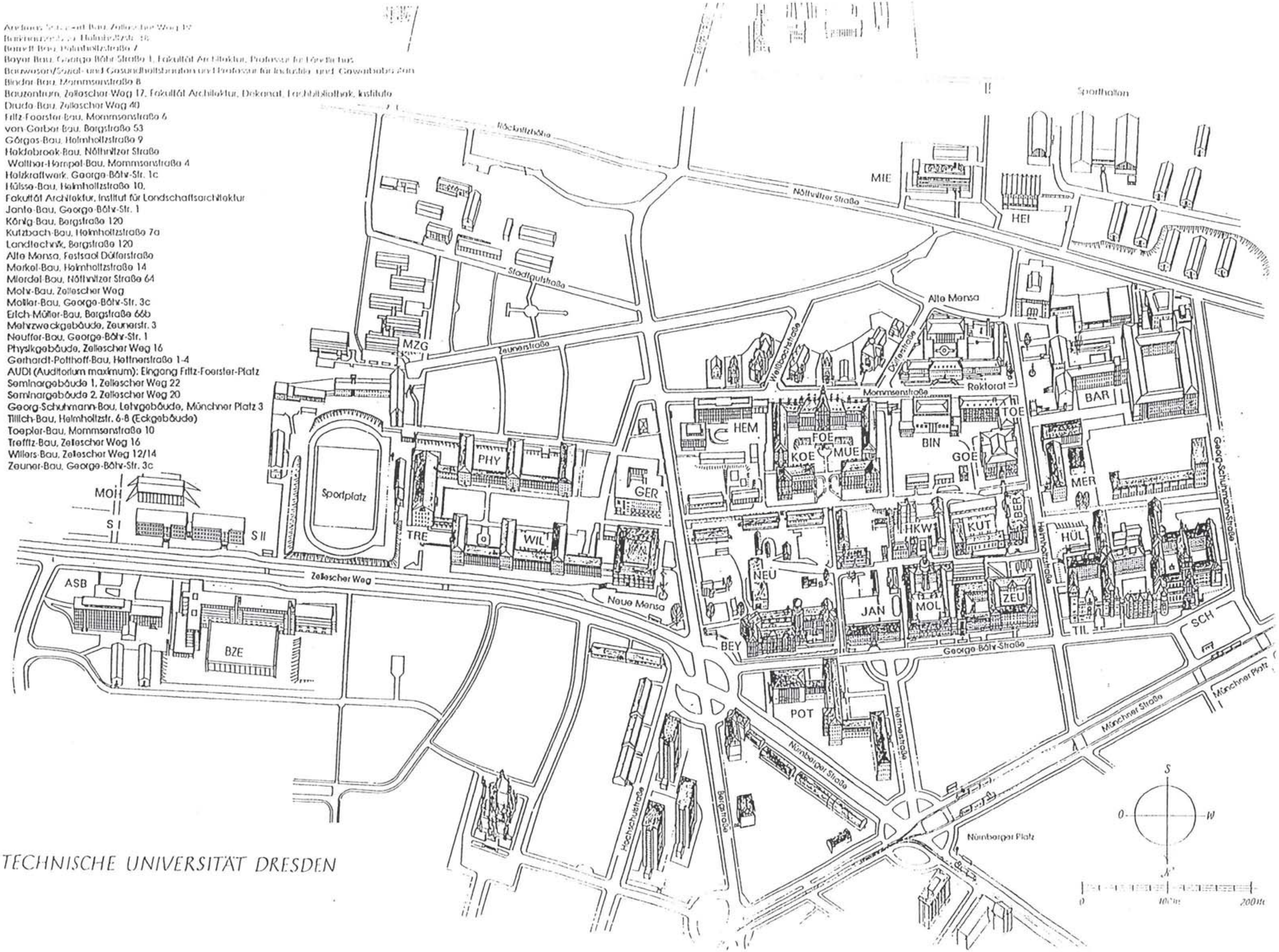
Chair of Meteorology
ECTS - coordinator
Department of Hydrosciences

The teaching for students in the course of water management but also for students of other courses, e.g. civil engineering, economy, mechanical engineering, geodesy, informatics, biology, chemistry, geography and forestry in the respective subjects of water management is provided by the lecturers and research assistants of at present 11 professorships, one lectureship and one private lectureship at the department of hydrosciences.

Lectureship	Basic studies SWS = credits-points	Main studies SWS = credits-points	Selected obligatory studies SWS = credits-points	Home-Task cr.-points	Practical Work credits-points	Diploma thesis cr.-points
Faculty of Forestry, Geosciences and Hydrosciences						
Department of Hydro Sciences						
Municipal Water-engineering	13	18	10	40	30	50
Groundwater Management	5	28	17		30	50
Hydrology and Meteorology	4	39	20	40	30	50
Hydrobiology / Hydrochemistry	8	5	21			*
Waste Management and Contaminated Sites	1	24	22		30	50
Department of Forestsciences						
	4					
Department of Geosciences						
	4					
Faculty of Civil Engineeringe						
River and Coastal engineering, Applied Hydromechanics	11	4	17			*
Other institutes of civil engineering	5	23	9			
Faculty Natura Sciences / Mathematics						
Dep of *Mathematics*	16	4	2			
Dep of Physics	10					
Dep of Chemistry	7					
Dep of Biology		1				
Faculty Electrical Engineering and Mechanical Engineering						
		2	3			

* Lectures given in other courses, that are not listed in this booklet.

ASB	Andreas-Schubert-Bau, Zellescher Weg 19
BAR	Barkhausen-Bau, Helmholtzstr. 18
BER	Berndt-Bau, Helmholtzstraße 7
BEY	Beyer-Bau, George-Bähr-Straße 1, Fakultät Architektur, Professur für Ländliches Bauwesen/Sozial- und Gesundheitsbauten und Professur für Industrie- und Gewerbebau
BIN	Binder-Bau, Mommsenstraße 8
BZE	Bauzentrum, Zellescher Weg 17, Fakultät Architektur, Dekanat, Fachbibliothek, Institute
DRU	Drude-Bau, Zellescher Weg 40
FOE	Fritz-Foerster-Bau, Mommsenstraße 6
GER	von-Gerber-Bau, Bergstraße 53
GOE	Görges-Bau, Helmholtzstraße 9
HEI	Heidebroek-Bau, Nöthnitzer Straße
HEM	Walther-Hempel-Bau, Mommsenstraße 4
HKW	Heizkraftwerk, George-Bähr-Str. 1c
HÜL	Hülsse-Bau, Helmholtzstraße 10, Fakultät Architektur, Institut für Landschaftsarchitektur
JAN	Jante-Bau, George-Bähr-Str. 1
KOE	König-Bau, Bergstraße 120
KUT	Kutzbach-Bau, Helmholtzstraße 7a
LAN	Landtechnik, Bergstraße 120
MEN	Alte Mensa, Festsaal Dülferstraße
MER	Merkel-Bau, Helmholtzstraße 14
MIE	Mierdel-Bau, Nöthnitzer Straße 64
MOH	Mohr-Bau, Zellescher Weg
MOL	Mollier-Bau, George-Bähr-Str. 3c
MUE	Erich-Müller-Bau, Bergstraße 66b
MZG	Mehrzweckgebäude, Zeunerstr. 3
NEU	Neuffer-Bau, George-Bähr-Str. 1
PHY	Physikgebäude, Zellescher Weg 16
POT	Gerhardt-Potthoff-Bau, Hettnerstraße 1-4
	AUDI (Auditorium maximum): Eingang Fritz-Foerster-Platz
S I	Seminargebäude 1, Zellescher Weg 22
S II	Seminargebäude 2, Zellescher Weg 20
SCH	Georg-Schumann-Bau, Lehrgebäude, Münchner Platz 3
TIL	Tillich-Bau, Helmholtzstr. 6-8 (Eckgebäude)
TOE	Toepler-Bau, Mommsenstraße 10
TRE	Trefftz-Bau, Zellescher Weg 16
WIL	Willers-Bau, Zellescher Weg 12/14
ZEU	Zeuner-Bau, George-Bähr-Str. 3c



TECHNISCHE UNIVERSITÄT DRESDEN

Contents

A. GENERAL INTRODUCTION

ECTS and the Technische Universität Dresden

This information package describes the Technische Universität Dresden and the courses offered by its Faculty of Forestry, Geosciences and Hydrosciences in order to help the prospective ECTS student to prepare for his/her study period at this institution.

What is ECTS?

ECTS, **the European Credit Transfer System**, was developed by the Commission of the European Union in order to provide common procedures to guarantee academic recognition of studies abroad. It provides a way of measuring and comparing learning achievements and transferring them from one institution to another.

The ECTS system is based on the principle of mutual trust and confidence between the participating institutions of higher education. The few rules of ECTS, concerning **Information** (on courses available), **Agreement** (between the home and host institutions) and the **Use of Credit Points** (to indicate student workload) are set out to reinforce this mutual trust and confidence. Each ECTS department will describe the courses it offers not only in terms of content but also credits being added to each course.

The pilot scheme

ECTS has been tested for five years as a pilot project forming one a part of the **ERASMUS** programme (European Community Action Scheme for the Mobility of University Students).

The pilot scheme operated in five subjects areas (Business Administration, Chemistry, History, Mechanical Engineering and Medicine) and involved 145 institutions of higher education in all EU Member States and EFTA countries, each of them with one faculty or department. The Faculty of Mechanical Engineering of the Technische Universität Dresden had been selected by the Commission of the European Union to participate in the pilot scheme in the fields of Mechanical Engineering and Processing and Process Engineering. In the meantime also the other faculties of Technische Universität Dresden have decided to introduce ECTS.

The ECTS credits

ECTS credits represent values allocated to course units to describe the **student workload** requierd to complete them. They reflect the **quantity** of work each course requires **in relation to** the total quantity of work required to complete a full year of academic study at the institution, these are, lectures, practical work, seminars, private work - in the library or at home - and examinations or other assessment activities. ECTS credits express a **relative value**.

In ECTS 60 credits represent the workload of a year of study; normally 30 credits are given for a semester and 20 credits for a term. It is important that no special courses are set up for ECTS purposes but that all ECTS courses are mainstream courses of the participating institutions, and followed by home students under normal regulations.

It is up to the participating institutions to subdivide the credits for the different courses. Practical placements and optional courses which form an integral part of the course of study also receive academic credit. Practical placements and optional courses which do not form an integral part of the course of study do not receive academic credit. Noncredit courses may, however, be mentioned in the transcript of records.

Credits are awarded only when the course has been completed and all required examinations have been successfully taken.

ECTS students

The students participating in ECTS will receive full credit for all academic work successfully carried out at any of the ECTS partner institutions and they will be able to transfer these academic credits from one participating institution to another as long as there is prior agreement between the institutions involved.

All students of the participating departments who are willing to take part in the ECTS Pilot Scheme may do so if their institution agrees and within the limit of available places.

Most of the students participating in the ECTS pilot scheme will go to one host institution in an EU Member State or EFTA country, study there for a limited period and then return to their home institution. Some may decide to stay at the host institution and finish their degree there. Others may decide to proceed to a third institution to continue their studies. In each of these three cases, students will be required to comply with the legal and institutional requirements of the country and institution where they take their degree.

When the student returns and has successfully completed the study programme previously agreed between the home and host institutions, credit transfer will take place, and the student will continue the study course at the home institution without any loss of time or credit. If, on the other hand, the student decides to stay at the host institution and to take his/her degree there, he/she may have to adapt his/her study course to the legal, institutional and departmental rules in the host country, institution and department.

For more details on ECTS, please consult the ECTS Brochure which is available from: the ECTS Department, Erasmus Bureau, Rue Montoyer 70, B-1040 Brussels, Tel: 32-2-233 01 11, Fax: 32-2-233 01 50.

B. GENERAL INFORMATION ABOUT THE UNIVERSITY

1. Institution

Technische Universität Dresden
Mommsenstr. 13
D-01062 Dresden

Telephone: (0351) 4630
Fax: (0351) 471 7985

Note the campus map at the beginning of this Information Package.

2. ECTS-Coordinator (of the Institution):

Christian Tauch
Director of the International Office
Visiting address: Mommsenstraße 12, Toepler Building, 1st floor
Telephone: (0351) 463 5358
Fax: (0351) 471 7985

3. From the University's History

The Dresden University of Technology (TUD) is among those German universities of technology which are most established and abound in tradition. Like the large majority of the German universities, also the Dresden University of Technology is a state university.

1828 Foundation of the **Technical Educational Institution** in Dresden
Training of technicians and mechanics for the domestic industry

1851 Renaming in **Royal Polytechnical School**
Creation of the foundations for the later departments of Mechanical Engineering, Civil Engineering and Chemistry

1865 Training of teachers for Mathematics, Natural Sciences and Engineering
A clear profile given to the technical departments of Mechanical Engineering, Civil Engineering and Chemistry

1871 Naming: **"Royal Saxon Polytechnic"**
At the Polytechnic 281 students are enrolled. Extension of the education in engineering and natural sciences by the education in humanities and linguistics

1878 Issuing of habilitation regulations

1883 Introduction of the diploma examination

1890 The Polytechnic advances to the status of the **Royal Saxon College of Advanced Technology**
The College has 281 students, among them 28 foreigners

1900 The College receives the right to confer doctorates. 1,007 students, including 232 foreigners, are enrolled.

1924 Until 1924 are established the Faculty of Electrical Engineering, the Institutes of Automotive Engineering, Metallurgy and Materials Science as well as Measurement Technology and Interchangeable Manufacture

1923 Integration of the Institute of Education of Dresden-Strehlen into the General Department

1928	2705 students are enrolled. The teaching staff consists of 63 full professors, 17 honorary professors and 24 outside lecturers.
1946	After the destruction in World War II, teaching is commenced with 450 students
1961	The status of a **"University of Technology"** is awarded In 9 faculties education is performed in 159 institutes. There are 10,768 full-time students and 5,266 extramural students.
1968	Restructuring of the University - from the faculties emerge 22 sections.
1990	Re-establishment of the faculties for the different branches of science as places of free teaching and research 14,652 students are enrolled.
1992/93	With the establishing of other faculties, development of the Dresden University of Technology into a **full-curriculum university** with more than 20,000 students

4. The City of Dresden

Dresden, the capital of the Free State of Saxony, counts at present about 500.000 inhabitants. Dresden as a place of art and science is held in international esteem. Also to the students manifold impressions and opportunities of education and leisure activities are offered. As there are for instance the worldwide renowned historical buildings like the Zwinger, the opera house Semperoper, the Castle of Residence, the Brühlsche Terrasse, the cathedral and the church Kreuzkirche. There are also numerous places of interest in the closer surroundings of Dresden: for instance Pillnitz castle, Moritzburg castle, Stolpen castle or the Baroque Garden in Großsedlitz. A lovely scenery invites you for restoration, walking and winter sports activities, especially in the mountain area of the Erzgebirge, and rock climbing in the romantic rocky world of the Sächsische Schweiz.

In Dresden you will find cultural events for everybody´s taste. The scale ranges from opera, drama and classical concert to music festivals and Dixieland festivals, jazz clubs, open air concerts and student clubs.

The art collections, numerous museums and temporary exhibitions draw thousands of visi-tors to Dresden. Cultural and sporting leisure activities at the Technical University are pos-sible for the students in nearly all variations. Ideal and material support is given to a great number of groups. These are for instance the symphony orchestra, the choir, the student drama group, the cabaret, photographic and graphical groups, and university sports groups.

5. To the Campus by Bus or Tram

The University is situated very close to the city centre. It is within a walking distance of five minutes from the Dresden Main Station. Several bus and tram routes are tangent to the campus.

In the area of the University of Technology only a limited number of car parks is available. Therefore the University has appealed for a long time to the students and staff to leave their cars at home and to use a public transport.

By paying the semester contribution with the share of DM 69.-- (winter semester 1995/ 96) students aquire the so-called "semester ticket", which is valid on all buses, trams and Elbe ferries of DVB (Dresden transport services). Here, as ticket the student's identity card, in connection with a valid identity card, is accepted.

All the other tickets are available in the sales office of DVB, Antonstr. 2a, 01097 Dresden, as well as from the ticket machines at the DVB stops.
For further information please apply to the DVB sales office.

Telephone:	DVB switchboard	52091
	customer telephone for passengers	53536
	current traffic information concerning DVB routes	011537

6. Division of the University

The Dresden University of Technology is divided into 14 faculties:

- Faculty of Natural Sciences and Mathematics
- Faculty of Philosophy
- Faculty of Linguistics and Literature
- Faculty of Education
- Faculty of Law
- Faculty of Economics
- Faculty of Computer Science
- Faculty of Electrical Engineering
- Faculty of Mechanical Engineering
- Faculty of Civil Engineering
- Faculty of Architecture
- Faculty of Transport and Communications "Friedrich List"
- Faculty of Forestry, Geosciences and Hydrosciences
- Faculty of Medicine "Carl Gustav Carus"

The faculty is responsible for the performance of studies on the basis of the regulations for study, examinations and practical training in the courses of studies represented by them. Research and teaching are realized by institutes, which are assigned to faculties.
At present, about 20,000 students, more than 1,000 of them are foreigners from more than 100 countries, are studying at Dresden University of Technology. About 430 of them are enrolled in the Faculty of Forestry, Geosciences and Hydrosciences.

The following central institutions are serving the entire university:
- the University Library
- the University Computing Centre
- the Centre for Languages for Special Purposes
- the University Sports Centre.

7. The University Library (UB)

With its rich stocks, the University Library serves research, teaching and studies, profes-sional as well as general education. Here you can inform yourself profoundly, borrow books and periodicals rapidly, do bibliographical research on-line and with the aid of CD-ROM or withdraw for literature studies to the reading-rooms offering a rich stock of reference books.

Literature which is not available can be ordered for you from other libraries for a fee. With the free registration in the Main Library you will receive a reader registration card admitting you to use all parts of the University Library including the specialized libraries.
In the **Main Library** you find book and periodical literature of an interdisciplinary charac-ter (total stock: about 415.000 units). Moreover, about 79.000 doctoral theses from all German universities are available to you. In the periodicals reading-room you can use about 1.500 different journals. "Nomen est omen" - the Student Library holds about 120.000 volumes with

open access, including many textbooks and specialized books for the basic semesters as well as scientific works of reference.

Besides the Main Library, the University Library comprises **18 Specialized Libraries** which are distributed over the whole TUD campus. At any time you can get information of the locations by the staff of the Library or by a reference sheet that is available in the user areas. You find old and special stocks in the specialized libraries.

You should devote special attention to the **Centre for Information on Patents and the Office for Standards / DIN Collection of the University Library** with their rich offers of national and international patents, standards and inquiry means.

8. The University Computing Centre (URZ)

What does the University Computing Centre offer to students?

PC-pool
There are available 25 DOS/Windows-PCs and 8 Macintosh-PCs mainly for free practising under expert guidance and permanent supervision. The pools offer access to other computers and network services. A choice of documentations and instruction leaflets for the basic studies is available.

Workstations and X-terminal Pool
Workstations from different manufacturers and X-terminals are available to the public in the University Computing Centre.

The Network Reference Centre
There you can get advice specifically concerning the possibilities of working in the Science Network and Internet as well as using the available services. A limited number of workplaces allows one's own working under expert supervision.

Further Training Courses
The University Computing Centre performs many further training courses, with their main focus on:

- using of computers under UNIX
- services in the Science Network
- PC-applications

The courses are planned semesterwise and published in a special booklet.

Software Consultation
Here, information can be gathered about acquisition and usage. Also special literature is available there on a limited scale.

9. The International Office

The Dresden University of Technology promotes contacts to foreign universities in various ways. The Akademisches Auslandsamt (AAA) (International Office) is the appropriate authority for the respective matters. Its address is:

Technische Universität Dresden
Akademisches Auslandsamt
01062 Dresden
Tel.: 0351/463 5358
Fax: 0351/471 7985

The AAA is organized in three divisions:

Studies Abroad

Ms Nuphaus and Ms Gärtner advise students of TUD on all questions concerning a stay for the purpose of study at a university abroad. They advise students on existing contacts to other universities, arrange practical training placements abroad and organize language tandems in which Germans and foreigners may meet informally and get acquainted with the respective other language and culture.

Studies for Foreigners

At present, about 1,000 foreigners from more than 100 countries are studying at the Dresden University of Technology. The AAA has the task of advising and tutoring this large group. The division of Studies for Foreigners is responsible for the admission, enrolment and re-registration of the foreign students. Moreover, the foreign students are advised and looked after in social, cultural, political and legal matters. The Division of Studies for Foreigners offers tutorates for the linguistic and academic further education of the foreign students as well as the language tandems mentioned above. In cooperation with the Institute of German Studies, the Division organizes the "Dresden Summer Courses" for foreign students and scientists at the Dresden University of Technology.

International Relations between Universities and Exchange of Scientists

The Dresden University of Technology is in partnership with many universities in Central and Eastern Europe and has established a rapidly growing number of relations with Western countries. For the financing of these contacts in many cases the acquisition of third-party funds is necessary. The existing offers of potential promotion from federal, state and endowed funds are as rich as they are confusing. That is why the AAA offers its consultation.

C. THE STUDY AT DRESDEN UNIVERSITY OF TECHNOLOGY

1. The Academic Year

The academic year is divided into a winter semester and a summer semester. Each semester comprises 15 weeks for courses, 4 weeks for examinations and additional weeks for scientific work.

Winter semester	**W**	01.10. - 31.03.
Summer semester	**S**	01.04. - 30.09.

The courses of the winter semester start in the first fortnight of October and last until the end of January. February is set aside for examinations. The courses of the summer semester begin early in April and last until the end of July. They are followed by examinations. The exact dates can be obtained from the International Office.

For each semester a university calendar ("Vorlesungsverzeichnis") is published by the Dresden University of Technology. Arranged according to faculties, it gives the courses of the respective semester, the lecturers' names and data concerning the day, time, duration and location of the course. The university calendar can be acquired in the University or in bookstores in Dresden.

Every student enrolled in the University has the opportunity to take part in all courses offered. Thus, it may be really interesting to attend a lecture of Law or Chemistry. For exercises or practicals only, there may occur restrictions for capacity reasons.

2. The Study

The German university studies consist of two parts. As a rule, four-semester basic studies are followed by five-semester main studies. The studies are completed with a one-semester diploma dissertation. During the basic studies, students are given orientation and the introduction into the context of the subject chosen. During that time, students are to acquire essential basic knowledge and elementary capabilities and skills. The programme of the first semesters is characterized by a great proportion of compulsory subjects of the most different special fields. The basic studies are completed after the 4th semester with the preliminary examination for the diploma degree. The preliminary diploma degree certificate is required for the commencement of the main studies. As it is recognized by all universities in Germany, this is the preferred time for a planned change of universities or a stay abroad.

3. Admission and Registration Procedures

Students wanting to study at the Dresden University of Technology within the framework of ECTS are recommended to contact first the ECTS or ERASMUS coordinator of their home university for the purpose of assistance. There is a simplified application procedure for ECTS students from partner universities. The **ECTS application documents should be sent as early as possible** to the host university, **i. e., to the ECTS Coordinator of the Institution (the International Office).**

Please note that, in accordance with the ERASMUS regulations, no tuition fees are charged at the registration. **However, all the students, including the ECTS students, are obliged to**

pay a semester fee. At present, it amounts to DM 105.- per semester and is composed of a contribution to the students' council (Studentenrat = self-administration of students), a contribution to the student welfare organization (Studentenwerk, theft and accident insurance, cultural catering) and, above all, the price for a semester ticket, valid for the entire public transport system of Dresden (buses and trams).

For the regular admission to the full-time study at the Dresden University of Technology different provisions apply regarding entry to the University. Those who are interested are requested to contact the International Office.

4. Residence Permit

There is no obligation to hold a visa for ECTS students. The required formalities of the registration with the police are went through in the course of the matriculation procedure.

5. Language Requirements

ECTS students should have a good command of the German language already before they come to Dresden, in order to be able to follow the courses, take part in general conversation and technical discussions and pass examinations in German. To raise the level of their proficiency in German, ECTS students from abroad are advised to take part in the three-week crash course offered to programme students at the Dresden University of Technology in September and in March (before the beginning of the winter semester and summer semester, resp.). Moreover, during the lecture period courses in German on different levels are offered to foreigners in each semester, parallel to their regular courses.

It is also possible to take part in the International Summer Course of the Dresden University of Technology (German for students and university teachers from abroad) in August. Information about dates and participation fees is given by the International Office.

6. Living and Accommodation in Dresden

The Student Welfare Organization (Studentenwerk)

The Dresden Student Welfare Organization, located in the close vicinity of the Dresden University of Technology, is an economically independent public institution. Its duty is social support, health care and cultural catering and assistance for the students of the Dresden University of Technology. It manages the dining halls and students' hostels, maintains kindergartens, students' clubs and other social and cultural facilities.

The office of the Dresden Student Welfare Organization is located at:

Fritz-Loeffler-Str. 18
01069 Dresden
Telephone: 469750

The payment of a semester contribution of DM 25,- entitles a student to use the facilities of the Student Welfare Organization and is required for the enrolment in the Dresden University of Technology.

Board

At the University, several dining halls and snack bars offer breakfast, lunch and snacks at very modest prices. (The average price of a meal is DM 3,-.)
Students themselves have to take care of dinner and meals on weekends. That is why all students' hostels are equipped with cooking facilities.

Cost of Living

The cost of living in Dresden is still comparatively low and varies between DM 800,- and DM 1,000,- per month.

Insurances

Foreign students who prove that by an insurance in their homeland they are insured also abroad need not additionally insure themselves against illness. Otherwise, they have to join a German health insurance on registration in the Dresden University of Technology.
Students are advised to effect a liability insurance (against damage culpably inflicted on others by the student).

Sports Facilities, Leisure-time Activities

The Dresden University of Technology has a large number of various sports facilities and sports clubs which, of course, are open to ECTS students.
There are 26 student clubs in Dresden that arrange a rich variety of leisure-time activities (disco, film shows etc.).
In addition, the International Office in cooperation with German and foreign students arranges numerous events (excursions, parties, language tandems etc.)

7. The Student Council of Dresden University of Technology

The Student Council is the elected body that represents the interests of the students of the Dresden University of Technology. Its members are elected by the student councils of the departments. By the Student Council and the department councils, students are sent into all university bodies.

D. THE FACULT OF FORSTRY, GEOSCIENCES AND HYDRO-SCIENCES

Dean:	Prof.Dr.-Ing.Dr.-Ing.habil. Gerd H. Schmitz
Dean´s Office:	Pienner Straß e 8, 01737 Tharandt
Tel.:	(035203) 37331, App. 206
Fax:	(035203) 37411
Visiting address:	Würzburger Str. 46, 01187 Dresden
Tel.:	(0351) 463 3931

Vice dean:	Prof.Dr.rer.nat.habil. Wolfgang Kaulfuß
Office:	Helmholzstraße, Hülsse-Bau, Ostflügel, 01069 Dresden
Tel.:	(0351) 463 2994
Fax:	(0351) 463 7064

The Faculty of Forestry, Geosciences and Hydrosciences of Dresden University of Technology combines the disciplines of life sciences, geo and water sciences and engineering. They are each concerned with the natural and man-made environment.

The geosciences research the earth with its litho, hydro, pedo and atmo sphere, including the history of the biosphere. The science of ecology focusses on the most recent biosphere (i.e. that which has been existing for 10,000 years), along with its biotopes, biocoenoses, aquatic and terrestrial ecosystems. One of the principal goals of which the three departments of the Faculty of Forestry, Geosciences and Hydrosciences have in common is to analyse and determine strategies for the optimum utilization of these natural resources. With respect to these subject-related orientations, the following disciplines are offered at the new Faculty:

- **Litho- and pedosphere**: geological fundamentals, general and forest pedology, soil geology, soil mineralogy

- **Hydrosphere**: hydrology and hydrogeology, surface and groundwater management, water chemistry

- **Atmoshere**: meteorology, climatology, environmental meteorology, remote sensing

- **Biosphere**: general ecology, terrestrial and aquatic ecosystems, forest site science, forest management planning, hydrobiology, limnology, forest botany, forest zoology, nature conservation, silviculture, eco-toxicology, phytochemistry, forestal computer science, environmental system analysis

- **Technosphere**: hydrotechnology, sanitary engineering, water supply, water quality management, forest technology, forestry and timber management, surveying, research on hazardous waste.

Research in the very classical disciplines of geosciences, such as geological history and paleontology which investigate the development of geo and biosphere, is covered by the relevant institutes of the nearby Mining Academy of Freiberg, with whom our Faculty enjoys a close collaboration. The Mining Academy of Freiberg is mainly concerned with the extraction of earth-borne (geological) resources (metals, rock, earths, fossile fuels, e.g. petroleum), whilst one of the important tasks of the Faculty of Forestry, Geosciences and Hydrosciences is to deal with the consequences of the mining operations by developing strategies for ecosystem and landscape rehabilitation. More generally, the research and teaching activities of our Faculty can roughly be summarized as follows:

- research and study of the natural environmental processes (hydrological, biological and silvicultural subjects), including their characterization by geographic parameters
- management, processing and supply of water and timber as raw materials
- analysis, observation and measurement of the earth`s surface (e.g. satellite geodesy, remote sensing) and identification of land use parameters
- all important issues of geography, including e.g. social aspects and those of land use and land evaluation.

Although the specific tasks of forestry, geosciences and hydrosciences are different among themselves, the joint goal, investigation of the earth and its ecosystems, involves a multitude of common aspects. Successful scientific analysis and management of the natural and man-made environment often require a multidisciplinary approach. This becomes evident in:

1. The study of interconnected phenomena of the different types of geosphere also in the various domains of ecosystems in paleozoic and recent times (earths, water bodies, gas envelope, biospheres, biotopes and biozönoses);

2. The exploration of global and ecosystem element cycles (water, O, C, S and other nutrients as well as trace elements); including the consideration and evaluation of the impact of anthropological factors;

3. Time scales, duration and speed of developmental processes in the geo, pedo, hydro and biosphere. Long-term effects of anthropological impacts on the natural equilibrium;

4. The dynamics of environmental changes, balances and imbalances; ecosystem and environmental systems alysis;

5. Modern methods of data acquisition, databases and geoinformation systems;

6. Mathematical modelling of ecosystems and environmental systems.

The main objective of the combined efforts may be defined as ecosystem conservation under the conditions of an environmentally acceptable utilization of resources facilitating a sustainable development. Handling these issues successfully requires a fully established interdisciplinary scientific atmosphere as is provided at the Faculty of Forestry, Geosciences and Hydrosciences of Dresden University of Technology. The interdependence and interlinking of engineering and natural sciences is well evident within the three departments, where engineers and natural scientists often closely collaborate within a single institute.

The Faculty is organized into institutes, each headed by an elected director. The members of the institutes within the three departments, Forestry, Geosciences and Hydrosciences, are represented by panels of experts which are presided over by the respective head. The panels of experts pass on their recommendations and proposals to the faculty council which, together with the Dean, is the legal authority of the Faculty to take decisions. The faculty council is headed by the Dean who is supported in his role by the vice-dean and the dean`s office. Students are involved and contribute on all levels.

The Faculty of Forestry, Geosciences and Hydrosciences of Dresden University of Technology combines both traditional and modern science subject areas. The Forest Academy, for example, founded at the beginning of the 19th century, represents one of the oldest research bodies in that field, while the Department of Hydrosciences which, in its multidisciplinary spectrum, is unique in Germany, forms a rather young research and teaching unit. Since the reunification of Germany, the new Faculty has become very popular among students. It remains, however, nonetheless loyal to its principles of educational quality, incorporating an excellent international academic standard and sound student guidance. This is provided on the one hand by a well-balanced training in natural and engineering sciences, and on the other hand by creating an ideal atmosphere of study between lecturer and student.

The studies of the various aspects of hydro, forest and geo sciences are essentially based on both natural and engineering sciences. Besides the graduate studies, the Faculty has included in its teaching spectrum a postgraduate course in Environment Protection and Regional Planning since 1994 and a master course in Tropical Forest Management. Other postgraduate courses are arranged under the auspices of UNESCO/ UNEP. These international courses, featuring issues of ecosystem management, protection of environment and water management, were especially created for represetatives from developing countries. The courses last for periodes between six weeks and six months and the lectures are given in English language. In cooperation with the European Institute for Postgraduate Education (EIPOS) a postgraduate study for attaining the Europäisches Diplom in Umweltwissenschaften (European Master Degree in Environmental Sciences) is offered for graduates from Poland, the Czech Republic, Slovakia and Germany, who are involved in tasks concerning interstate environmental issues.

E. DEPARTMENT OF WATER SCIENCES

Head of the Department:	Prof.Dr.rer.nat.habil. Jürgen Benndorf
Office:	Georg-Bähr-Straße 1, Beyer-Bau
Mailing address:	Technische Universität Dresden
	Mommsenstraße 13, 01062 Dresden
Tel.:	(0351) 463 3382/2967
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Dean of Studies of the Department of Hydrosciences:	Prof.Dr.-Ing.habil. Bernd Bilitewski
students advisor:	Dr.rer.nat. Karin Luckner
Office:	Georg-Bähr-Str. 1, 01069 Dresden, Beyer-Bau
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1. Description of the department

Water conservation and sustained management of water resources necessitate a multidisciplinary approach. We are able to achieve this quite successfully at the Department of Hydrosciences due to the coordinated activities of our engineers, biologists, hydrologists, meteorologists and chemists.
The positive effects of this multidisciplinary linking are reflected, above all, in the modern - and in Germany perhaps even exemplary - teaching philosophies within the water management course. As far as the management of water resources is concerned the constructional aspect is no longer of prime importance; it is the „functional aspect" which now plays the principal role. It must be remembered that even the most ideally constructed plant does not guarantee a high level of efficiency. A water treatment plant may be of outstanding engineering design, however the quality of its output depends on the optimal functioning of the whole plant.

In the era of increasing local, regional and global environmental hazards it is no longer possible to educate on the mere grounds of traditional theorems and a philosophy of „patch-work repairing". Rather is it the task to educate concentrating on future planning and taking responsible action with foresight. This, however, presupposes profound knowledge of the processes involved in surface water, groundwater and water treatment plants.
The required profile of the graduated engineer refers to master the instruments of water resources management on the basis of an excellent knowledge of natural sciences.

Similar requirements are to be made on graduates of natural sciences employed at the Department of Hydrosciences (hydrochemists, hydrologists, hydrobiologists). The educational strategy followed here is vice versa, i.e. teaching and research of natural sciences are only regarded as complete, if the aspects of engineering are likewise involved. Hence, it is not quite by chance that important integration concepts developed at the Department of Hydrosciences received ready acceptance among national and international experts.
Courses of studies leading to the Master degree:
- Water Management
- Hydrology
- Hydrobiology
- Hydrochemistry

Tradition

The fields of water sciences have their fixed place in the history of Dresden University of Technology since the previous educational centre was founded. Already in 1838 the way of the training in water sciences in Dresden started with the beginning of the course „Hydraulic engineering". With this place in Saxony renowned names are connected, such as:

Prof.J.A. Schubert (1808 bis 1870), who for instance built the first Elbe-steamboats for the transport of people;
Prof.H. Engels (1854 bis 1945), the founder of the first stationary laboratory for river training in the world;
Prof. A. Frühling, who already before 1900 started with specialized lectures in water supply and sewerage in cities;
the hygienicist **R. Renk**, who presented treatment apparatuses for municipal wastewaters at the International Congress for Hygiene in 1907;
the professors **W. Geißler**, **W. Ortleb** and **F.Liebold**, who before and after World War II continued developing the courses of „Water supply", „Sewerage" and „Wastewater treatment";
Prof. F. Zunker (1886 bis 1956), who in 1946 founded the institute for soil and water management, and who aimed at the unity in European water management by his work in several international professional commissions.

With **Prof.H. Gravelius** (1861 bis 1938) a geographer, meteorologist and hydrologist was called as the professor for climatology, water sciences and water management in 1914. In the same year his book „River science" was published as the first volume of the general work in water science. He offen worked as a consultant for the ministry of Saxony giving advice in questions of dam constructions and flood events.

Continuing the work of Prof. F. Zunker, **Prof. K.-F. Busch**, being the head of the department of water sciences from 1968, was able to concentrate in Dresden the manifold disciplines of natural and engineering sciences in the field of water research and education. So, besides the existing engineering institutes of „Municipal and industrial water engineering" and „Groundwater management" the institutes of „Hydrology and Meteorology", „Hydrobiology" and „Hydrochemistry" were formed from other educational places at Dresden university of Technology or they were newly founded. In 1995 the institute for „waste management and contaminated sites" was founded together with the professorships of the same names.

Building on the long traditions in teaching and research future specialists for solving complex environment concerning tasks are trained at Dresden University of Technology in the course of water engineering since 1988.
Within these newly designed studies a synthesis of natural and engineering sciences is practised. This multidisciplinary approach to every problem in water sciences has opened new ways in education, which are taken since 1991 and can also be observed at other European universities.

The training in water related subjects for the students of water sciences and those of other courses is provided by university lecturers and research assistants of, at present 11 professorships and one associate professorship at the department of water sciences. From the view-point of structural organization the department of water sciences consists of 6 institutes, whose teaching and research tasks are subsequently described.

2. Organization of the department

Institute of Municipal and Industrial Water Engineering

Director:	**Prof.Dr.-Ing.habil. Joachim Hackenberger**
Chair of Municipal Water:	Prof.Dr.-Ing.habil. Joachim Hackenberger
Chair of Water Supply:	Prof.Dr.-Ing. Reinhard Weigelt (from 1. 10. 96)
Chair of Wastewater Treatment:	Prof.Dr.-Ing.habil. Klaus. Lützner
Senior research associate:	Dr.rer.nat. Klaus Kermer
Office:	Georg-Bähr-Str. 1, 01069 Dresden, Beyer-Bau
Mailing address:	Technische Universität Dresden, Mommsenstraße 13, 01062 Dresden
Telephone:	(0351) 463 2337 / 5257
Fax:	(0351) 471 0294

At the institute students are trained during their whole course of studies in water engineering, civil engineering, geodesy, geography, biology and informatics. The scientists of the institute together with the professorship of waste management are responsible for the teaching in the course of municipal and industrial water engineering with the

Specializations:
- Industrial Water Engineering
- Water Supply
- Wastewater Treatment
- Waste Management

Areas of Instruction:
- - Municipal water engineering
- industrial water engineering
- water supply; drinking water treatment; water distribution
- wastewater treatment, sludge treatment, sewerage

Areas of Research:
- process control in water distribution
- iron and manganese removal from water
- deacidification in drinking water treatment
- nitrate elimination in drinking water treatment
- application of ozone and adsorption methods in drinking water treatment
- special investigations on biological denitrification
- optimization of anaerobic multi-phase reactors
- application criteria for biological P - elimination
- prozess analyses in metal working and metal processing industries
- investigation on the issue of how to avoid heavy-metal sludge
- lab-scale investigations on biological degradation processes and inhibitory effects concerning wastewater emitters
- hydraulic investigations and assessment of pollutant loads in sewage systems

Special Tasks:
- studies, expert reports and scientific consultancy regarding sewage-engineering problems

Technical Facilities:
- Technical facility and sewage laboratory Dresden- Kaditz
- trial plant for biological nitrogen elimination
- special analyzing equipment and field measuring devices

Institute of Groundwater Management

Director:	**Prof.Dr.-Ing.habil. Wolfgang Walther**
Chair of Groundwater Management:	Prof.Dr.-Ing.habil. Wolfgang Walther
Office:	Karcherallee 8,01277 Dresden, NabeshimaBau
Mailing address:	Technische Universität Dresden, Mommsenstraße 13, 01062 Dresden
Telephone:	(0351) 257970
Fax:	(0351) 2579714

At the institute students are trained during their basic and main studies and during their specialization in the course of water engineering. Moreover parts of the education in subsidiary subjects of the courses of informatics, biology and geography are covered here. The scientists of the institute together with the professorship of contaminated sites and the professorship of hydrology are responsible for the teaching in the course of (ground) water management with the

Specializations:
- Groundwater management
- Landreclamation and drainage
- Contaminated sites

Areas of Instruction:
- fundamentals of water prospecting
- fundamentals of water management
- dynamics of subterranean water
- groundwater management
- groundwater protection
- System analysing of groundwater processes
- geohydrotechnics
- hydromelioration
- groundwater measurement technology

Areas of Research:
- geohydraulics and substance transport in soils and groundwater
- methods and technologies of soil and groundwater monitoring
- modelling and simulation of groundwater processes
- process investigations into substance transport and turnover in labs and in the field
- water and substance balances of landscapes
- management of groundwater resources
- transport of particles and colloids

Special Tasks:
- design of computer programmes to control water management and monitoring systems
- high performance and parallel computation by means of workstations and transputer networks, visualization and animation
- development of concepts for monitoring and research in the area of substance deposition, soil and groundwater in the field of drinking water supply
- development of methods and technologies for measurements and assessments of contaminate sites and their rehabilitation

Technical Facilities:
- laboratory for water - and for soil-/rock-investigations
- data processing facilities
- workshop for technical construction

Institute of Hydrology and Meteorology

Director:	**Prof.Dr.-Ing.Dr.-Ing.habil. Gerd Schmitz**
Chair of Hydrology:	Prof.Dr.-Ing.habil. Gerd Schmitz
Senior research associate:	Dr.sc. Franz Lennartz
Office:	Würzburger Str. 46, 01187 Dresden
Mailing address:	Technische Universität Dresden, Mommsenstr. 13, 01062 Dresden
Telephone:	(0351) 463 3931
Fax:	(0351) 463 7162

The chairs of hydrology and meteorology perform the formation of the students during their basic and main studies and during their specialization in the course of water engineering. Moreover the work at the institute contributes to the education in subsidiary subjects within the courses of civil engineering, informatics, biology and geography. Moreover students are trained in the course Forest management and in the two postgraduate courses: „Environmental Protection and Regional Planning": The scientists of the institute are responsible for the teaching in the course of hydrology with the

Specialization:
- Hydrology
- Meteorology

Areas of Instruction:
- fundamentals of hydrology
- general hydrology
- applied hydrology
- regional hydrology
- urban hydrology
- soil moisture regime
- hydrologic cycle and water balance
- surface water management/reservoir management
- hydrometry
- hydrological statistics

Areas of Research:
- impacts of the changes in land use and environment on the hydrologic cycle and on water management
- simul.of interconnected surface and subsurface flow mainly in view of surface irrigation
- prognostic computation of flood events
- prognostic computation of low flow regimes in rivers
- dimensioning of water management facilities
- mathematical modelling of precipitation runoff processes
- development of physically based submodules in simulation models for water balance calculations
- approaches for analyzing hydrological data
- modeling of soil moisture transfer considering natural soil variability
- neural networks for optimizing irrigation systems

Technical Facilities:
- laboratory for investigations in the fields of soil sciences and hydrometry
- data processing facilities

Institute of Hydrology and Meteorology

Chair of Meteorology:	**Prof.Univ.Doz.Dr.phil. Christian Bernhofer**
Senior research associate:	Dr.rer.nat. Franz Berger
Office:	Pienner Str. 9, 01737 Tharandt
Mailing address:	Technische Universität Dresden, Mommsenstr. 13, 01062 Dresden
Telephone:	(035203) 37331, App. 340
Fax:	(035203) 37495

Teaching areas of Meteorology:

- introduction into meteorology and hydrology
- measurement of environmental variables
- meteorology
- remote sensing
- boundary layer climates
- meteorological lab-class
- energy and environment
- environmental meteorology
- forest meteorology
- forest and water

In Research regarding Meteorology emphasis is laid on the following topics:

- research and modelling of meteorological processes of forest systems and agricultural systems
- analysis and modelling of the soil-plant-atmosphere system
- landscape evapotranspiration („Biospheric Aspects of the Hydrological Cycle")
- water- und carbon fluxes of temperate forests
- regional climate
- methods of remote sensing
- meteorological investigations on man-made environment (urban and other drastically changed ecosystems)
- deposition of atmospheric and aquatic pollutants
- climatic change and climate research

The meterology branch has the following experimental and technical facilities:

- experimental watershed Wernersbach
- anchorstation Ökomeßfeld
- MeteoSat-receiver
- climate network Osterzgebirge
- mechanical workshop

Special tasks of the institute are research projects on:

- mass balances of materials for areas of agricultural use and forested areas
- prevention of flood events for cities and urban areas
- run-off processes in sewer systems
- topo- and regional climate
- environmental climate

Institute of Hydrobiology

Director:	**Prof.Dr.rer.nat.habil. Roland Nagel**
Chair of Limnology:	Prof.Dr.rer.nat.habil. Jürgen Benndorf
Chair of Hydrobiological Engineering:	Prof.Dr.rer.nat.habil. Roland Nagel
Senior research associate:	Dr.rer.nat. Konrad Mädler
Office:	Zellescher Weg 40, 01217 Dresden,Drude-Bau
Mailing address:	Technische Universität Dresden, Mommsenstr. 13, 01062 Dresden
Telephone:	(0351) 463 4956
Fax:	(0351) 463 7108

At the institute students are trained in the courses of biology and water engineering. Moreover parts of the education in subsidiary subjects within the courses in informatics, civil engineering and geography are covered here.

Areas of Instruction:

- technical hydrobiology
- applied limnology
- general and theoretical ecology
- biochemical ecology
- biology of aquatic organisms
- ecotoxicology
- ecological systems analysis and applied informatics

Substantial contribution to the following postgraduate studies:

- Enviromental Management for Developing Countries
- Enviromental Protection / Regional Planning

Areas of Research:

- biological fundamentals of water quality management of stagnant and flowing waters
- control of water quality by optimizing the flood web structure
- mechanisms of eutrophication of reservoirs
- self-purification mechanisms in polluted flowing waters
- ecotoxicology

Technical Facilities:

The institute uses to a high extent the facilities of the hydrobiological laboratory at Neunzehnhain in the Erzgebirge Mountains which serves education and further training as well as research work of the entire faculty.

Institute of Water Chemistry and Chemical Water Technology

Director:	**Prof.Dr.rer.nat.habil. Eckhard Worch**
Chair of Hydrochemistry:	Prof.Dr.rer.nat.habil. Eckhard Worch
Lectureship in Limnochemistry:	Ass.Prof.Dr.rer.nat.habil. Roland Fischer
Senior research associate:	Dr.rer.nat. Dieter Lienig
Office:	Zellescher Weg 40,01217 Dresden, Drude-Bau
Mailing address:	Technische Universität Dresden, Mommsenstr. 13, 01062 Dresden
Telephone:	(0351) 463 2759
Fax:	(0351) 463 7271

At the institute students of chemistry are trained in the specialization of hydrochemistry. The scientists of the institute fullfill fundamental teaching tasks in the course of water engineering (basic studies) and in the education in subsidiary subjects within the courses of civil engineering, informatics, geography and biology.

Areas of Instruction:

- fundamentals of water chemistry
- water analysis
- chemical engineering in water treatment
- limnochemistry
- pollutants in aquatic systems
- modelling in water chemistry
- corrosion at water constructions
- practical training: water analysis, chemical engineering in water treatment, limnochemistry

Areas of Research:

- fundamentals of chemical engineering in drinking water treatment and wastewater treatment
- modelling of adsorption processes in drinking water treatment
- assessment of inorganic and organic pollutants in surface waters
- development of methods in water analysis
- photocatalytic oxidation of organic components in waste waters
- photochemical reactions of halogenated hydrocarbons in the presence of hydrogen peroxide and ozone
- refractory organic matter in waters
- landscape recultivation after mining activities

Special Tasks:

- hydrochemical expert reports
- development of computer programmes for modelling of water treatment processes
- mathematical modelling of the complexation of metals and its utilization for the interpretation of physico-chemical processes in natural waters

Technical Facilities:

- analytical laboratory for the application of chromatographic methods, organic trace analysis, determination of collective parameters, heavy metals analysis
- laboratory for drinking water and wastewater treatment
- radiochemical laboratory

Institute of Waste Management and Contaminated Sites

Director:	**Prof.Dr.-Ing.habil. Bernd Bilitewski**
Chair of Waste Management:	Prof.Dr.-Ing.habil. Bernd Bilitewski
Chair of Contaminated Sites:	Prof.Dr.rer.nat. Peter Werner
Senior research associate:	Dr.-Ing. Diethelm Weltin
Office:	George-Bähr-Str. 1, Beyer-Bau
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Telephone:	(0351) 463 7020
Fax:	(0351) 463 7288

Students of the engineering sciences are trained at this institute and at the institutes of municipal and industrial water engineering and the institute of ground water management. Moreover teaching tasks are covered in the education in subsidiary subjects within the courses of civil engineering, water engineering, geography, biology and informatics.

Areas of Instruction:

- engineering of landfill sites
- thermic, biological, chemical and physical waste treatment
- recycling of domestic and commercial waste, waste avoidance, waste reduction
- projecting and precalculation of waste treatment plants
- comparsion of economic efficiencies
- fundamentals of mechanical and thermic process engineering, bio-process engineering
- assessment and redevelopment of contaminated sites

Areas of research:

- assessment of different waste charge systems
- usability of deposited waste and development of special recycling technologies
- optimization of recycling plants for domestic and commercial waste
- development of recycling processes for the utilization of scrap cars
- potentialities of systematic demolition of buildings
- investigations on the utilization of wood waste
- biological prozesses for the recultivation of contaminated sites
- improvement of methods for quantitative registration of decline in production
- avoidance potentials and recovery potentials for different industrial sectors
- investigations on potentials for changing production processes, closing of internal cycles and external recovery
- development of an universally valid concept for internal waste management

Special Tasks:

- Longstanding experience as scientific consulant in technical environmental protection and waste management
- Function as ordered and sworn expert for waste management

Technical Facilities:

- laboratories with special analytic equipment
- bench scale reactors for simulation of biological processes in landfill sites
- special equipment for mechanical waste treatment
- multi-component system for monitoring emissions
- waste incineration facility (planned small-scale plant)

3. Structure of studies

The course of water engineering at the department of water sciences is divided into the fallowing parts:

1. basic studies
2. main studies
3. selected obligatory studies
4. semester of practical work

After 4 semesters the basic studies are completed by the preliminary degree examination. Knowledge in the fields of natural, engineering and water sciences is to be gained during that period. The timetable „basic studies" shows the obligatory courses and their order within the semesters.

The main studies also consist of 4 semesters and are divided into 3 sub-courses:

- municipal and industrial water engineering
- (ground)water management
- hydrology

After having passed the preliminary degree examination in the course of water engineering the student has to decide on one of these sub-courses. The following timetables for the main studies give an overview about the obligatory courses and their order within the semesters.
During the studies 9 complexes are given for choice as courses within the selected obligatory studies in the 7th and 8th semester. Here the student receives special training with at least 10 SWS (lectures per week per semester) in

- special topics in municipal and industrial water engineering
- special topics in waste management
- selected problems in (ground)water management
- hydraulic engineering
- bio-process engineering
- hydrochemistry
- regional hydrology
- meteorology
- construction economics

It should be emphasized that here the students can attend lectures within the courses of hydrobiology and hydrochemistry of which detailed descriptions are to be found in the ECTS - Information - Packages of the departments of biology and chemistry both being part of the joint faculties of natural sciences / mathematics.
The lectures of the selected obligatory studies and their order within the semesters are shown for each complex at the end of the timetables.

The semester of practical work, related to the sub-courses of the students, takes place within the 9th semester. During that period the students general basic knowledge should be extended and professional engineering work has to be practised. So the students will learn how to approach complex tasks and problems of organization in a plant, a factory or at consulting engineers.

The 10th semester is set apart for the diploma-thesis.

The whole scope of obligatory lectures necessary for completing ones studies successfully amounts to 180 SWS (lectures per week per semester). These are 100 SWS during the basic studies and 80 SWS during the main studies before the 9th semester.

The successful completion of studies is documented in a diploma - certificate and an university record on the diploma examination. Graduates from the course of municipal and industrial water engineering and from the course of (ground)water managemnt will be awarded the academic degree of a Diplom-Ingenieur (graduated engineer), graduates from the course of hydrology the academic degree of a Diploma - Hydrologe (graduated hydrologist).

Basic Studies in the course of Water Management

Nr.	subjects	SWS sum	1. semester VÜPr	2. semester VÜPr	3. semester VÜPr	4. semester VÜPr
1.	Basics of Informatics	**7**	2 1 1	1 0 2		
2.	Mathematics	**16**	4 2 0	4 2 0	2 2	
3.	Physics	**10**	2 2 0	2 2 2		
4.	Chemistry	**15**				
4.1.	Fundamentals of chemistry	3	2 1			
4.2.	Biochemistry	4		2 2		
4.3.	Fundamentals of hydrochemistry	3		2 0 1		
4.4.	Pollutants in aquatic systems	2			2 0 0	
4.5.	Limnochemistry	3			2 0 1	
5.	Principles of geology a. soil science	**6**			2 1 0	
5.1.	Principles of geology				2 1 0	
5.2.	Principles of soil sciences					
6.	Basics of surveying	**4**				2 2 0
7.	Selected obligatory course	**2**				
7.1.	Theory of the strength of materials	2				2 0 0
7.2.	Measurement of environmental varaiables	2				1 1 0
8.	Applied hydromechanics	**11**	2 1 0	2 2 0	2 1 1	
9.	Basics of meteorology and hydrology	**3**	2 0 0	1 0 0		
10.	Basics of water exploration and water management	**4**				
10.1	Basics of water exploration	2			2 0 0	
10.2	Basics of water management	2				2 0 0
11.	Basics of water supply	**5**				
11.1	Basics of water distribution	3			2 0 1	
11.2	Basics of drinking water treatment	2			2 0 0	
12.	Basics of wastewater treatment and Industrial water engineering	**7**				
12.1	Basics of wastewater treatment	3				3 0 0
12.2	Basics of sewerage	2				2 0 0
12.3	Basics of industrial water engineering	2				2 0 0
	Economics	**1**				1 0 0
	Project assessment in water engineering	**1**			1 0 0	
	Fundamentals of ecology and Environmental protection	**2**			2 0 0	
	Studium generale	**2**				
		96	19	26	29	22
	V = lectures	64	12	14	21	17
	Ü = exercise	23	6	7	6	4
	Pr= practical work	9	1	5	2	1

4 SWS language studies within the 1th and 2nd semester are not offered to ECTS- Students

Main studies in the course of water management

course of municipal and industrial water engineering

Nr.	subjects	SWS sum	5. semester VÜPr	6. semester VÜPr	7. semester VÜPr	8. semester VÜPr
1.	Basics in hydrobiology	**6**				
1.1.	Technical hydrobiology	**2**	2 0 0			
1.2.	Water hygiene	**1**		1 0 0		
1.3.	Applied limnology	**2**			2 0 0	
2.	Soil mechanics and foundation engineering	**4**				
2.1.	Soil mechanics	2	1 1 0			
2.2.	Foundation engineering	2		2 0 0		
3.	Supporting structures - Statics	**5**	3 2 0			
4.	Supporting structures - Technical Mechanics	**4**		2 2 0		
5.	Reinforced concrete	**4**			2 2 0	
6.	Structural theory and construction management	**6**				
6.1.	Structural theory	4	2 2 0			
6.2.	Construction management	2	2 0 0			
7.	Basics of electrical engineering and automatation technology	**5**				
7.1.	Electrical engineering	2			1 0 1	
7.2.	automatation technology	3		2 1 0		
8.	Process engineering and biotechnology	**6**				
8.1.	Environmental process engineering	4	1 1 0	1 0 1		
8.2.	Biotechnology	2				2 0 0
9.	Water supply	7				
9.1.	Water distribution	3	2 1 0			
9.2.	Drinking water treatment	4		2 1 1		
10.	Sewerage and sewage traetment	**6**				
10.1	Sewerage II	1			1 0 0	
10.2	Sewage treatment	5			1 1 0	1 1 1
11.	Industrial water engineering II	**3**		1 1 0	1 0 0	
12.	Basics of waste management	**4**			2 0 0	1 1 0
	Water and environmental legislation	**2**				2 0 0
	Basics hydraulic engineering, river engineering	**4**	2 0 0	2 0 0		
	Descriptive geometry	**2**	1 1 0			
	Selected obligatory studies	**10**			5 0 0	5 0 0
	Student seminar	**2**			0 2 0	
		80	24	21	21	14
	V = lecture	55	16	13	15	11
	Ü = exercise	20	8	5	5	2
	Pr= practikal work	5	0	3	1	1

Main studies in the course of water management

course of groundwater management

Nr.	subjects	SWS sum	5. semester VÜPr	6. semester VÜPr	7. semester VÜPr	8. semester VÜPr
1.	Basics in hydrobiology	**6**				
1.1.	Technical hydrobiology	**2**	2 0 0			
1.2.	Water hygiene	**1**		1 0 0		
1.3.	Applied limnology	**2**			2 0 0	
2.	Soil mechanics and foundation engineering	**4**				
2.1.	Soil mechanics	2	1 1 0			
2.2.	Foundation engineering	2		2 0 0		
3.	Supporting structures	**9**				
3.1.	Statics	5	3 2 0			
3.2	Technical mechanics	4		2 2 0		
4.	Minicipal engineering	**4**				
	selected obligatory course	3			1 1 0	1 1 0
4.1.	Industrial water engineering II			(1 1 0)	(1 0 0)	
4.2.	Drinking water treatment			(2 1 1)		
4.3.	Sewage treatment				(1 1 0)	(1 1 1)
4.4.	Basics of waste management				(2 0 0)	(1 1 0)
5.	Dynamics of subterranean waters	**9**				
5.1.	Transport of water and substances	6	3 2 1			
5.2.	System analysis of groundwater processes	3		2 1 0		
6.	Surface water management	**4**			3 1 0	
7.	Groundwater management	**5**				
7.1.	Groundwater management	3				2 1 0
7.2.	Remediation of contaminated groundwaters	2				2 0 0
8.	Waterprotection	**3**				
8.1.	Hazardous substances	2		2 0 0		
8.2.	Risk assesment	1			1 0 0	
9.	Geohydrotechnics	**5**		1 1 0	1 1 1	
10.	Hydromelioration	**4**		2 0 0	1 1 0	
11.	Evaluation of contaminated sites and remediation techniques	**6**		2 1 0	2 1 0	
12.	Groundwater measurement technology	**3**	2 0 1			
	Water and environmental legislation	**2**				2 0 0
	Basic hydraulic engineering, river engineering	**4**	2 0 0	2 0 0		
	Selected obligatory studies	**10**			5 0 0	5 0 0
	Student seminar	**2**				0 2 0
		80	20	22	22	16
	V = lectures	57	13	16	16	12
	Ü = exercise	19	5	5	5	4
	Pr= practical work	4	2	1	1	0

Main studies in the course of water management

course of hydrology

Nr.	subjects	SWS sum	5. semester VÜPr	6. semester VÜPr	7. semester VÜPr	8. semester VÜPr
1.	Basics in hydrobiology	**6**				
1.1.	Technical hydrobiology	**2**	2 0 0			
1.2.	Water hygiene	**1**		1 0 0		
1.3.	Applied limnology	**2**			2 0 0	
2.	Dynamics of subterranean waters	**8**				
2.1.	Transport of water and substances	6	3 2 1			
2.2.	System analysing of groundwater processes	2		2 0 0		
3.	Surface water management	**4**			3 1 0	
4.	Groundwater management	**5**				
4.1.	Groundwater management	3				2 1 0
4.2.	Remediation of contaminated groundwaters	2				2 0 0
5.	Waterprotection	**3**		2 0 0	1 0 0	
5.1.	Hazardous substances	2		2 0 0		
5.2.	Risk assesment	1			1 0 0	
6.	Hydrogeology	**2**			1 1 0	
7.	Hydrometry	**3**		2 0 1		
8.	Meteorology	**9**	2 1 0	2 1 3		
9.	Principles of hydrology	**6**	3 3 0			
10.	Applied hydrology	**11**				
10.1	Mathematical statistics	3	2 1 0			
10.2	Hydrological cycle and water balances	4		1 1 0	1 1 0	
10.3	Variability of runoff	2		1 1 0		
10.4	Operational hydrology	2				2 0 0
11.	Water movement in the unsaturated soil	**4**			2 1 1	
12.	Remote sensing in geosciences	**4**				2 1 0
	Water and environmental legislation	**2**				2 0 0
	Basics hydraulic engineering	**2**			2 0 0	
	Selected obligatory studies	**10**			5 0 0	5 0 0
	Student seminar	**2**				0 2 0
		80	20	19	22	19
	V = lectures	55	12	11	17	15
	Ü = exercise	18	7	3	4	4
	Pr= practical work	7	1	5	1	0

Selected obligatory Studies

during the 7th and 8th semester (minimum: 10 SWS required)

Complex for choice 1 **Waste Management**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Thermic waste treatment	2		2 0 0
2.	Recycling of materials	2		2 0 0
3.	Projecting and precalculation	2	2 0 0	
4.	Colloquium	2	2 0 0	

Complex for choice 2 **Municipal water engineering**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Water distribution III	2	2 0 0	
2.	Water treatment III	2		2 0 0
3.	Wastewater traetment III	2	2 0 0	
4.	Special fields in sludge treatment	2	2 0 0	
5.	Special process of industrial water engineering	2	2 0 0	
6.	Sanitary engineering	1	1 0 0	

Complex for choice 3 **Groundwater management**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Special topics of exploration	2		2 0 0
2.	Special topics in groundwatermanagement	2		2 0 0
3.	Special topics of geohydro technics	2	2 0 0	
4.	Special topics of the dynamics of the subterranean waters,water quality	2	2 0 0	
5.	Special topics of the dynamics of subterranean waters,prognosis of water quality	2		2 0 0
6.	Special topics in land reclamation and drainage	2		2 0 0
7.	Special topics in soil remediation	2	2 0 0	
8.	Special topics in the remediation of contaminated sites	2		2 0 0
9.	Special topics of informatics	3		3 0 0
10.	Applied Informatics	2	2 0 0	
11.	Hydrogeologie	2	1 1 0	
12.	Operational Hydrology	2		2 0 0
13.	Mathematical Statistics	3	2 1 0	
14.	Hydrometry	3		2 0 1
15.	Water Movement in the Unsaturated Soil	3	2 1 0	

Complex for choice 4 **Hydraulic Engineering**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Applied hydromechanics II	4		2 1 1
2.	Waterway Engineering	4	2 0 0	2 0 0
3.	Headworks	2	2 1 0	
4.	Coastal Engineering a.Coast Protection	2	1 0 0	1 0 0
5.	Hydroelectric Power Plants	2	1 0 0	1 0 0
6.	Geology of Rock Engineering	2		2 0 0
7.	Geology of Germany	2	2 0 0	
8.	Prestressed concrete constructions	2	2 0 0	

Complex for choice 5 **Bio-Process Engineering**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Bioremediation of contaminated sites	2	2 1 0	
2.	Toxikology	1		1 0 0
3.	Bio-Process Engineering	3	2 1 0	
4.	Technical Microbiology	6	2 0 4	
5.	Ecotoxicology	2	2 0 0	

Complex for choice 6 **Hydrochemistry**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Fundamentals of hydrochemistry	2	2 0 0	0 0 4
2.	Limnochemistry	2		2 0 0
3.	Water treatment chemistry	6	2 0 0	0 0 8
4.	Water analysis	6	2 0 8	
5.	Processes of preparation and analysis in bio-technology	2	2 0 0	
6.	Modelling of processes in water chemistry	3		1 2 0

Complex for choice 7 **Regional Hydrology**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Regional hydrology	2		2 0 0
2.	River engineering	2		2 0 0
3.	Remediation of contaminated groundwater	4	2 1 0	2 1 0
4.	Hydromelioration	4	2 0 0	2 0 0
5.	Transport processes	2	2 0 0	
6.	Limno-ecosystems	3	1 0 0	2 0 0
7.	Groundwater measurement technology	3	2 1 0	
8.	System analysing of groundwater processes	1		0 1 0

Complex for choice 8 **Meteorology**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Special aspects of remote sensing	4		2 0 2
2.	Hydrometeorology	2		2 0 0
3.	Boundary layer climates	4	2 0 2	
4.	Meteorological lab-classes	4		2 0 2
5.	Envirnonmental meteorology	2	2 0 0	
6.	Energy and envirnonment	2		2 0 0

Complex for choice 9 **Construction Economics**

Nr.	Fächer	SWS Summe	7. Semester VÜPr	8. Semester VÜPr
1.	Descriptive geometry	4	2 2 0	
2.	Structural Theory	2		1 1 0
3.	Construction Management	1	1 0 0	
4.	Fundamentales of mechanical engineering	4	2 2 0	
5.	Public building law	2		2 0 0
6.	Economics	1	1 0 0	
7.	Management	1		1 0 0

4. ECTS-Coordinator of the department

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F. THE CATALOGUE OF COURSES

1. General introduction

The following list of lectures the different subjects of the basic and main studies and of the specialization. Because the course of water engineering is unique among German univer-sities every lecture is shown in the list. The description of the lectures has the following pattern (example):

WSI 213	**Water supply**	
	W/S	**210 / 211** **7 cr**
W	department of water sciences	
SI	abbreviation of the institute or the abbreviation of the respective faculty	
213	numbers within the 3 parts of studies: 100 basic studies 200 main studies 300 selected obligatory studies	
Water supply	title of the lecture	
W / S	the lecture includes 2 semesters (starting with the winter semester) W - winter semester S - summer semester	
2	number of teaching lessons per week and semester	
1	number of exercise lessons per week and semester	
1	number of practical lessons per week and semester	
7 cr	ECTS-credits	

Distribution of the credits

Basic studies	100 cr
Main studies, including studies of the specialization	80 cr
Semester of practical work (9. semester)	30 cr
Assignet paper	40 cr
Diploma thesis	50 cr

Abbreviation of the teaching institutes and professorships

Department of water sciences **W**

Institute of	Abbreviation
Municipal and Industrial Water Engineering	SI
Groundwater Management	GW
Hydrology and Meteorology	HM
Hydrobiology	HB
Water Chemistry and Chemical Water Technology	HC
Waste Management and Contaminated Sites	AA

Faculty of Civil Engineering **B**

Institute of	**Abbreviation**
Hydraulic Engineering and Applied Hydromechanics	WB
Structural Design and Timber Engineering	BH
Geotechnics	GT
Construction Management	BW
Structural Mechanics and Informatics in Civil Engin.	BB
Supporting Structures and Building Materials	TB

Faculty of Natural Sciences/Mathematics **N**

Institute of	**Abbreviation**
Mathematical Stochastics	MS
Geometry	GM
Inorganic Chemistry	AC
Biochemistry	BC
Applied Photophysics	AP
Mikrobiology	MB

Faculty of Informatics **I**

Institute of	**Abbreviation**
Softwaretechnics I	SW

Faculty of Architecture **A**

Professorship of	**Abbreviation**
Planning of supporting structures	TW

Department of forest sciences **F**

Institute of	**Abbreviation**
Soil sciences and Standortlehre	BS
General ecology and environmental protection	ÖU

Department of Geosciences **G**

Institute of	**Abbreviation**
Geodesy	GO

Faculty Elektrical Engineering **E**

Institute of	**Abbreviation**
Elektrotechnology	ET

Faculty Mechanical Engineering **M**

Institute of	**Abbreviation**
Thermodynamics and Technical Equipment	TG
Machine unit and machine construction	MM

2. Courses of Basic Studies

Courses with an examination:

ISW 101 **Basics of Informatics**
W/S 211/ 102 7cr

Reflecting the dynamic development of computer sciences this course is centred round the presentation of modern tendencies in connection with basic ideas, principles and methods of this science which can be derived from that. The education focuses on imparting knowledge of the construction of hard- and software components that are contained in modern computer systems as well as on developing capabilities enabling students to describe problems that are to be solved by means of algorithms and data structures. A practical training offers possibilities to practise the use of an operating system and to carry out own programs by means of modern programming techniques and software engineering.

prerequisites: none
examination: written
achievement test: written after the first term, essay for practical assessment purposes
lecturer: Karl

NMS 102 **Mathematics**
W/S/W 420/ 420/ 220 16cr

In the subject „Mathematics", an applicable and well-founded knowledge of essentual mathematical foundations is taught such as solution methods for systems of equations, problems in analytical geometry, differential and integral calculus and their applications, differential equations and, last but not least, basic elements of probability theory and mathematical statistics.
The aim of studies in mathematics is to develop the capability of mathematical modelling for specific technical problems and hereby to make use of the mathematical processes of reasoning, correlations, approaches and algorithmic methods.

prerequisites: none
examination: divided into 3 parts, each one after the respective semester, written
lecturer: Franz; Sasvari

NAP 103 **Physics**
W/S 220/ 222 10cr

This course gives an introduction into fundamentals of physics, containing the following subjects: mechanics of the gravity centre, mechanics of liquids and gases, oscillation and waves, electricity, optics and within the laboratory classes 7 tests on different subjects have to be carried out successfully: push and rotating oscillations, surface tension, specific heat of solid bodies, humidity, error analysis and Geiger counter.

prerequisites: A - levels
examination: oral after the second semester
achievement test: passed written examination after the first semester
lecturer: Leo

NAC 104 **Fundamentals of Chemistry**
W 210 3cr

A short review of general and inorganic chemistry is given in the lecture, including:
Atomic structure, chemical bounding, chemical reactions, chemical equilibrium, nonmetalic elements, metallic ellements, environmental problems.

prerequisites: A - levels in chemistry
examination: written
lecturer: Reichelt

NBC 105 **General Biochemistry**
S 220 4cr

Students will be introduced to the chemistry of biomolecules and fundamental principles of anabolic and catabolic metabolism.
1. Biomolecules: mono- and oligosaccharides; fatty acids and lipids; amino acids, peptides, proteins; enzymes and water
2. Bioenergetics: ATP-cycle, electron transfer, respiratory system, regulation of ATP-formation
3. Anabolic and catabolic metabolism glycolysis; citrate cycle; oxidation of fatty acids; oxidative degradation of amino acids, urea cycle, biosynthesis of carbohydrates, lipids and amino acids; photosyntheses; Introduction into molecular genetics; protein biosynthesis

prerequisites: A - levels in chemistry and biology
examination: written
lecturer: van Pee

WHC 106 **Fundamentals of Hydrochemistry**
S 201 3cr

The lecture includes the following topics: structure and properties of water, properties of aqueous solutions, chemical equilibria in aquatic systems, occurence and properties of inorganic and organic water constituents, physical and chemical processes for drinking water and wastewater treatment.

prerequisites: none
examination: written
lecturer: Worch

WHC 107 **Pollutants in Aquatic Systems**
W 200 2cr

The lecture imports reasons for input of selected organic and inorganic pollutants in aquatic systems, effects of the pollutants on ground and surface waters, including the sediment, demands to be met following the Drinking Water Decree with regard to the pollutant limits, as well as the efficiency of various methods of drinking water treatment concerning the pollutant elimination.

prerequisites: fundamentals of hydrochemistry
examination: written
lecturer: Fischer

WHC 108 **Limnochemistry**
W 201 3cr

The educational tasks comprise to imparting of knowledge on the pollutant transformation and pollutant handling by physico-chemical and biochemical processes in natural waters, selfcleaning mechanisms and processes, as well as the loading capacity of waters, fundamentals of the underground passage and remediation of contaminated waters.

prerequisites: basic knowledge in chemistry
examination: written
lecturer: Fischer

BTG 109 **Principles of Geology**
W 210 3cr

The lecture treates the effects of the geodynamical processes as well as the investigations of the building ground and the building area. The mechanisms of river- and coastal erosion, subsidences, landslides, earthquakes are some subjects of the lessons. In training-courses the most important rocks are presented and the interpretation of geological maps will be taught.

prerequisites: soil mechanics
examination: written
lecturer: Grunert

FBS 110 **Soil Science**
W 210 3cr

The lectures impart basic knowledge of soil science with the main emphasis on soil geology, physical, chemical and biological soil properties, soil genetics, and soil systematics. The theoretical fundamentals are supplemented by regional and utilizational aspects as for agriculture, forestry and water management.

prerequisites: geology, especially pleistocene geology
examination: oral at the end of the winter semester
achievement test: participation in some field practice
lecturer: Nebe

GGO 111 **Fundamentals of Surveying**
S 220 4cr

The study instruction of „Fundamentals of surveying" undertakes the education in the surveying for civil engineers and for water engineers and includes operating the geodetic and measuring instruments.
In the studies students will develop the ability of using geodetic technologies in civil engineering to realize geometric parameters in a high accuracy and quality.

prerequisites: none
examination: oral
achievment test: course-work
lecturer: Möser

BTB 112 **Theory of the Strength of Materials**
S 200 2cr

The education in construction materials technology imparts the way of trinking in categories of this scientific field to the students. Priority is set to the construction materials properties which are essentially for structures and buildings, to their mutual influence and their relevance for the structural behaviour. Additionaly some special problems are shortly discussed concerning the corrosion and the durability of construction materials and structural components.

perequisites: none
examination: written
lecturer: Schorn

WHM 113 **Measurement of Environmental Variables**
S 110 2cr

The lecture covers theroretical and practical fundamentals of measurement technique, especially regarding physical variables in the field including error analysis. The student will become familiar with the major electronical measurement techniques and sensors as well as with methods of transmission, recording and processing. Tendencies of developement will be dealt with and an overview will be given about principle techniques of remote sensing and measuring the components of the hydrological cycle.

perequisites: Basic knowledge in physics, chemistry and computer science
examination: written
lecturer: Bernhofer/Gräber

BWB 114 **Applied Hydromechanics**
S/ W/ S 210/220/211 11cr

The lectures are given on hydrostatic and hydrodynamic subjects. The phenomena of hydrostatic pressure are analysed and the calculation of resulting loads on hydraulic structures is explained. In hydrodynamics the students receive basic knowledge about the discharge in pressure pipes and open channels, about overflow and outflow as well as about the basics of the theory of turbulence. The training also includes the application of knowledge to the calculation of the mentioned kinds of flow.

prerequisites: applied mechanics
examination: intermediate written examination after 2nd term, test after 3rd term
final written examination after 4th term
lecturer: Martin, Aigner

WHM 115 **Introduction into Meteorology and Hydrology**
W/S 200/ 100 3 cr

The lecture deals with fundamental processes in the atmosphere and hydrosphere. Energy and water budgets are presented on a physical basis. It covers radiation, precipitation, evapotranspiration, surface and sub-surface runoff as well as water and energy storage. Emphasis is also laid on climate, its fundamentals and its variability. The student learns to critically evaluate

meteorological and hydrological information (data, consulting and forecasts) and to utilize this information for water management purposes (planning, design and management of hydrological facilities).

prerequisites: none
examination: written
lecturer: Bernhofer

WGW 116 Basics of Water Exploration
W 200 2cr

The aim of the lecture is to demonstrate methods of the design and construction of water intake out of lakes, out of flowing waters, of spring tappings, of tube wells and horizontal filter wells. Furthermore the design of facilities for the recharge of groundwater and for bank filtration are shown.

prerequisites: basics of natural sciences
examination: written
lecture: Walther

WGW 117 Basic of Water Management
S 200 2cr

The lecture presents the basics about methods of water management, water yield and water demand of the earth and about the distribution of surface and subsurface resources. Fundamental knowledge will be presented of groundwater flow and substance balances in catch-ment areas. Furthermore methods of land reclamation, drainage and management of agricul-tural used the soil and principles of the design of wellhead protection zones are shown.

prerequisites: none
examination: written
lecture: Walther

WSI 118 Basics of Drinking Water Treatment
W 401 5cr

Basics of pumping, transport and storage of water and drinking water treatment are given. Students receive an overview about operation conditions of pumps as well as about design and operation of water distribution systems. Basing on the quality of raw waters and the requirements on drinking water quality basic processes and the necessary facilities for water treatment are explained.

prerequisites: basics of hydrochemistry
examination: written, devided into 2 parts
lecturer: Weigelt (from 1. 10. 96)

WSI 119 **Basics of Wastewater Treatment**
S 300 3cr

In the course „Wastewater treatment I" wastewaster compounds, natural and technical processes as well as treatment plants for wastewater and sludge are explained, including ways of sludge disposal. Besides their gain of knowledge about technological and scientific facts, the students learn which problems occur in planning, constructing and operating plants of different wastewater treatment systems and how to solve these problems with the help of recent findings.

prerequisites: none
examination: written
lecturer: Lützner

WSI 120 **Basics of Sewerage**
S 200 2cr

In the course „Sewerage I" the students receive a general view on appropriate urban and industrial drainage, including stormwater. The topics emphasized in the lectures are drainage systems, constructions in a sewer system, evaluation of design parameters, stormwater treatment and oparational aspects.

prerequisites: none
examination: written
lecturer: Lützner

WSI 121 **Basics of Industrial Water Engineering I**
S 200 2cr

The lecture deals with selected physical and chemical unit operations (e.g. reverse osmosis, flocculation, neutralization) in the field of water-, wastewater-, and sludge treatment including the recovery of utilizable substances of waste water. Many examples are used to explain the different unit operations.

prerequisites: basics of hydrochemistry
examination: written
lecturer: Hackenberger/Kermer

Courses with an achievment test:

WAA 122 **Economics**
W 100 1cr

During these lectures the students learn how to apprach and to solve economical problems. Methods necessary and the essential terminology are taught in order to enable the future water engineers to co-operate with economists in a professional way.

perequisites: none
examination: written
lecturer: Bilitewski

WSI 123 **Project Assessment in Water Engineering**
S 100 1cr

The aim of the lectures is to prepare the students for practice in dimensioning and designing both from the viewpoint of consulting engineers and from the viewpoint of controlling state organs. The future water engineers shall be enabled to evaluate their projects of developing, planning, upgrading and restoring the water-related infrastructure by means of organizative, economical and financial facts and methods. Imortant methodes in this context are the determination of costs and calculation, and the comparing costs calculation. These items form the introduction into the questions of project assessment in water engineering.

perequisites: none
examination: written
lecturer: Kaufhold

FÖU 124 **Fundamentals of Ecology and Environmental Protection**
W 200 2cr

Based on the physico-chemical determinants of the biosphere and its evolution the principles of energy transfer and metabolism of materials in organisms are discussed. Emphasis is laid on the eco-technological and environmental application and on opportunities of regeneration and management with explanations by examples.
This course focuses on the understanding of causality and results of a quick change in the dynamic equilibrium of ecosystems and the whole biosphere as well as on possibilities and limitations of influencing these relationships.

perequisites: none
examination: written
lecturer: Dudel/Kinze

3. Courses of Main Studies

Courses with an examination:

WHB 201 **Technical Hydrobiology**
W 200 2cr

The main topic of the lecture are limnic ecosystems and the important biological processes in sewage clarification and production of drinking water. Additionally the strength of aquatic ecosystems and their responses to changes of stress will be discussed.

prerequisites: ecology, hydrochemistry
examination: written
lecturer: Nagel

WHB 202 **Laboratory classes in Hydrobiology**
S 001 1cr

In summer semester lab-classes of each students will be held in the laboratory of hydrobiology in Neunzehnhain. Emphasis is laid on the following subjects:

1. Distribution of temperature, light intensity and organisms in standing waters
2. Organisms in running waters; biological evaluation of water quality
3. Microscopy (plankton of drinking water reservoirs)

prerequisites: Technical Hydrobiology
examination: written together with „Applied Limnology"
lecturer: Benndorf

NMB 203 **Water Hygiene**
S 100 1cr

The lecture comprises the origin and dispersal patterns of diseases, The carriers of which are microorganisms in water bodies and water supply systems, and methods of control. The standards relevant to the quality of drinking water are examplified.

prerequisites: chemistry, Technical hydrobiology
examination: written
lecturer: Röske

WHB 204 **Applied Limnology**
W 200 2cr

The lecture brings into focus the combination of all parts of basic limnological knowledge in order to realize and solve problems regarding the protection of waters and the management of water quality. The following topics are taken into consideration: principles and goals of the protection of waters; physical, chemical and biological components of the loading of water bodies; evaluation and classification of water quality and of the morphological state of water bodies; methods to control water quality; tools for decision making with respect to control, planning and prediction of water quality. Students should develop the ability to realize water

prerequisites: basic knowledge in hydrobiology and hydrochemistry
examination: written
lecturer: Benndorf

BGT 205 **Soil Mechanics and Foundation Engineering**
W/S 200/ 200 4cr

Soil mechanics is a subject of the advanced level of studies. As an introduction problems of soil mechanics as a part of geotechnices are show together with examples. The methods of subsoil exploration and testing in field and laboratory are explained. The knowledge about laboratory investigations is supported by a practical course. The theoretical base, like the principle of effective stresses, the elastic - plastical critical state, an introduction of consolidation theory and of ground - water flow are discussed. Some characteristic applications as the calculation of earth pressure, the bearing capacity of plain foundations, the stability of slopes as well as the calculation of the stress distribution in the ground and the settlements are taught in detail by exercises.
Foundation engineering as a part of geotechnices includes the construction, the design and the restoration of shallow foundations, pile foundations and box foundations as well as the retaining constructions, the corresponding stability checks and the design problems.
Connected measures, as the establishment and the structural stabilization of foundation pits as well as the disposition and the design of the dewatering facilities are discussed. The waterproofing, the underpinning and the tunnelling under buildings constructions and the artificial cementation by compression, by injection are topics of the lectures.

prerequisites: technical mechanics
examination: written
lecturer: Franke

ATB 206 **Supporting Structures - Statics and Technical Mechanics**
W/S 320/ 220 9cr

The course of „Supporting structures" gives fundamentals of statics and the theory of the strength of materials as a part of technical mechanics and thus forms a prerequisite for dimensioning and calculating supporting constructions. The principal ways of approach focus on the effecting forces and on the advantageous choice of the supporting structure system, not depending on the building material.
General appraches are applied to typical examples of building practice including building materials common in the field of civil engineering. The water engineers are taught the dimensioning of supporting structures and of parts of them, and the necessary proof of the load-bearing ability of the structures.

prerequisites: advanced mathematics
examination: written after each semester
achievement test: course-work
lecturer: Fenster

BTB 207 **Reinforced Concrete**
W 220 4cr

In the lectures the working of reinforced concrete and the dimensioning for bending, shear forces and compressive forces are explained. The serviceability limiting states are described and the reinforcement are presented in easy examples. The lectures and practical courses make possible, to recognize the ranges of applications of reinforced concrete in the field of water supply and distribution and to service existing reinforced concrete structures.

prerequisites: technical mechanics
examination: written
achievement test: course-work
lecturer: Wiese

BBH 208 **Strucural Theory**
W/S 220/ 110 wo 6cr

Taking into account the given time limits the lectures provide fundamental knowledge about selected basic structural designs of structural elements of old and new buildings, especially wall and skeleton structures. This fundamental knowledge will increase professional skills and facilitate the co-operation with designers and construction personnel.
The lectures are completed by seminars that concentrate on foundation, wall, ceiling and roof structures. The students are guided to solve their design exercises.

prerequisites: none
examination: written
achievement test: 6 performance tests
lecturer: Gruber/Weller

BBW 209 **Construction Management**
W/S 200/ 100 wo 3cr

The lecture is devided into three parts:
1. Production engineering / earth-works technology W 100
2. erection of concrete constructions W 100
3. operation scheduling / construction economics S 100

1. „Production engineering" deals with the basics and methods of choice considering construction machinery. The focal point of „earth-works technology" is process technology within soil excavation, transport and placement considering aspects of organization and safety.

prerequisites: soil mechanics
production engineering - basic course
lecturer: Kämpfe

2. A summery about proceeding by erection of concrete constructions is given. A main subject is supervision and quality control of concrete work as well as improvement of durability of concrete structures. The student will receive information about special methods for example use of mass and watertight concrete. In addition to concrete distress the most important clearance and reinstatement methods are explained.

prerequisites: none
lecturer: Doppelmann

3. Besides the function, aim and fields of operations scheduling above all the necessary conditions, for example documents and staff, are discussed. The basis for calculation and pricing within a construction company will follow. After representing basics in legislation universally valid, a introduction in public and private building legislation is given. Placing of order and general questions of forming and transacting a construction contract are treated.

prerequisites: none
lecturer: Sperling
examination (part 1 to 3): written

EET 210 **Electrical Power Engineering**
W 110 2cr

This course deals with the engineering principles of electrical power engineering prepared for students of water engineering. Starting with a summary of important basic information on electrical engineering the main topics are the design of electric pump drives, their control in speed and their interface to the feeding power system including protective measures against the electric shock. Additionally binary control principles of drives with contactors and programmable controllers are provided. The lectures are completed with four numeri-cal exercises (network calculation, dynamics of a pump drive, design of a pump drive, control with contactors).

prerequisits: physics, automatic control
examination: written, four short tests during the exercises
lecturer: Büchner

WGW 211 **Basics of Automation Technology**
S 210 3cr

The course offers electronical and controlling basics. The students obtain knowledge about the theoretical and practical basis of controlling engineering and of the most important elec-tronically measurement technology as well as sensors for water engineering, also of the transmission and utilisation including the software. By means of water engineering examples the fundamentals are verified.

prerequisites: basics in mathematics and natural science, informatics
examination: written
lecturer: Gräber

WAA 212 **Environmental Process Engineering**
W/S 110/101 4cr

This course is an introduction into mechanical and thermal process engineering with an interdisciplinary reference to waste management and water engineering. Fluid dynamics, mass and heat transport, and separation processes of solids and fluids (mechanical, thermal) are treated concisely. The terms: system, quantity and balances are defined and the theory of dimension and similarity is derived. The course outline includes applied engineering methods for environmentally sound manufacturing processes, resource sensitive (circular) concepts, and measures to avoid waste and waste water.

prerequisites: basics of chemistry, physics and water engineering
examination: written
lecturer: Weltin

WAA 213 **Biotechnology**
S 200 2cr

The course provides an introduction into basic knowledge on biotechnological methods. It focuses essentially on measures applied in environmental protection and remediation. The biodegradation of contaminants in sewage treatment and bioremediation of polluted sites will be discribed in detail.

prerequisites: basic knowledge in the evalution and remediation of contaminated sites
examination: written
lecturer: Werner

WSI 214 Water Supply and Drinking Water Treatment
W/S 210/211 7cr

Basing on the knowledge of basics of water engineering comprehensive advise is given for planning, building and operating water distribution systems and complex drinking water treatment plants. Special questions are water transport and storage, design and operation of pipe systems, process design of water distribution systems, removal of inorganic and organic micro-pollutants, removal of nitrogen compounds, desinfection of drinking water, preparation facilities for chemical additives and treatment of sludges from the water cleansing process.

prerequisites: basics of water engineering
examination: written, devided into 2 parts
achievment test: course-work
lecturer: Weigelt (from 1. 10. 96)

WSI 215 Wastewater Treatment II-
(specialization wastewater, sludge treatment)
W/S 110/111 5cr

The course „Wastewater treatment II" basing on the natural and technical sciences that are taught previously explains the multiple problems of wastewater.
This course is based on the fundamentals of wastewater engineering that were lectured during the 4th term (basic studies). Specialized knowledge will be given in the fields of sludge utilization and qualities of sludges, sludge thickening, dewatering, anaerobic and thermal processes of sludge treatment, and desinfection of sewage sludges. By these lectures the students will be enabled not only to develop modern concepts of sludge utilization and treatment but also to design the necessary plants and installations and to conduct construction and operation of these plants.

prerequisites: basics of municipal and industrial water engineering
examination: part within the total written examination of wastewater treatment
lecturer: Hackenberger/Lützner

WSI 216 Sewerage (II) -Specialization Course
W 100 1cr

The course „Sewerage II" is based on the knowledge gained during the basic studies in „Sewerage I". The students receive more detailed information on the design of sewerage systems and their various constructions, on the composition of stormwater and its treatment in connection with the design of wastewater treatment plants and the quality of receiving waters. Exercises in design calculations, one assessment and one excursion are included into the course in order to make the knowledge applicable.

prerequisites: basics of sewerage and wastewater treatment
examination: written
achievment test: course-work
lecturer: Lützner

WSI 217 Industrial Water EngineeringII

S/W 110/ 100 3cr

Based on further basic operations and on the respective processes of production the water management within specific industrial branches as examples is presented. The students shall be enabled to solve problems concerning water management in industrial plants.

prerequisites: industrial water engineering I
examination: written
achievment test: course-work
lecturer: Hackenberger/Kermer

WSI 218 Extensive Home-Task (Project)

S 40cr

This project includes optional the complex restoration of the water related infrastructure of an urban area, the design of a treatment plant for either wastewater or drinking water or industrial wastewater. While working on this project the students shall be enabled to put into practice their knowledge of engineering and natural sciences gained previously in the lectures. Besides the cultivation of scientific, creativity the work on this project shall show the interaction of the manifold interdisciplinary specializations when solutions of problems concerning water engineering are required and train the complex application of the wide ranged lecturing contents.

prerequisites: basics and specialized knowledge in wastewater treatment, water supply and industrial water engineering
lecturer: Hackenberger/Lützner/Kermer/Weigelt

WSI 219 Student Seminar

S 020 2cr

In this seminar the student shall be enabled to prepare a scientific report and interpret it freely as well as to defence his/her theses within the discussion.

prerequisites: basics of the (respective) specialization
achievment test: evaluation of the report
lecturer: Hackenberger/Lützner/Kermer/Weigelt

WAA 220 Basics of Waste Management

W/S 200/110 4cr

On an introductory level the student is familiarized with definitions and concepts of waste management. A sound overview of composition, quantities, handling, and pathway (transport) of domestic and industrial waste materials is provided. Addressed are concepts of waste disposal (landfill design and maintenance) and waste treatment (thermal, biological, chemical, and physical methods). Integrated processes of waste treatment are discussed and compared on ground of their economic efficiencies. Methods of plant projection and precalculation are outlined. In accordance with their increasing importance in today's society, modern concepts of waste avoidance and recycling are introduced.

prerequisites: basics of water engineering; soil mechanics and foundation engineering; industrial water engineering; environmental process engineering.
examination: written
achievment test: course-work
lecturer: Bilitewski

WAA 221 **Seminar of Students**
S 020 2cr

The students can choose a topic from avariety of themes for giving a lecture and working out a report. The contribution to the course contains of a lecture of about 20 minutes and a following discussion. On one course date there shall be lectures of two students which are coordinated in their content. The students will get an examination receipt after drawing up the report. The target of the course is to convey basic elements of scientific working methods.

prerequisites: basics of waste mangement.
achievment test: evaluation of the report
lecturer: Bilitewski/Weltin

WGW 222 **Dynamics of the Subterranean Waters, part: Transportation of Water and Substances**
W 321 6cr

The lecture deals with the principles of water flow and transport of substances. The lecture is one basis to understand methods for computation of groundwater flow and transport of substances and substance turn over, mainly in the saturated zone. This knowledge is the precondition to develop mathematical models and is a basic requirement for lectures in groundwater management and subterranean technics in the field of hydrogeology.

prerequisites: Technical hydromechanics, basics of geology and soil sciences
examinations: written, practical works
achievment test: practical
lectures: Walther, Schmidt, Pätsch

WGW 223 **Dynamics of the Subterranean Waters, System Analysing of Groundwater Processes**
S 210 3cr

The course deals with problems of system theory, study of transmission relation, modelling and simulation, solving of differential equation, methods of indirect parameter identification and knowledge based methods of processes in the soil and groundwater zone. The goal on the course is that the students develop abilities and become versed in solving mathematical problems of groundwater management and controlling including modelling and simulation.

prerequisites: mathematical and natural sciences, description of processes of subsurface water
examination: written
lecturer: Gräber

WHM 224 **Surface Water Management**
W 310 4cr

The course deals with water resources on the one hand as an element exclusively determined by natural conditions (catchment-related) and on the other hand as an element of social development (water usage - flood protection). This is demonstrated e.g. by the development of strategies for the simultaneous renaturation of rivers along with measures for flood protection. Starting from basic theory of the time and space dependent distribution of water availability with the associated probability characteristics, advanced methods of stochastic modelling

techniques are discussed and applied to establish water management strategies and design parameters for water resources development, satisfying the overall objective of reconciling as far as possible both the society's requirements and the existing natural conditions. Real world examples taken from the humid sector as well as from irrigation projects show the close relationship between water volume management and water quality.

prerequisites:	principles of hydrology, introduction to meteorology/hydrology
examination:	written
achievement test:	home traetis
lecturer:	Schmitz

WGW 225 **Groundwater Management, part: Management**

S 210 3cr

The lecture offers methods of groundwater management in the field of water quantity and water quality. Among those methods there are the use of modells for water flow and substance transport, the development and the use of monitoring systems and criteria to assess value groundwater quality. This is demonstrated, for example, for compounded water works, for open mines areas. In addition it is shown how to control groundwater flow in cases of damages with not decomposable substances, and to calculate the dimension of wellhead protection zones.

prerequisites:	dynamics of subterranean waters, basics of water management and water exploration
examinations:	written
achievment test:	course-work
lectures:	Walther, Pätsch

WAA 226 **Groundwater Management, part: Remediation of Contaminated Groundwater**

S 200 2cr

The objective of the course is to provide a detailed knowledge on protection- and remediation methods in the field of groundwater. Physico-chemical as well as biological techniques and combinations of them are presented. The spectrum covers sampling techniques, analytical approaches, control systems and success prove. Fundamental knowledge in chemistry, groundwater management, microbiology and civil engineering is required.

prerequisites:	basics of civil engineering
examination:	written
lecturer:	Werner

WGW 227 **Waterprotection**

S/W 200/ 100 3cr

This course provides an overview on methods concerning the protection of surface and groundwater. It is based on watermanagement, ecology of environmental protection, hydrology. Moreover basic knowledge in geology, soil science and hydrochemestry is required. Hazardous substances and their risk assesment are subject of the course.

prerequisites:	water engineering, geology and soil sciences, hydrology, hydrochemistry
examination:	written
lecturer:	Werner

WGW 228 **Geohydrotechnics**
S/W 110/111 5cr

The course „geohydrotechnics" offers the theoretical and practikal knowledge of laboratory and field test methods for exploration and production of groundwater from the subsurface. Among these methods there are geophysical techniques for the study of the subsurface, pumping tests, slug and bail tests and tracer tests. The aim of the course is to use the theoretical knowledge about groundwater and aquifers in practical exploration methods as well as to become acquainted with the widely used methods.

prerequisites: basics of geology and hydrochemistry, dynamics of the subsurface water
examination: written
lecturer: Walther

WGW 229 **Hydromelioration**
S/W 200/ 110 4cr

This lecture deals with the fundamental methods of irrigation and drainage of agricultural and forestal used soils. Furthermore, technologies of soil management will be presented, as the avoidance of erosion, the use of sewage sludge on soils and their impact on substance balances in soil- and groundwaterzones. The management of soil use in protection zones with the aim to minimize leaching of substances will be presented.

prerequisites: dynamics of subterranean waters, basics of geology and soil sciences
examinations: written
achievment test: course-work
lecturer: Walther/Pätsch

WAA 230 **Evaluation of Contaminated Sites and Remediation Techniques**
S/W 210/ 210 6cr

The objective of the course is to provide the fundamentals of the evaluation of contaminated sites concerning their environmental risk assessment (air,water,soil). The techniques available for protection and remediation are described in detail and examples are given. Basic knowledge in chemistry, microbiology and civil engineering is required.

prerequisites: basics in civil engineering
examination: written
lecturer: Werner

WGW 231 **Groundwater Measurement Technology**
W 201 3cr

The course offers theoretical and practical foundation of the modern groundwater measurement and sampling technology for physical, chemical and biological parameters including error analysing. In the part „measurement technique" the students attend the most important electronically measurement procedures and sensors as well as the transmissions, the storage and the mathematical interpretation of dates and the automatically working of measurement devices. In the part „Field experiments and sampling technology" methods and technologies of data extraction in the field are introduced.

prerequisites: basics in Physics, Chemistry, informatics and electronical engineering
examination: written
achievment test: 4 experiments
lecturer: Gräber

WGW 232 **Student Seminar**
(Groundwater Management/Contaminated Sites)
S 020 2cr

In this seminar the student shall be enabled to prepare a scientific report and interpret it freely as well as to defence his/her theses within the discussion.

prerequisites: basics of the (respective) specialization
achievment test: Evaluation of the report
lecturer: Walther/Werner

BGT 233 **Hydrogeology**
W 110 2cr

The lecture treates the structure of rocks and its influence on ground-water resources. The type of rocks and their waterbearing properties as well as the exploration of groundwater resources are taught.

prerequisites: engineering geology, soil mechanics
examination: written
lecturer: Grunert

WHM 234 **Hydrometry**
S 201 3cr

Precondition to this lecture is basic knowledge about the fundamentals of microelectronics and general measurement techniques. Principles and practices of the common and advanced hydrometric measurement techniques, with special emphasis on flow and discharge measurement, are explained and an introduction to methods for evaluating the data quality with respect to consistency and systematic and random errors is given. In practical exercises, the students make the acquaintance of the correct execution of measurements, the installation of gauging stations and the adequate selection of sites for representative discharge measurements. The students are introduced into the planning, control and maintenance of measurement networks as well as into the basic principles of recent hydrological databanks.

prerequisites: measurement of environmental variables
examination: written
lecturer: Lennartz

WHM 235 **Meteorology**
W/S 210/ 213 9cr

This class is based on the course *„Introduction into Meteorology and Hydrology"* and enlarges the meteorological and climatological knowledge including an overview of meteorological data collection and analysis. Recent meteorological problems will be addressed. The students are encouraged to deal with the weather and - in a broader sense - with their natural and man-made environment.
A lab-class accompanies the second semester (partLY as group work). This lab-class is instrument and outdoor oriented. The presentation of results of the students' own measurements as oral reports, posters or protocols concludes the obligatory meteorological training of hydrology students.

prerequisites: introduction into meteorology and hydrology; physics, basics in mathematics, geography, chemistry, biology and computer sciences
examination: written
requirements for the exam: "Beleg", accompanying lab-class
lecturer: Bernhofer

WHM 236 Principles of Hydrology
W 330 6cr

The course analyses the subject of hydrology as a geo science, considering the Water- Energy-Matter- Cycle as an integrated system and discussing the key role of the hydrological science with respect to the various aspects of sustainability in a changing environment (e.g. climatic change). After this introduction, the main subject of the course deals with the hydrology of river basins (Rainfall - Runoff - Relationships). The lectures include the presentation of the most important hydrological processes (runoff formation, soil - vegetation - atmosphere - complex, runoff concentration, flood routing) which are influenced by the structure and other natural conditions of hydrological catchments. The course also analyses scale problems and aspects of regionalisation by means of an adequate description of different hydrological processes. Another main subject focusses on catchment modelling, introducing the student into the problems of describing the rainfall - runoff - relationship with mathematical models by black - box, conceptually and physically based models.

prerequisites: mathematics, physics, applied hydromechanics
examination: written
achievment test: hydrological field studies, two course-work
lecturer: Schwarze/Schmitz

NMS 237 Mathematical Statistics
W 210 3cr

The lecture imparts methods of descriptive and inductive statistics to prepare and to analyze data in the context of hydrology. The students become acquainted with the laws of stochastics and with an assortment of statistical methods such as sampling, tests of homogeneity, of independence and of goodness of fit, confidence and tolerance intervals, regression, correlation, time series analysis, and their applications to problems of hydrology .

prerequisites: mathematics
examination: written
lecturer: Storm

WHM 238 Hydrologic Cycle and Water Balance
S/W 110/ 110 4cr

The course analyses the dynamics of the global hydrologic cycle and its interconnection with the global matter cycle, considering especially the climatologically relevant processes and potential anthropogeneous impacts. Subsequently, the interrelationships between the elements of the natural water balance, namely precipitation, evaporation, runoff and change in water storage as a function of space and time are discussed. In addition to methods of data collection and data processing, the student is introduced into basic water balance computations and also into catchment related, detailed mathematical modelling of the short and long term water balance. The various approaches are illustrated by case studies of real world examples.

prerequisites: basics of meteorology and hydrology
examination: written
lecturer: Schmitz/Lennartz

WHM 239 **Variability of Runoff**
S 110 2cr

The student is introduced into statistical treatment and probabilistical interpretation of fluvial low and high water phenomena. The first section of the course deals with high water levels due to flood events, to which a certain recurrence interval can be ascribed. For these critical flood events, methods for establishing hydrological design parameters for dams and waterworks are discussed, paying close reference to the data situation. The subsequent course subject, namely the treatment of low water phenomena, focusses on the development of methods for identifying specific low water parameters and on the evaluation of the probability of occurence.

prerequisites: principles of hydrology
examination: written
achievment test: course-work
lecturer: Schmitz/Walther

WHM 240 **Operational Hydrology**
S 200 2cr

This course provides firstly a general overview of the basic principles and also of the advanced philosophies of mathematical modelling. Subsequently, the theory and application of physically based mathematical models is presented, paying special attention to hydrodynamic numerical modelling of unsteady flow in natural rivers. Further model applications include e.g. investigations of the effect of natural and man made changes of the environment with respect to the behavior of hydrological systems and the simulation of hydrological extremes. A section which deals with the optimal control of specific hydrological systems rounds off the course.

prerequisites: principles of hydrology, hydrologic cycle and water balance, meteorology
examination: written
lecturer: Schmitz

WHM 241 **Water Movement in the Unsaturated Soil**
W 211 4cr

The soil is a complex system of solid, liquid and gaseous material where various chemical and biological reactions as well as water and solute transport take place. Increasing environmental hazards require an understanding and quantification of the transport processes. This is to a certain extent provided in this course which deals with the soil physical concepts and model approaches for calculating water and solute transport in the unsaturated soil. The students become acquainted with the theoretical background and practical applications of the different approaches. The effect of the various model assumptions and simplifications is highlighted by comparing the process descriptions with the actual real world processes with the overall goal to provide capabilities for an appropriate model choice for a given problem.

prerequisites: physics, soil science
examination: written
lecturer: Lennartz

WHM 242 **Remote Sensing in Geoscience**
S 210 3cr

Remote Sensing in Geoscience is an important tool to analyse areal data. Concerning hydrology, the main components are the hydrological and energy cycle, which allow the estimate of individual components like evaporation for a specific area. Thus, remote sensing plays an important role in generating data sets in hydrology and meteorology.

The main topics of this lecture cover the radiation transfer (shortwave, longwave and microwave) in the atmosphere, atmospheric and surface properties like absorption bands or surface reflectivity. To analyse different datasets, either from satellite or aircraft or surface based measurements, statistical and radiometric techniques will be presented. A further topic covers a description of current and future instruments which shows the different availability in time and space in remote sensing.

prerequisites: knowledge in atmospheric radiation, meteorology, mathematics, and computer sciences
examination: written
lecturer: Berger

WHM 243 **Preparatory Thesis**
40cr

Within the scope of this project a complex-applied or basic research oriented task has to be undertaken. The student shall be enabled to apply the knowledge of natural sciences and engineering supported by the necessary tutorials to get familiarized with the important steps for the preparation of a scientific work.

In a typical way this project leads from the understanding of the problem via necessary information (references in literature, data by keeping to a proposed way of solution to the presentation (student seminar) and documentation (home-task). The tasks are derived from every hydrological and meteorological subject within the main studies.

prerequisites: specialized lectures in hydrology and meteorology
duration: 100 hours
lecturer: Bernhofer/Schmitz

WHM 244 **Student Seminar**
(Hydrology/Meteorology)
S 020 2cr

The Student seminar serves for the presentation of the investigations and their results that were undertaken within the frame of the extensive home-task (project). Emphasis is laid on the techniques of presentation and speech. At the same time methods for improving these techniques are shown. The students will be made familiar by outside lectures with present problems in hydrology and meteorology.

prerequisites: specialized lectures in hydrology and meteorology
achievment test: evaluation of the report
lecturer: Bernhofer/Schmitz

245 **Semester of practical work**
W (9th semester) 30cr

In this specialization - oriented semester the general knowledge gained during the first basic practical term is extended by doing specialized engineering works. In this way the student learns how to approach complex tasks and problems of plant internal organization.
After the submission of a concept by the student the task will be confirmed by the responsible tutor (member of the academic staff). The task is linked with the solution of a scientific problem concerning the respective field of practical work.
The positive evaluation of the report is one prerequisite for starting ones diploma project.

achievment test: report
lecturer: all professors and tutors

It is not possible to start ones diploma-project (thesis) without the successful examinations of all necessary courses including achievement tests and other works required.

WSI 246 **Diploma-thesis**
S (5 months) 50cr

In the Diploma-thesis the student shall prove his own ability to work at municipal or industrial water engineering problems in the field of basic or applied research. Alternatively the student has to solve a complete practical engineering task in planning and design.
The diploma-thesis is to show that the student is capable not only to master the basics of natural sciences, technology and engineering lectured during the studies but also to apply them in a complex way.
The results of the diploma-thesis have to be presented within the scope of a public defence before the tutors and the examination committee and have to be reasoned in a professional discussion. The mark given on the defence amounts to 1/3 of the whole mark on the diploma-project.

lecturer/tutor: Hackenberger/Lützner/Kermer/N.N. (water supply)/Bilitewski
Walther/Werner

WHM 247 **Diploma-thesis**
S (5 months) 50cr

Within the scope of the diploma-thesis and the necessary tutorials the student shall prove that he is able to do on his own a scientific work that contributes to the solution of hydrological problems. In this context problems in the fields of basic and applied research but also practical tasks comected with projecting are undertaken and presented in the thesis.
The diploma-thesis shall prove that the student is capable to master the basics of natural sciences, technology and engineering and to apply these for scientific work. The problem/task of the diploma-thesis can be derived from every field of hydrology and ist scientific basics. If the theme includes experimental work the working time of 5 months is possible to be extended.
The results of the diploma-project have to be presented within the scope of a public defence before the tutors and the examination committee and have to be reasoned in a professional discussion. The mark given on the defence amounts to 1/3 of the whole mark on the diploma-project.

duration: 5 months (in exceptional cases 9 months)
lecturer: Bernhofer/Schmitz

Lectures with an achievement test:

WWB 248 **Basic of Hydraulic Engineering, River Engineering**
W/ S 200/ 200 4cr

In the lectures the main hydraulic structures are presented with respect to their performance, construction and place in the environment. Dams, waterways and hydropower stations are the most important structures which are presented. Special topics in this frame are stability calculation, safety of performance, loads on structures, rules and standards for design, construction and operation of hydraulic structures.
In the field of river engineering the following topics are dealt with: river development, power utilization, weirs, intakes, outlets, navigation, flood control, water supply, removal of rivers. Particular attention is paid on efficient and environmentally compatible solutions in river engineering.

prerequisites: applied hydromechanics (partial)
achievment test: test after each term
lecturer: ass. Prof. Lattermann

249 **Water and Enviromental Legislation**
S 200 2cr

This course, as a link between the subjects of law and engineering, will complete the interdisciplinary training at the department of water sciences and enable the future water engineers to their own decisions in complex tasks of their professional life.
The topics taught are: targets of laws; proprietary law; duties to suffer; compensation duties in water reserves; regulations concerning water supply and wastewater treatment, regulations concerning the ensuring of high water flowing run-off; compulsory rights; spheres of responsibility; administrative procedure.

prerequisites: civil law
achievment test: written
lecturer: outside lecturer

NGK 250 **Descriptive geometry**
W 220 4cr

This module aims to provide the student with basic knowledge and skills to solve design problems with three-dimensional geometrical objects using normal projections into related two-dimensional design graphics. Thereby, the spatial imagination is developed and the student will be able to communicate by means of engineering design drawings and maps. The module is fundamental to the subjects „Construction“ and „Mechanical Engineering“.

prerequisites: mathematics
achievment test: written
lecturer: Bär

4. Courses of selected obligatory Studies

WAA 301 Thermic Waste Treatment

S 200 2cr

This course is done in form of a seminar. It is divided into three parts, which are the incineration of domestic and commercial waste, the incineration of hazardous waste and the gasification of waste. The main topics of the incineration of domestic waste are to introduce to the processes of incineration and air purification, the methods of using energy and output products as well as methods of wastewater purification. The second part contents some specific constructive features of incineration plants for hazardous waste and concerns about the specific problems of this input material. The field of gasification of waste will be made accessible to the students by introducing to the physical and chemical basics of this topic. The course finishes with a presentation of the input and output materials and the different construction methods of reactors.

prerequisites: basics of waste management.
achievment test: written or spoken
lecturer: Bilitewski

WAA 302 Recycling Technologies

S 200 2cr

The course deals in the first part with the basic operations of mechanical processing and introduces the accompanying machine elements. Their operational area in waste management is discussed, regarding recovery rates and economic feasibility of the processes. The practical meaning is demonstrated by giving examples of recycling technologies for building and construction waste and for plastic waste. Also some new developments in recycling technologies are considered. The second part, „recirculation of industrial waste", is about the possibilities to implement closed circles of materials in industrial companies. More contents of this topic are material and energy balances and ways of changing and creating products to be suitable for a later recycling, all of this important elements of a modern waste and recycling management.

prerequisites: basics of waste management.
achievment test: written or spoken
lecturer: Bilitewski

WAA 303 Planning and Precalculation of Waste Treatment Plants

W 200 2cr

This course has two main working subjects. One is to deliver a basic knowlwedge on a theoretical level about the planning of waste treatment plants, as well as methods of precalculation of financial requirements and running costs of the plant. In the second part, the theoretical knowledge of planning and precalculation will be applied to a practical example. The realization takes place in the course.

prerequisites: basics of waste management.
achievment test: written or spoken
lecturer: Bilitewski

WSI 304 Water distribution III

W 200 2cr

In continuation to the lectures of water distribution this course leads to a deeper understanding in the field of process design. Contents of the lectures are especially analogue models and computing processes as well as considerations on the optimal load distribution. Moreover specific problems of water storage are discussed.

prerequesites: basic and further knowledge in water supply
achievment test: written or oral
lecturer: Weigelt and outside lecturers

WSI 305 Drinking Water Treatment III

S 200 2cr

Based on the course „Water distribution (supply) and drinking water treatment" special problems and means of drinking water treatment are presented and discussed, for instance in the fields of bank filtration, artificial enrichment of ground water, quality problems of hygienic critical raw waters.

prerequisites: basics and specialized lectures in water supply
achievment test: written or oral
lecturer: Weigelt and outside lecturers

WSI 306 Wastewater Treatment III

W 200 2cr

These lectures focus on special topics of sewerage, rainwater and wastewater treatment. New, future regarding trends and concepts of modelling are presented.

prerequisites: basics and specialized lectures in wastewater treatment
achievment test: written or oral
lecturer: Lützner and outside lecturers

WSI 307 Special Fields in Sludge Treatment

W 200 2cr

This course is based on the lectures of wastewater treatment part: sludge treatment. The students receive deeper knowledge in the fields of anaerobic degradation of special substrates, improvement in efficiency of anaerobic processes and process design.

prerequisites: basics and specialized lectures in wastewater treatment part: sludge traetment
achievment test: written or oral
lecturer: Hackenberger an outside lecturers

WSI 308 Special Process of Industrial Water Engineering

W 200 2cr

Based on the lectures in industrial water engineering special ways of processing in some industrial branches are shown. Concepts of wastewater treatment with respect to a further recycling technology are presented in terms of physico-chemical concepts of process design.

prerequisites: basics and specialized lectures in industrial water engineering
achievment test: written or oral
lecturer: Kermer and outside lecturers

MTG 309 **Sanitary Engineering**
W 100 1cr

On the basis of technical regulations selected basic elements of the usage of drinking water within buildings are explained to the students of water management. It is dealt with the organization of pipe systems for cold, warm, circulating and wastewater, as well as pipe systems for ventilation within buildings. Special installations for the technology of fire-fighting equipment, of increase of pressure, of water purification facilities as well as the necessary protective measure for water, material and buildings are presented.

prerequisites: technical mechanics, theory of the strength of materials
achievment test: written
lecturer: Richter, H.

WGW 310 **Special topics of exploration**
S 200 2cr

The lecture offers specialized methods of water exploration such as subterranean groundwater treatment. With the help of case studies the processes of removal for substances like iron, manganese, nitrate and hydrocarbons are explained and the possibilities of controlling are demonstrated.

prerequisites: basics of water exploration
achievment test: written
lecturer: Walther and outside lecturers

WGW 311 **Special topics of groundwater management**
S 200 2cr

Content of this lecture are present case studies about the design of infiltration plants for mine waters with high iron concentrations, about problems in groundwater quality in coal-mine areas and about methods how to manage these problems, about the application of geochemical models. Furthermore the water management of coal-mine areas are offered like lowering of the groundwater level in extended areas.

prerequisites: dynamic of subterranean water
achievment test: written
lecturer: Walther and outside lecturers

WGW 312 **Special topics of geohydrotechnics**
W 200 2cr

Special methods to explorate groundwater resources and contaminated sites are presented, e. g. geoelectrical and geomagnetic techniques. The theoretical bases will be developed and than trained in the field on subterranean contaminated site.

prerequisites: dynamics of subterranean water
achievment test: written
lecturer: Walther and outside lecturers

WGW 313 **Special topics of the dynamics of the subterranean waters, water quality**

W 200 2cr

The basics of water chemistry will be applied in case studies. With the help of data from groundwater measurement methods like computation of pH-value, chalk-carbonic acid-equilibrium will be demonstrated. The groundwater in large regions can be separated in hydrochemical based units. Graphical and mathematical tools are presented and explained, e. g. chemical models of thermodynamics.

prerequisites: dynamics of subterranean water
achievment test: written
lecturer: Walther/Schmidt

WGW 314 **Special topics of the dynamics of subterranean waters, prognosis of water quality**

W 200 2cr

Different methods of prognosis with regard to special cases of application will be introduced, such as convection hydrodynamic dispersion, exchange between different phases. Further the present state of knowledge about processes like adsorption decomposition of the most important groundwater loading substances is shown. The limits of prognosis methods are discussed. Basis for this are case studies.

prerequisites: dynamics of subterranean waters
achievment test: written
lecturer: Walther and outside lecturers

WGW 315 **Special topics in land reclamation and drainage**

S 200 2cr

The surplus of materials like sewage sludge and composts is often a problem in urban areas. Therefore the intention is to use sewage sludge etc. as a nutrient carrier fertilizer in agricultural used areas. The application on soils, the estimation of emission, which can be expecteded have to be discussed. Furthermore special methods of land reclamation and drainage and their design are presented. Basis of this presentations are case studies.

prerequisites: basics of hydromelioration
achievment test: written
lecturer: Walther and outside lecturers

WAA 316 **Special Topics in Soil Remediation**

W 200 2cr

The majority of contaminations is located in the unsaturated zone. According to the composition of the hazardous compounds either physico-chemical, thermic or microbial remediation can be applied. The objective should be a combination of all three methods in order to minimize the quantity of residuals. E.g. the residuals of one method applied can be treated by another method. The ecological, economical and logistical aspects will be taught

during the lecture. Morciver the risk assessment of contaminated soil will be estimated regarding the geological, hydraulical and microbial conditions.

prerequisites:	basic knowledge in remedial practice, chemistry, physics, microbiology and civil engineering
achievment test:	written
lecturer:	Werner and outside lecturers

WAA 317 **Special Topics in the Remediation of Contaminated Sites**
S 200 2cr

This lecture focuses essentially on recent and alternative methods in remediation and protection. Among others there are to mention passive systems for in situ remediation of soil and groundwater (e.g. permeable walls, funnel and gate). Their feasibility and limitation as well as their efficiency and profitability will be discussed.

prerequisites:	basic knowledge in remedial practice, chemistry, physics, microbiology and civil engineering
achievment test:	written
lecturer:	Werner and outside lecturers

BWB 318 **Applied Hydromechanics II**
W 211 4cr

Calculation methods and solutions of special, frequent occuring hydraulic problems and currents are subjects of this lecture. It is given an introduction into potential flow. Phenomenaa and calculation of selected unsteady currents in tubes and channels are explained.

prerequisites:	applied hydromechanics I
achievment test:	written
lecturer:	Martin, Aigner, Pohl

BWB 319 **Waterway Engineering** (I and II)
W/S 200/200 4cr

The main topic is the field of canal construction. The lectures are given on sealing and cross-sectional shape and size of canals, traffic and running installation and the water supply of canals.

The lectures of Waterway Engineering II are about design and assessment of coastal ports and inland harbours. They also include operational facilities and the organisation of harbours. Students receive knowledge in construction and assessment of dolphins, shore embankments and piers. Arrangement of piers and port basins are further topics.

prerequisites:	applied hydromechanics, foundation engineering
achievment test:	oral
lecturer:	Wagner

BWB 320 **Coastal Engineering and Coast Protection** (I and II)
S/W 100/100 2cr

In this lecture engineering works along or nearby the coast are treated. Coast and flood protection, construction of ports and landing places, maintenance and reconstruction of navigable waterways are topics of training. The determination of required water levels by application of wave therory is explained. The training includes planning and calculation of coastal engineering and coast protection structures.

prerequisites: applied hydromechanics, foundation engineering
achievment test: oral
lecturer: Wagner

BWB 321 **Headworks**
W 210 3cr

Lectures are given on construction and operation of weirs, dams, impoundment dams, barrages, watersheds, water and sedimentation reservoirs. Main topics are design and hydraulic calculation of headworks, hydraulic operational equipment and stability analysis as well.

prerequisites: applied hydromechanics, foundation engineering
achievment test: oral
lecturer: Horlacher

BWB 322 **Hydroelectric Power Plants**
S/W 110/110 4cr

It is given a general view about the utilisation of the potential of waterpower in the world and in Germany and about chances of its extension. Energetic and economical basics of waterpower, types and elements of power plants are subjects of the lectures. Selection criteria for turbines and calculation methods for design capacity, number of turbines and dimensions of machines and plants are explained.

Ecological requirements to power plants (transmissibility, fishways, minimum discharge in side channels, water inlet systems) are treated. Further subjects are the investigation of the economic efficiency of power plants and an introduction into static and hydraulic calculation methods for the assessment of essential plant elements.

prerequisites: applied hydromechanics, foundation and tunnel engineering
achievment test: oral
lecturer: Horlacher

BGT 323 **Geology of Rock Engineering and Tunneling**
S 200 2cr

Fundamental principles of the projecting and building of slopes, tunnels and cavernes by consideration of the geological behavior of the rock are taught.

prerequisites: engineering geology, soil mechanics
achievment test: written
lecturer: Grunert

BGT 324 **Geology of Germany**
S 200 2cr

The geology, engineering geology and the hydrogeology of the characteristical landscapes of Germany are discussed and demonstrated by geological maps and pictures.

prerequisites: engineering geology, soil mechanics
achievment test: written
lecturer: Grunert

BTB 325 **Prestressed Concrete Constructions**
W 200 2cr

The lectures are based on the knowledge about concrete given in the course of reinforced concrete. They cover the following chapters: specialities of prestressed concrete and the advantages compared with normal reinforced concrete; technical solutions and prestressing level; prestressing, usual prestressing methods; properties and application of prestressing steels and tendons; influence of prestress on the internal stress situation (prestress, friction and slip, creep and shrinkage); preliminary design; checks in prestressed concrete members; detailing provisions; precarious member sections (anchorages, deviation points, high concrete compression stresses).

prerequisites: reinforced concrete
achievment test: written exercise
lecturer: Stritzke

WAA 326 **Bio-Process Engineering**
W 210 3cr

This course focuses on linking the basic knowledge in the field of bio-process engineering, especially biochemistry and microbiology, with the engineering disciplines in order to understand the subject of bio-process engineering as a closed and working set of rules.
Emphasis is laid on the following subjects: bio - reaktors, basics of kinetics, growth models, transport of substances, stoichiometrics, process models, dynamics and stability.

prerequisites: biochemistry, microbiology
achievment test: written
lecturer: Werner

WHB 327 **Toxicology**
S 100 1cr

Occurence and distribution of toxic compounds in water and their effects in man. Overview about methods, principles and strategies in toxicology.

Prerequisites: biology, chemistry
achievment test: written
lecturer: Nagel

WHB 328 **Ecotoxicology**
W 200 2cr

Ecotoxicology studies the detrimental changes of structural elements and functions of ecosystems caused by environmental chemicals. These tasks and goals are easily fomulated. However, there are many problems when changes in the environment are to be traced to the effects of chemicals and assessed. They describe the so-called dilemma of ecotoxicology, which can not be fully resolved either through a retrospective nor through a prospective approach to the evaluation of environmental chemicals. The lecture gives an overview about methods, principles and strategies in ecotoxicology.

prerequisites: ecology, biology, chemistry
achievment test: written
lecturer: Nagel

WAA 329 **Bioremediation of contaminated sites**
S 200 2cr

Based on practical examples the lecture will focus on:
- hydrogeological properties of the subsurface and its possibilities of transport
- chemical and biological influences on groundwater and soil
- distribution of contaminants in soil and groundwater, biological availability of contaminants and substrates
- effects of environmental conditions
- biodegration of special pollutants, mixed-contamination, limiting factors
- technologies in the field of soil and groundwater (in-situ-treatment; on-site-traetment, combinations of different measures, microbiological monitoring of bioremediation methods

prerequisites: basic knowledge in the evalution and remediation of contaminated sites
achievment test: written or oral
lecturer: Werner

WAA 330 **Technical Microbiology**
W 204 6cr

Basic knowledge in microbial methods and biochemical processes required for biotechnology will be provided. Fermentation for production and degradation of a certain subrate pattern. Large scale application in the field of watertreatment and remedeation technology. The lecture will be supported by execices and excursions to pilot and large scale plants of interest.
Introduction into the microbiological analysis: Qualitative and quantitative processes of detection for bacteria, yeast and mould, microscopic - colouring methods, aerobic and anaerobic cultures, biochemical and scrological tests for differentiation of microbes, detection of starch and cellulose degrading germs, bacteriological investigation of drinking water, pathogenic germs - for humans and animals - that can be conveyed by water, water-virological investigation methods, processes for desinfection and sterilization, agar preparation and strain collection of microbes.

prerequisites: basics of hydrobiology
achievment test: oral
lecturer: Werner

WGW 331 **Applied Informatics** 2cr
W 200

In this course the students shall gain a deeper understanding of informatics as a working mean of water engineers. Emphasis is laid on modern hardware and software concepts, various standard and professional software programs and tools, for instance data banks, simulation systems and programs on statistics.

prerequisites: water engineering, informatics
achievment test: oral
lecturer: Gräber

WGW 332 **Selected Problems in Informatics** 3cr
S 300

During these lectures the students will be enabled to develop algoriths and programs in the field of water engineering. Not only modern methods of programming and hardware solutions are shown but also aspects of artificial intelligence and the treatment of undefined quantities are discussed.

prerequisites: water engineering, informatics
achievment test: oral
lecturer: Gräber

WHC 333 **Water Analysis** 6cr
W 208

The lecture includes the following topics: sampling location, sampling from different water systems, sample storage, separation methods, digestion processes, enrichment methods, taste and odour, colour, turbidity, determination of inorganic water constituents (photometry, potentiometry, conductometry, amperometry, AAS, AES-ICP), determination of organic water constituents by collective parameters (BOD, COD, TOC, UV, AOX, POX, EOX, AOS) and individual substance analysis (DC, GC, HPLC), assessment of analytical measurements.
The lecture is supplemented by a practical course including the following analytical methods: titrimetric analysis, redox methods, TOC, AOX, heavy metal analysis (AAS), electrometric methods, photometric methods, HPLC.

prerequisites: basics of hydrochemistry
achievment test: oral
lecturer: Lienig

WHC 334 **Process Chemistry in Water Treatment** 6cr
W/S 200/ 008

The lecture deals with the process fundamentals and the application of the following processes in water and wastewater treatment:
mechanical processes (sedimentation, filtration), biological processes (activated sludge process, nitrification, denitrification), physical and chemical processes (flocculation/ coagulation,

precipitation, neutralization, oxidation, stripping, adsorption, ion exchange, membrane processes).
The practical course includes experiments on the following processes: flocculation, deacidification, ion exchange, photo-oxidation of organic water impurities, precipitation.

prerequisites: basics of chemistry
achievment test: oral
lecturer: Worch

NBC 335 Processes of Preparation and Analysis in Bio-Technology
W 200 2cr

Preparation processes for animal and vegetative cells, and for microorganisms by mechanical, thermal, chemical and enzymatical methods;
Enrichment methods; handling of microorganisms in pilot plants; analysis processes - calorimetric method, spectroscopic measuring methods, ion-sensitive electrodes and biosensores, chromatografical methods; examples of application for bio-technological processes - production of proteins, enzymes, biomass and special substances.

prerequisites: biochemistry, bio-technology
achievment test: written
lecturer: Braun

WHC 336 Modelling of Processes in Water Chemistry
S 120 3cr

The lecture and the supplementary training give information on: architecture and components of personal computers, operating systems, application programmes, statistics, process modelling and operations in internet.

Prerequisites: Basics of hydrochemistry
achievment test: oral
lecturer: Worch/Schilling

WHM 337 Regional Hydrology
S 200 2cr

This course focusses on the hydrologically relevant properties of different climatological regions of the earth. It provides on the one hand an overview of the globally interconnected hydrologic phenomena and also considers aspects of a potential anthropogeneous impact on the hydrologic cycle. On the other hand, the regional hydrological characteristics are thoroughly analysed especially with respect to an evaluation of the effect of the regional social and technical development on the water balance. Based on real world examples with special emphasis on practical aspects, the inherent problems are scientifically described. An introduction to solving such problems by physically based mathematical modelling is given, taking into account the frequently experienced shortage of available field data and observation records. Participation on a 7 day hydrologic excursion is considered as a necessary course requirement.

prerequisites: principles of hydrology and applied hydrology, meteorology, dynamics
examination: oral
lecturer: Schwarze/Schmitz

WHM 338 **Hydrometeorology**
S 200 2cr

The class deals with thermodynamics of the humid atmophere, cloud physics, formation, form and deposition of precipitation, as well as data assembling and analysis of hydrometeorological information.

prerequisites: introduction into meteorology and hydrology
achievment test: written
lecturer: not yet nominated

WHM 339 **Boundary Layer Climates**
W/S 200/200 4cr

The climates of the atmopheric boundary layer are deduced in an explanatory and physical manner for various surface characteristics (both for natural and man-made-climates). They include ocean/land surfaces, dry/humid surfaces, the influences of snow, ice and vegetation as well as the effect of orography.

prerequisites: introduction into meteorology and hydrology
achievment test: oral
lecturer: Bernhofer

WHM 340 **Meteorological Lab-Class**
S 202 4cr

The fundamentals of experimental meteorological investigations are worked out. The results are presented as oral reports, posters, and protocols. Emphasis is laid on the critical evaluation of the results and their potential application.

prerequisites: introduction into meteorology and hydrology
achievment test: written protocol or poster
lecturer: Bernhofer

WHM 341 **Environmental Meteorology**
W 200 2cr

The atmophere is a major medium for transport of pollutants. The pathway from emission via transport to deposition is analysed and depicted by simple models. Additionally consequences for ecosystems and man, as well as possible cures are discussed.

prerequisites: introduction into meteorology and hydrology
achievment test: oral
lecturer: Flemming

WHM 342 **Energy and Environment**
S 200 2cr

Energy is an important tool when evaluating the environment. Here the fundamentals of the energy balance approach are introduced and applied to natural and man-made systems. Emphasis is laid on the stability and sustainability of systems.

prerequisites: knowledge of physics (thermodynamics) and ecology
achievment test: written protocol
lecturer: Bernhofer

WHM 343 **Special Aspects in Remote Sensing**
S 202 4cr

This lecture will give an opportunity to train the students in one specific topic, like the determination of precipitation, or soil humidity, or radiation / energy budget components at the surface, or the changes in land surface variability. After a short introduction into one of these aspects, the students will have the chance to study and to apply methods on different remotely sensed data, which are presented in the current literature. Finally, a report on these studies will close that lecture.

prerequisites: knowledge in atmospheric radiation, meteorology, mathematics, computer sciences and basics in remote sensing
achievment test: written
lecturer: Berger

MMM 344 **Fundamentales of Mechanical Engineering**
W 220 2cr

The students will gain the capability of not only reading technical documents such as drawings, piece lists, calculations, norms and prospects, but also extracting important information and evaluating it. Besides the required knowledge about the representation of technical objects basic knowledge about common materials in mechanical engineering, about ways of dimensioning, about production processes and operation and effects of machine elements is necessary, too.

prerequisites: technical mechanics, descriptive geometry
achievment test: written
lecturer: Höper

343 **Public Building Law**
S 200 2cr

The course focuses on the follouing items:
1. Preparation of building plans (development schemes and plans of surface usage/usability) and their legal importance.
2. Which requirements for building plans are included into the public building law?
3. The procedure for planning and building permission.
4. Under which circumstances is it possible for offices of site supervision to stop building schemes?
5. What kind of protection for neigbaurs of building clients is provided by the public building law?

prerequisites: none
achievment test: written
lecturer: hired lecturer