Karlsruher Institut für Technologie

Module Handbook
Applied Geosciences Master 2021 (Master of Science (M.Sc.))

SPO 2021

Winter term 2024/25

Date: 20/10/2024

KIT DEPARTMENT OF CIVIL ENGINEERING, GEO AND ENVIRONMENTAL SCIENCES

Table Of Contents

1 General Information

1.1 Study program details

KIT-Department	KIT Department of Civil Engineering, Geo and Environmental Sciences
Academic Degree	Master of Science (M.Sc.)
Examination Regulations Version	2021
Regular terms	4 terms
Maximum terms	8 terms
Credits	120
Language	
Grade calculation	Weighted by (Weight * CP)
Additional Information	Link to study program www.agw.kit.edu

2. Welcome

We are pleased that you are interested in the Master's program in Applied Geosciences at the KIT Faculty of Civil Engineering, Earth and Environmental Sciences have decided and wish you a good start into the new semester!

If you have any questions about modules and partial services, please do not hesitate to contact us:

Lisa Schäfer

Program coordination

consultation hours:
By appointment
Build. 50.40, room 122
Phone: +49 721 608 44172
lisa.schaefer@kit.edu

Mirja Lohkamp-Schmitz

Coordination exams, courses and field exercises

consultation hours: see website
Build. 50.40, room 117
Phone: +49 721 608 43316
mirja.lohkamp-schmitz@kit.edu

About the module handbook

Welcome to the Applied Geosciences at the University of Excellence KIT, one of the few institutes in Germany to achieve top positions in international rankings. Here, at one of the largest technical research institutions in Europe, you will receive an excellent education and get to know your lecturers personally.
Karlsruhe, one of the sunniest cities in south-west Germany, offers you a high quality of life in one of Europe's strongest economic regions.The field of Applied Geosciences contributes to the applied topics of energy, storage, groundwater and raw materials. The innovative environment at KIT enables you to advance your career in industry and research.

All information about the legal and official framework of your study can be found in the respective study and examination regulations for your program. This legally binding information can be found in the KIT official announcements (https://www.sle.kit.edu/english/amtlicheBekanntmachungen.php) and at https://www.agw.kit.edu/english/9269.php.
In addition to the module handbook, information on the course of the individual courses is compiled in the course catalog (online). Information about the exams offered during the semester is stored in the student portal.

3. Admission Requirements

Excerpt from the "Statutes for the admission in the Master program in Applied Geosciences at the Karlsruhe Institute of Technology (KIT)" official announcement number 64, dated November 30, 2022:

§5 (1) An outstanding Bachelor's degree in Applied Geosciences or a related scientific field. The completed study program needs to include a minimum of 180 ECTS.

§5 (2) Necessary ECTS in the following fields need to be included in the completed study program

- Geosciences: min. 20 ECTS, geoscientific subjects like structural geology, mineralogy, petrology, hydrogeology, engineering geology, geochemistry, paleontology, geophysics, geological field exercises and geological mapping
- Physics and/ or Chemistry: min. 10 ECTS,
- Mathematics: min. 10 ECTS,
- Furthermore min. 30 ECTS in mathematical-scientific or geoscientific fields.

§5 (4) Language skills:

- German Skills according to the KIT admission and enrollment regulations
- or English Skills according to the Statutes for the Admission in the Master Program in Applied Geoscience at KIT:

  Overview (translated from the original in German language):
  - Very good proficiency in the English language corresponding to level B2 of the Common European Framework of Reference for Languages (GER), as confirmed by the
  - Test of English as a Foreign Language (TOEFL), with a result of at least 90 points
  - International English Language Testing Service (IELTS), with a result of at least 6.5 points and no partial examination worse than 5.5 points
  - University of Cambridge Certificate in Advanced English (CAE) or University of Cambridge Certificate of Proficiency in English (CPE)
  - UNIcert at least level II.

  For the following cases the proof of the B2 proficiency can be omitted:
  - A university degree of a studies program with English as the only teaching language (documented in the Diploma Supplement, the Transcipt of Records or a final certificate)
  - The University Entrance Qualification Certificate with the English course having been attended by the applicant for at least five years until graduation and the final or average grade of the last two years of the language class corresponding at least to the German grade 4 (sufficient) or at least 5 points.

4. Profiles Applied Geosciences

The MSc degree program in Applied Geosciences has three profile areas: Sustainable Energy Resources Storage (ERS), engineering and hydrogeology as well as mineralogy and geochemistry. The MSc course in the ERS profile can be studied entirely in English.

Sustainable Energy-Resources-Storage (ERS)

At KIT, the Applied Geosciences MSc profile "ERS" provides you with an understanding of Sustainable Energy, Resources and Storage. The ERS profile enables you to explore and unlock energy sources with a low carbon footprint in order to provide a sustainable supply of energy. Develope sustainable solutions for the increasing raw materal demand in the context of the emerging energy transtition. Learn about subsurface storage systems to secure a countries energy supply. You will develop analytical and soft skills to perform in an international and interdisciplinary environment.

The ERS profile is closely linked to our KIT research in the Helmholtz program for GeoEnergy and Storage, and the national ThinkTank Industrial Resources Strategies on raw materials supply. Helmholtz's geothermal energy program strives for internationally visible large scale infrastructures. The institute hosts the State's Research Unit on Geothermics evaluating wells and well logging tools. It offers world-class analytical facilities, such as geochemical and petrophysical laboratories, and IT infrastructure.

The profiel is taught in English language.

MSc AGW / Sustainable Energy-Resources-Storage			
1. Semester	**2. Semester**	**3. Semester**	**4. Semester**
Numerical Methods in Geosciences **5LP***	Advanced Geological Mapping **5 LP***	Borehole Technology **5 LP***	
Geology **5 LP***			
Geothermics 1: Energy and Transport Processes **5 LP***	Geothermics 2: Application and Industrial Use **5 LP***	Geothermics 3: Reservoir Engineering and Modeling **5 LP***	
Ore Geology of Metals **5 LP***	Structural Geology **5 LP***	Basin Analysis and Modeling **5 LP***	
Industrial Minerals and Environment **5 LP***	Geological Storage of Gas **5 LP***	Diagenesis and Cores **5 LP***	
Reserve Modeling **5 LP**	Reservoir Geology **5 LP***	Shallow Geothermal Energy **5 LP**	**Master Thesis 30 LP**
	Mineral Exploration **5 LP**		
	Field Seminar **5 LP**		
	Seismic Interpretation **5 LP**		
Elective Module **5 LP***	Elective Module **5 LP***	Elective Module **5 LP***	
		Elective Module **5 LP***	
Sum 30 LP & 6 exams (modules marked with *)	**Sum 30 LP & 6 exams (modules marked with *)**	**Sum 30 LP & 6 exams (modules marked with *)**	**30 LP**
120 LP			
Subject 1: Specialisation in Geosciences, compulsory modules 20 LP			
Subject 1: Specialisation in Geosciences, elective modules 50 LP (10 out of 15 modules)			
Subject 2 : Specific supplements 20 LP			

Profile Engineering- and Hydrogeology

As part of the Master's program in Applied Geosciences, the Hydrogeology and Engineering Geology (HYDRO-ING) profile can be selected. The profile includes the basics, applications and methods of engineering and hydrogeology, from sampling and data acquisition in the field to state-of-the-art laboratory analysis and experimental techniques to numerical modeling of groundwater flow, heat and pollutant transport as well as mass movements and underground structures. The application of artificial intelligence in water, environmental and georesearch is one of our new focuses in research and teaching.

The diverse research projects at home and abroad as well as the intensive cooperation with institutions from professional practice enable students to complete a variety of exciting and professionally qualifying master's theses. Our graduates work in engineering offices, consulting companies, construction companies, offices, state and federal authorities in the areas of applied geology, water, construction and the environment, as well as in development cooperation, at water suppliers and in research, both in Germany and internationally.

The profile is taught in German language.

<table>
<tr><th colspan="4">MSc AGW / Hydro-/Ing.</th></tr>
<tr><th>1. Semester</th><th>2. Semester</th><th>3. Semester</th><th>4. Semester</th></tr>
<tr><td>Geodatenanalyse I - Programmierung und Geostatistik 5LP*</td><td></td><td>Projektstudie oder Berufspraktikum 5 LP*</td><td rowspan="13"></td></tr>
<tr><td>Angewandte und Regionale Hydrogeologie 5LP*</td><td></td><td></td></tr>
<tr><td colspan="2">Ingenieurgeologie: Labor- und Geländemethoden (Prüfung im SS) 5LP*</td><td></td></tr>
<tr><td colspan="2">2 LP* Ingenieurgeologie: Massenbewegungen und Modellierung (Prüfung im SS) 2 LP*</td><td>Shallow Geothermal Energy 5 LP*</td></tr>
<tr><td colspan="2">3 LP* Karsthydrogeologie (Prüf im WS) 2 LP*</td><td>Hydrogeologie: Grundwassermodellierung 5 LP*</td></tr>
<tr><td>Geothermics 1: Energy and Transport Processes 5 LP</td><td>Hydrogeologie: Gelände- und Labormethoden 5LP*</td><td>3D Geologische Modellierung 5 LP*</td></tr>
<tr><td></td><td>Geodatenanalyse II - Big Data und Maschinelles Lernen 5 LP*</td><td>Aktuelle Forschungsthemen der Hydrogeologie und Ingenieurgeologie 5 LP*</td><td>Masterarbeit 30 LP</td></tr>
<tr><td></td><td>Hydrogeologie: Hydraulik & Isotope 5 LP*</td><td></td></tr>
<tr><td></td><td>Angewandter Kartierkurs und GIS-Kartografie 5 LP*</td><td></td></tr>
<tr><td></td><td>Geochemische Prozesse und Analytik 5 LP</td><td></td></tr>
<tr><td></td><td>Felsmechanik und Tunnelbau (Import) 6 LP</td><td></td></tr>
<tr><td>Wahlmodul 5 LP*</td><td>Wahlmodul 5 LP*</td><td>Wahlmodul 5 LP*</td></tr>
<tr><td>Wahlmodul 5 LP*</td><td></td><td></td></tr>
<tr><td>Summe 28 LP & 5 Prüfungen (Module mit *)</td><td>Summe 32 LP & 7 Prüfungen (Module mit *)</td><td>Summe 30 LP & 6 Prüfungen (Module mit *)</td><td>30 LP</td></tr>
<tr><td colspan="4">120 LP</td></tr>
<tr><td colspan="3">Fach 1: Geowissenschaftliche Spezialisierung, Pflicht 20 LP</td></tr>
<tr><td colspan="3">Fach 1: Geowissenschaftliche Spezialisierung, Wahlpflicht 50 LP (10 aus 13 Modulen)</td></tr>
<tr><td colspan="3">Fach 2: Fachbezogene Ergänzung 20 LP (beispielhafte Kombination)</td></tr>
</table>

Profile Mineralogy and Geochemistry

The “Mineralogy and Geochemistry” profile is aimed at students with a particular interest in the physical and chemical properties of crystals, minerals, rocks and materials. At the end of the master's degree, you will have a high level of competence in mineralogical-geochemical analysis methods to describe processes in the earth system and in relation to the human environment and will be able to apply these to various questions.

The spectrum ranges from modern high-performance ceramics to pollutants in the ecosystem. Thanks to the lecturers involved and the collaboration between the university and the large research area at KIT, various focal points in the mineralogy and geochemistry profile can be deepened.

Bachelor's and master's theses are offered in the specified subject areas, which are often integrated into national and international research collaborations or take place in close collaboration with industry but also with museums, for example. Modern mineralogy and geochemistry are characterized by a great diversity of content and range of methods in application and basic research, which is offered broadly and in-depth at the Karlsruhe location.

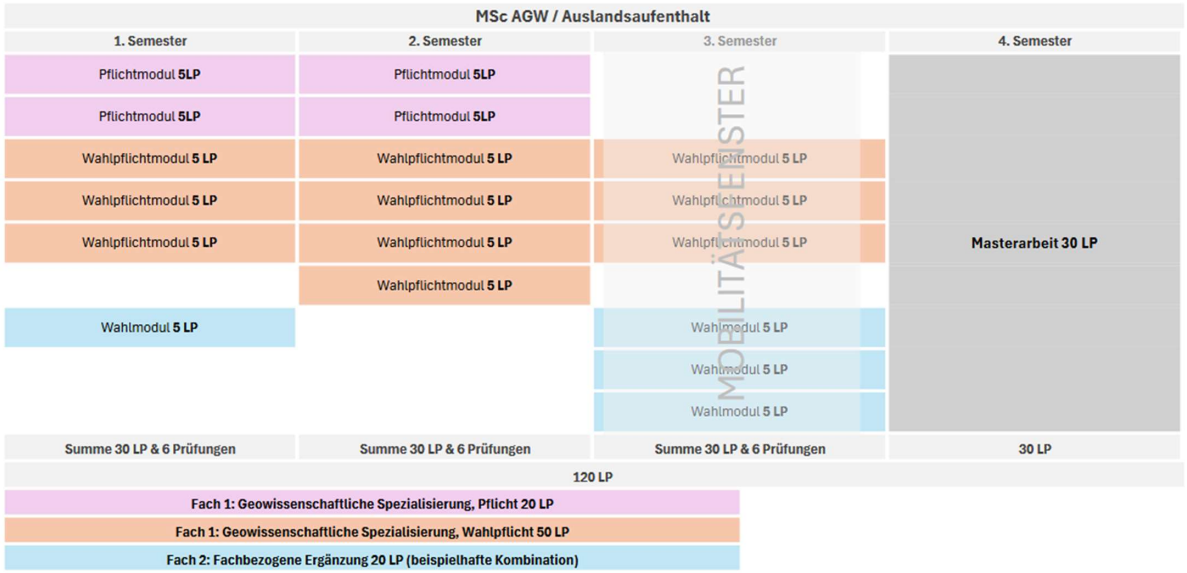
The profile is taught in German language.

MSc AGW / MiG			
1. Semester	2. Semester	3. Semester	4. Semester
Angewandte Mineralogie: Geomaterialien **5 LP***	Geochemische Prozesse und Analytik **5 LP***		**Masterarbeit 30 LP**
Geochemisch-Petrologische Modellierung **5 LP***	Mineralogische Analytik **5 LP***		
3 LP* Angewandte Mineralogie: Tone & Tonminerale **2 LP***		Sedimentpetrologie **5 LP***	
2 LP* Umweltgeochemie 3 **LP***		Elektronenmikroskopie 1 **5 LP***	
9 LP* Physikalische Chemie für AGW **6 LP***		Rohstoffe und Umwelt **5 5 LP***	
3 LP* Umweltgeologie: Radio- und chemotoxische Elemente **2 LP***			
Keramik Grundlagen (Voraussetzung Strukturkeramiken) **5 LP***	**2 LP*** Mineralisch gebundene Werkstoffe im Bauwesen 3 **LP***		
Field Seminar **5 LP**	Elektronenmikroskopie 2 **5 LP**		
Nichtmetallische Rohstoffe **5 LP**	Strukturkeramiken **5 LP**		
Metallische Rohstoffe **5 LP**	Petrologie **5 LP**		
	Lagerstättenexploration **5 LP**		
	Petrophysik **5 LP**		
	Geol. Kartierübung für Fortgeschrittene **5 LP**		
	Isotopengeochemie und Geochronologie **5 LP**		
	Structural Geology **5 LP**		
Wahlmodul **5 LP***	Wahlmodul **5 LP**	Wahlmodul **5 LP***	
		Wahlmodul **5 LP***	
		Wahlmodul **5 LP***	
Summe 28 LP & 5 Prüfungen (Module mit *)	Summe 32 LP & 7 Prüfungen (Module mit *)	Summe 30 LP & 6 Prüfungen (Module mit *)	30 LP
120 LP			
Fach 1: Geowissenschaftliche Spezialisierung, Pflicht 20 LP			
Fach 1: Geowissenschaftliche Spezialisierung, Wahlpflicht 50 LP (10 aus 13 Modulen)			
Fach 2: Fachbezogene Ergänzung 20 LP (beispielhafte Kombination)			

Mobility period

A possible time for a stay abroad is in the 3rd semester, as the 4 modules of the compulsory area of geoscience specialization can be completed here, depending on your choice. In the compulsory elective areas, it is possible to have comparable achievements from abroad recognized.

Below is an example of a study plan with mobility in the 3rd semester.



5. Recognition of study and examination achievements within and outside the higher education

The examination regulations of the programs in Applied Geosciences at KIT stipulate that the achievements required in the curriculum of the respective program can also be proven by the recognition of external achievements. A distinction is made between achievements

- within the higher education system (worldwide, all credits earned at a recognised higher education institution in an accredited degree program);
- outside the higher education system (achievements proven at institutions with a standardised quality assurance system)

The prerequisite for recognition is the determination of the equivalence of the acquired competences by expert examiners. This involves comparing the qualification goals in the KIT goal module and the external performance and determining whether they essentially correspond. The scope and depth of external performance should be equivalent. Reasons for refusal (i.e. an externally provided service is not considered equivalent) for the subject examiners may include:

- if there is no equivalence of competences
- if the topicality is no longer given
- if equivalence cannot be determined due to missing documents

The request may be made:

- Applicants for higher semesters (change of study programme or change of location). Please note: In addition to any applications for recognition that may have been submitted, a current grade sheet with all passed and failed grades must be submitted with the application.
- Students on the KIT study program (First semester students who want to have their academic achievements from previous courses of study recognised or students returning from international time studies)
- Please note: For study programs abroad, it is strongly recommended to discuss the possibility of recognition of the intended courses with the respective KIT representative. On this occasion, further recognition details will be determined, e.g. whether a grade will be awarded (standard default) or not. The agreement reached is recorded in writing. Should there be any changes in the program on site later, these should be clarified immediately with the KIT Institute, e.g. by e-mail. In case of Erasmus, the Learning Agreement must be drawn up in advance with the Erasmus coordinator at KIT.

Form of application:

1. Applications must be submitted within the 1st semester after enrolment.
2. Compare your external performance with the local, scheduled performance via the module handbook.
3. Contact the responsible subject examiners (usually those responsible for the module) and clarify which documents are required for recognition.
4. Print and complete the application form:
    a) Application form (for services outside the Erasmus+ programme)
    b) Application form (for services provided during an Erasmus+ stay)
5. A separate application must be made for each benefit for which recognition is sought
6. Fill in page 1 of the form completely and copy it according to the number of services to be recognised
7. Please complete page 2 of the application for each achievement you wish to have recognised.
8. For each achievement, attach a copy of the first page and the completed page 2 of the achievement to be recognised and enclose with each application all documents required for recognition (e.g. copy of the certificate, transcript of records, extracts from the module handbook), on which the examination achievements on which recognition is based are documented. For documents that are not available in German or English, an officially certified translation may be required.
9. Submit all documents to the examiner as agreed. If equivalence exists with regard to the acquired competences (qualification objectives), this will be confirmed by the examiner with a stamp and signature.

The final recognition is made by the examination board on the basis of the opinion of the responsible subject examiner.

5 ANERKENNUNG VON LEISTUNGEN

Please hand in the completed and signed application form to the examination secretariat (Ms. Lohkamp-Schmitz).
10. Enclose a copy of the confirmation of the service provided.
11. The examination board will inform you about the decision by e-mail.
12. The achievements are usually entered a few weeks later by the Studiengangservice Bau-Geo-Umwelt or the *Prüfungssekretariat* Angewandte Geowissenschaften.
13. Please check whether the achievements have been entered correctly.

6 Field of study structure

Mandatory	
Master's Thesis	30 CR
Specialisation in Geosciences (Election: 1 item)	
Specialisation in Geoscience: Sustainable Energy-Resources-Storage	70 CR
Specialisation in Geoscience: Mineralogy and Geochemistry	70 CR
Specialisation in Geoscience: Engineering Geology and Hydrogeology	70 CR
Mandatory	
Specific Supplements	20 CR
Voluntary	
Additional Examinations *This field will not influence the calculated grade of its parent.*	

6.1 Master's Thesis

Credits
30

Mandatory		
M-BGU-105845	Module Master's Thesis	30 CR

6.2 Specialisation in Geoscience: Sustainable Energy-Resources-Storage

Credits
70

Mandatory		
M-BGU-105739	Numerical Methods in Geosciences	5 CR
M-BGU-105744	Geology	5 CR
M-BGU-105745	Borehole Technology	5 CR
M-BGU-105736	Advanced Geological Mapping	5 CR
Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules (Election: at least 50 credits)		
M-BGU-105741	Geothermics I: Energy and Transport Processes	5 CR
M-BGU-103993	Industrial Minerals and Environment	5 CR
M-BGU-105759	Reserve Modeling	5 CR
M-BGU-105742	Geothermics II: Application and Industrial Use	5 CR
M-BGU-102445	Geological Storage of Gas	5 CR
M-BGU-103742	Reservoir Geology	5 CR
M-BGU-102451	Structural Geology	5 CR
M-BGU-105746	Field Seminar	5 CR
M-BGU-103994	Ore Geology of Metals	5 CR
M-BGU-105743	Geothermics III: Reservoir Engineering and Modeling	5 CR
M-BGU-103734	Diagenesis and Cores	5 CR
M-BGU-105357	Mineral Exploration	5 CR
M-BGU-105730	Shallow Geothermal Energy	5 CR
M-BGU-105777	Seismic Interpretation	5 CR
M-BGU-105773	Basin Analysis and Modeling *First usage possible from Oct 01, 2022.*	5 CR

6.3 Specialisation in Geoscience: Mineralogy and Geochemistry

Credits
70

Mandatory		
M-BGU-103995	Geochemical Processes and Analytical Methods	5 CR
M-BGU-102430	Applied Mineralogy: Geomaterials	5 CR
M-BGU-105747	Geochemical and Petrological Modeling	5 CR
M-BGU-105765	Mineralogical Analytics	5 CR
Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules (Election: at least 50 credits)		
M-BGU-102444	Applied Mineralogy: Clay Science	5 CR
M-PHYS-103760	Electron Microscopy I	5 CR
M-PHYS-103761	Electron Microscopy II	5 CR
M-BGU-103733	Sedimentary Petrology	5 CR
M-BGU-102452	Petrology	5 CR
M-BGU-105357	Mineral Exploration	5 CR
M-BGU-105222	Introduction to Ceramics	6 CR
M-CHEMBIO-104581	Physical Chemistry for Applied Geosciences	15 CR
M-BGU-105784	Petrophysics	5 CR
M-BGU-102455	Environmental Geology: Radio- & Chemotoxic Elements	5 CR
M-BGU-105736	Advanced Geological Mapping	5 CR
M-BGU-102453	Mineral Materials	5 CR
M-BGU-105766	Environmental Geochemistry	5 CR
M-BGU-102451	Structural Geology *First usage possible from May 31, 2022.*	5 CR
M-BGU-105746	Field Seminar *First usage possible from May 31, 2022.*	5 CR
M-BGU-103993	Industrial Minerals and Environment *First usage possible from May 31, 2022.*	5 CR
M-BGU-103994	Ore Geology of Metals *First usage possible from May 31, 2022.*	5 CR
M-BGU-106025	Isotope Geochemistry and Geochronology *First usage possible from Oct 01, 2022.*	5 CR
M-BGU-105963	Raw Materials and Environment *First usage possible from Oct 01, 2022.*	5 CR

6.4 Specialisation in Geoscience: Engineering Geology and Hydrogeology

Credits
70

Mandatory		
M-BGU-105505	Geospatial Data Analysis I – Programming and Geostatistics	5 CR
M-BGU-105731	Engineering Geology: Laboratory and Field Methods	5 CR
M-BGU-105793	Applied and Regional Hydrogeology	5 CR
Internship or Project Study (Election: 1 item)		
M-BGU-103996	Internship	5 CR
M-BGU-102438	Project Study	5 CR
Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules (Election: at least 50 credits)		
M-BGU-102442	Engineering Geology: Mass Movements and Modelling	5 CR
M-BGU-105790	Karst Hydrogeology	5 CR
M-BGU-105506	Current Research Topics in Hydrogeology and Engineering Geology	5 CR
M-BGU-105634	Geodata Analysis II – Big Data and Machine Learning	5 CR
M-BGU-105713	Applied Mapping and Processing of Geospatial Data	5 CR
M-BGU-105726	Hydrogeology: Hydraulics and Isotopes	5 CR
M-BGU-105730	Shallow Geothermal Energy	5 CR
M-BGU-102439	Hydrogeology: Groundwater Modelling	5 CR
M-BGU-105729	3D Geological Modelling	5 CR
M-BGU-100069	Rock Mechanics and Tunneling	6 CR
M-BGU-103995	Geochemical Processes and Analytical Methods	5 CR
M-BGU-105741	Geothermics I: Energy and Transport Processes	5 CR
M-BGU-105963	Raw Materials and Environment *First usage possible from Nov 10, 2023.*	5 CR
M-BGU-100079	Environmental Geotechnics *First usage possible from Nov 10, 2023.*	6 CR

6.5 Specific Supplements

Credits
20

Compulsory Elective Modules Specific Supplements (Election: at least 10 credits)		
M-BGU-105729	3D Geological Modelling	5 CR
M-BGU-101053	Advanced Analysis in GIS	4 CR
M-BGU-105506	Current Research Topics in Hydrogeology and Engineering Geology	5 CR
M-BGU-102430	Applied Mineralogy: Geomaterials	5 CR
M-BGU-102444	Applied Mineralogy: Clay Science	5 CR
M-BGU-105793	Applied and Regional Hydrogeology	5 CR
M-BGU-105713	Applied Mapping and Processing of Geospatial Data	5 CR
M-BGU-105773	Basin Analysis and Modeling *First usage possible from Oct 01, 2022.*	5 CR
M-BGU-103996	Internship	5 CR
M-BGU-105745	Borehole Technology	5 CR
M-BGU-103734	Diagenesis and Cores	5 CR
M-BGU-106693	Introduction to Paleontology *First usage possible from Apr 01, 2024.*	5 CR
M-BGU-106898	Introduction to Computational Geodynamics: Part 1 neu *First usage possible from Oct 01, 2024.*	3 CR
M-PHYS-103760	Electron Microscopy I	5 CR
M-PHYS-103761	Electron Microscopy II	5 CR
M-BGU-100068	Earthworks and Foundation Engineering	6 CR
M-BGU-100069	Rock Mechanics and Tunneling	6 CR
M-BGU-105746	Field Seminar	5 CR
M-BGU-103995	Geochemical Processes and Analytical Methods	5 CR
M-BGU-105747	Geochemical and Petrological Modeling	5 CR
M-BGU-105505	Geospatial Data Analysis I – Programming and Geostatistics	5 CR
M-BGU-105634	Geodata Analysis II – Big Data and Machine Learning	5 CR
M-BGU-102445	Geological Storage of Gas	5 CR
M-BGU-105736	Advanced Geological Mapping	5 CR
M-BGU-105744	Geology	5 CR
M-BGU-103698	Geotechnical Engineering	11 CR
M-BGU-105741	Geothermics I: Energy and Transport Processes	5 CR
M-BGU-105742	Geothermics II: Application and Industrial Use	5 CR
M-BGU-105743	Geothermics III: Reservoir Engineering and Modeling	5 CR
M-BGU-106521	Basics in Soil Mechanics neu *First usage possible from Sep 11, 2024.*	6 CR
M-BGU-106523	Basics in Foundation Engineering neu *First usage possible from Sep 11, 2024.*	6 CR
M-BGU-100073	Ground Water and Earth Dams	6 CR
M-BGU-102439	Hydrogeology: Groundwater Modelling	5 CR
M-BGU-105726	Hydrogeology: Hydraulics and Isotopes	5 CR
M-BGU-105731	Engineering Geology: Laboratory and Field Methods	5 CR
M-BGU-102442	Engineering Geology: Mass Movements and Modelling	5 CR
M-BGU-106025	Isotope Geochemistry and Geochronology *First usage possible from Oct 01, 2022.*	5 CR
M-BGU-105790	Karst Hydrogeology	5 CR
M-BGU-105222	Introduction to Ceramics	6 CR
M-BGU-105357	Mineral Exploration	5 CR
M-BGU-103994	Ore Geology of Metals	5 CR
M-BGU-102453	Mineral Materials	5 CR
M-BGU-105765	Mineralogical Analytics	5 CR
M-BGU-103993	Industrial Minerals and Environment	5 CR
M-BGU-105739	Numerical Methods in Geosciences	5 CR
M-BGU-102452	Petrology	5 CR
M-BGU-105784	Petrophysics	5 CR
M-CHEMBIO-104581	Physical Chemistry for Applied Geosciences	15 CR

M-BGU-102438	Project Study	5 CR
M-BGU-105759	Reserve Modeling	5 CR
M-BGU-103742	Reservoir Geology	5 CR
M-BGU-105963	Raw Materials and Environment *First usage possible from Oct 01, 2022.*	5 CR
M-BGU-103733	Sedimentary Petrology	5 CR
M-BGU-105777	Seismic Interpretation	5 CR
M-BGU-105730	Shallow Geothermal Energy	5 CR
M-BGU-102451	Structural Geology	5 CR
M-BGU-105236	Structural and Phase Analysis	4 CR
M-BGU-105766	Environmental Geochemistry	5 CR
M-BGU-102455	Environmental Geology: Radio- & Chemotoxic Elements	5 CR
M-BGU-100079	Environmental Geotechnics	6 CR
M-CIWVT-103753	Water Chemistry and Water Technology	10 CR
M-BGU-103360	Water and Energy Cycles	6 CR
M-CIWVT-106680	Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation *First usage possible from Apr 01, 2024.*	5 CR
M-BGU-106717	Fundamentals of Project Management *First usage possible from Apr 01, 2024.*	1 CR

6.6 Additional Examinations

Additional Examinations (Election: at most 30 credits)		
M-FORUM-106753	Supplementary Studies on Science, Technology and Society neu *First usage possible from Oct 01, 2024.*	16 CR

7 Modules

M 7.1 Module: 3D Geological Modelling [M-BGU-105729]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	5	1

Mandatory			
T-BGU-111446	3D Geological Modelling	5 CR	Blum

Competence Certificate
Written Report (approx. 15 Pages)

Prerequisites
none

Competence Goal
The students will have the required qualification to create an own 3D geological model and get an overview on available software and recent developments of these programmes. For the control of success, the students will create their own 3D geological model, which will be marked in form of a written report.

Content
The course deals with the theory and application of various software programmes for 3D geological modelling. Furthermore, an overview of various software programmes and their applications and possibilities is provided. The course will be complemented by practical exercises using a suitable software for 3D geological modelling (3 SWS in winter term).

In addition to the two courses, the students create their own 3D geological models using an available case study and document their results in a final report.

Module grade calculation
The grade of the module is the grade of the written report.

Annotation
none

Workload
45h attendance time, 105 h self-study time

Recommendation
keine

Learning type
Lecture, exercise, report and self-study

Base for
none

M 7.2 Module: Advanced Analysis in GIS (GEOD-MPEA-3) [M-BGU-101053]

Responsible: Prof. Dr. Martin Breunig
Dr.-Ing. Norbert Rösch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German/English	4	3

Mandatory			
T-BGU-101782	Advanced Analysis in GIS	4 CR	Breunig, Rösch

Competence Certificate
The assessment consists of an oral exam (about 20 min.)

Prerequisites
None

Competence Goal
The students explain the advanced concepts of spatial analysis and 2D interpolation procedures. Especially the different aspects of statistical reasoning are analyzed. They can categorize all analysis problems with spatial background and estimate possible solutions.

Content
After an introduction to analysis in GIS in general, this lecture is dealing with the specific approaches of statistical analysis of spatial data. Among them, in particular, the different methods of pattern analysis. This also encompasses the test strategies inherent to the aforementioned methods. Another topic is data mining, which is introduced as an extension of the point pattern analysis. Furthermore the 2D interpolation procedures are discussed (e. g. Natural Neighbor Interpolation, Kriging, …).

Module grade calculation
The grade of the module is the grade of the oral exam in T-BGU-101782 Advanced Analysis in GIS.

Workload
Contact hours: 30 hours

- courses plus course-related examination

Self-study: 90 hours

- consolidation of subject by recapitulation of lectures
- processing of exercises
- consolidation of subject by use of references and by own inquiry
- preparations for exam

M 7.3 Module: Advanced Geological Mapping [M-BGU-105736]

Responsible: apl. Prof. Dr. Kirsten Drüppel
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (mandatory)
Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-BGU-111455	Advanced Geological Mapping	5 CR	

Competence Certificate
The assessment consists of an examination of another type, including field work, preparation of a geological mal and a mapping report.

Prerequisites
none

Competence Goal
The students are able to carry out a geological investigation of an unknown area independently and to create a geological map using GPS data. They can interpret the data and use it to evaluate the potential of possible geological resources.

Content
Introduction to the geology of the mapping area

Instructions for mapping of sedimentary, igneous and metamorphic rocks and analysis of their structural features

Drawing of geological profiles

Interpretation of a geological map

Assessment of the potential of existing georesources

Production of a digital geological map

Assessment and analysis of geodata with a geological background

Management of geospatial data according to established standards

Module grade calculation
The grade of the “examination of another type” is the module grade

Annotation
The practical part of this course is carried out face-to-face. The field exercises are essential for the participants' progress in their studies.

Workload
70h fieldwork and 80h self studying time

Literature
Walter Maresch, Hans-Peter Schertl, Olaf Medenbach (2012): Gesteine: Systematik, Bestimmung, Entstehung. Schweizerbart, 359 S.

M 7.4 Module: Applied and Regional Hydrogeology [M-BGU-105793]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-BGU-111593	Applied and Regional Hydrogeology	5 CR	Goldscheider

Competence Certificate
Oral examination (30 minutes)

Annotation
It is mandatory to choose the module "Applied and Regional Hydrogeology" as a requirement for the modules "MBGU-102439 – Hydrogeology: Groundwater Modelling" and "M-BGU-102441 - Hydrogeology: Field and Laboratory Methods, since it addresses their theoretical and practical background".

Workload
150 h, of which 50 h attendance time and 100 h self-study time

M 7.5 Module: Applied Mapping and Processing of Geospatial Data [M-BGU-105713]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-BGU-111444	Applied Mapping	4 CR	Blum
T-BGU-111445	GIS Cartography	1 CR	Menberg

Competence Certificate
The assessment consists of an examination of another type, consisting of:
- the geological map
- a report of 15 pages
- an oral presentation of results of 15 minutes duration,
and four unmarked exercise sheets for GIS cartography.

Prerequisites
Study profile Engineering and Hydrogeology

Competence Goal
The students are able to perform geological mapping campaigns in an unknown area and generate a geological map based on GPS data and GIS. The students can answer engineering and hydrogeological questions with respect to the mapped field site. They are able to interpret the data.

Content

- Geological, engineering and hydrogeological introduction to the mapping area
- Mapping of the geology and structure, as well as the engineering and/or hydrogeological features
- Geological cross-sections
- Introduction to GIS-based processing of engineering and/or hydrogeological questions
- Guidance for producing digital engineering and/or hydrogeological maps
- Evaluation and analysis of geodata with geological background

Module grade calculation
The module grade is the grade of the examination of another type.

Workload
150 h, of which 55 h attendance time, 95 h self-study time

Learning type
Field Exercises, Exercises

M 7.6 Module: Applied Mineralogy: Clay Science [M-BGU-102444]

Responsible: apl. Prof. Dr. Katja Emmerich
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German/English	4	2

Mandatory			
T-BGU-104839	Clay Mineralogy Introduction	2 CR	Emmerich
T-BGU-104840	Advanced Clay Mineralogy	3 CR	Emmerich

Competence Certificate
The assessment consists of a written ungraded test (Clay Mineralogy Introduction, 90 min. To pass 70 % of 100 % must be correct) and an examination of another type (Advanced Clay Mineralogy, graded report, ca. 12 pages, submission till 4 weeks after the end of the lecture period).

Prerequisites
None

Competence Goal
The students are able to classify clays and clay minerals and to identify processes and process parameters in (geo)technical systems.
Students are able to plan and perform clay mineralogical analyses. They are able to evaluate the results, present them in a structured way and critically evaluate them with regard to consistency.

Content

- Building blocks and ideal structure of 1:1 and 2:1 layer silicates, types of clays
- Real structure (layer charge, polytypes, interstratifications) of clay minerals.
- Analytical methods: X-ray diffraction, thermal analysis (with examples to learn how to evaluate the measurement curves), methods for determination of cation exchange capacity and layer charge, infrared spectroscopy, electron microscopy, methods for the determination of surfaces, complex phase analysis
- Material properties and process variables in technical and geotechnical applications of clays are discussed using examples of current research
- Analytical methods are applied to real samples in the laboratory

Module grade calculation
grade of the module is the grade of the T-BGU-104840 Advanced Clay Mineralogy

Annotation
Depending on the auditorium, this module is held in German or English

The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

Workload
contact hours: 60

self study time: 90

M 7.7 Module: Applied Mineralogy: Geomaterials [M-BGU-102430]

Responsible: Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	5	3

Mandatory			
T-BGU-104811	Applied Mineralogy: Geomaterials	5 CR	Schilling

Competence Certificate
The assessment consists of an examination of another type (worksheets, reports).
To pass the worksheets and reports, at least 50% of the points must be achieved.

Prerequisites
keine

Competence Goal
The students are qualified to apply basic mineralogical approaches to describe and targeted use of geomaterials.
The students have knowledge of basic methods of applied mineralogy:

- about the basics of crystallography, this includes the detailed consideration from point to space groups.
- to describe and visualise the structures of relevant geomaterials.
- to analyse group-subgroup relationships and phase transitions of different geo-materials.

They master basic crystallographic methods and are able to apply these to a technically important group of minerals, the zeolites. The students have:

- a deep understanding of the crystal chemistry of microporous mineral phases.
- advanced knowledge of framework structures and their physico-chemical properties.
- basic knowledge of modern functional materials with key applications in industry.
- the competence to investigate and characterize materials using diffraction techniques.

Content
Modern geoscientific materials research focuses on the relationship between structure and (thus mostly) anisotropic material behaviour. Therefore, a profound understanding of symmetry and structure relationships is the focus of the course, in addition to a detailed process understanding of the mode of action of one of the most important geomaterials - zeolites. These nanoporous materials are of fundamental importance in many technical processes which cannot be imagined without them (from the food industry to petrochemistry).

- Crystallography: from point groups to space groups
- Crystal structures descriptions
- Symmetry relations between crystal structures
- group-subgroup relationships
- phase transitions of different geo-materials
- Zeolite and zeolite-like framework structures
- Industrial applications: molecular sieves, catalysts and ion exchangers.
- Fundamentals of diffraction: Theory and Praxis
- Structural determination of microporous mineral phases

Module grade calculation
The module grade results from the evaluation of the worksheets and reports (average of worksheets and reports).

Annotation
Enthusiasm and commitment to mineralogical questions are expected
The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

Workload
60 hours attendance time and 90 hours self-study

Recommendation
Openess for new ideas and things

Learning type
- Lectures
- Exercises
- Laboratory Exercises
- Self-study
- Discussions

Literature
Will be discussed during the lectures

Base for
A fulfilled and successful professional life and highly recommended for the module Petrophysics [M-BGU-105784].

M 7.8 Module: Basics in Foundation Engineering (bauiBFP9-GRUNDB) [M-BGU-106523]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements (Usage from 9/11/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	3	1

Mandatory			
T-BGU-112815	Basics in Foundation Engineering	6 CR	Stutz

Competence Certificate
- 'Teilleistung' T-BGU-112815 with written examination according to § 4 Par. 2 No. 1

details about the learning control see at the 'Teilleistung'

Prerequisites
none

Competence Goal
Because of their knowledge in usual geotechnical construction methods the students can independently select, design and describe the construction process for standard applications, such as building foundations, construction pit linings and tunnels adapted to the respective ground and groundwater conditions. Further, they are able to proof independently ultimate limit states and serviceability limit states of those geotechnical constructions and natural slopes and to evaluate the results critically.

Content
The module imparts theoretical principles for designing of the most common geotechnical constructions. This covers:

- standards, codes and safety concepts in foundation engineering
- seepage and groundwater management
- design of shallow foundations
- earth pressure and earth resistance, design of retaining structures and retaining walls for excavations
- pile foundations, deep foundations and caisson foundations in open water
- methods for soil improvement
- introduction to tunneling

Module grade calculation
grade of the module is grade of the exam

Annotation
Tutorials are offered accompanying to the lectures, the participation is strongly recommended.

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Basics in Foundation Engineering lecture, exercise, tutorial: 90 h

independent study:

- preparation and follow-up lectures, exercises Basics in Foundation Engineering: 30 h
- examination preparation: 60 h

total: 180 h

Recommendation
The attendance of the lecture accompanied tutorials (6200517) is recommended.

It is highly recommended to take the module Basics in Soil Mechanics [M-BGU-106521] first.

Literature
Gudehus, G (1981): Bodenmechanik, F. Enke

Grundwissen "Der Ingenieurbau" (1995) Bd. 2: Hydrotechnik – Geotechnik, Ernst u. Sohn

Lang, H-J, Huder, J, Amann, P, Puzrin A.M. (2011): Bodenmechanik und Grundbau, Springer Verlag

Kolymbas, D.: Geotechnik, Springer-Verlag 5. Auflage

M 7.9 Module: Basics in Soil Mechanics (bauiBFP8-BODMECH) [M-BGU-106521]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements (Usage from 9/11/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	3	1

Mandatory			
T-BGU-112814	Basics in Soil Mechanics	6 CR	Stutz

Competence Certificate
- 'Teilleistung' T-BGU-112814 with written examination according to § 4 Par. 2 No. 1

details about the learning control see at the 'Teilleistung'

Prerequisites
none

Competence Goal
The students have a scientifically sound understanding of the building material 'soil' with respect to its appearance and mechanical behaviour. They are able to describe the latter on base of soil mechanical and soil hydraulic models, to classify and to analyse respective field and laboratory tests. They are able to proof independently ultimate limit states and serviceability limit states of natural slopes and shollow foundations and to evaluate the results critically.

Content
The module imparts theoretical principles of soil behavior. This covers:

- standards, codes and safety concepts in foundation engineering
- subsoil investigation, soil classification, soil properties and soil parameters
- permeability and seepage
- stress distributions in the subsoil, compression behavior and consolidation
- shear resistance of soils, stability of slopes and foundations
- design and settlement calculation of shallow foundations
- earth pressure and earth resistance

Module grade calculation
grade of the module is grade of the exam

Annotation
Tutorials are offered accompanying to the lectures, the participation is strongly recommended.

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Basics in Soil Mechanics lecture, exercise, tutorial: 90 h

independent study:

- preparation and follow-up lectures, exercises Basics in Soil Mechanics: 40 h
- examination preparation: 50 h

total: 180 h

Recommendation
The attendance of the lecture accompanied tutorials (6200417) is recommended.

Literature
Gudehus, G (1981): Bodenmechanik, F. Enke

Grundwissen "Der Ingenieurbau" (1995) Bd. 2: Hydrotechnik – Geotechnik, Ernst u. Sohn

Lang, H-J, Huder, J, Amann, P, Puzrin A.M. (2011): Bodenmechanik und Grundbau, Springer Verlag

Kolymbas, D.: Geotechnik, Springer-Verlag 5. Auflage

M 7.10 Module: Basin Analysis and Modeling [M-BGU-105773]

Responsible: TT-Prof. Dr. Nevena Tomašević
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules) (Usage from 10/1/2022)
Specific Supplements (Usage from 10/1/2022)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	5	1

Mandatory			
T-BGU-111543	Basin Analysis and Modeling	5 CR	Tomašević

Competence Certificate
The assessment consists of an end-term examination of another type (graded written report up to 10 pages, submitted 4 weeks after the end of the lecture period and a final oral presentation (and discussion). Each of the two components weighs 50 %.

Prerequisites
Requirements for participation in the module exam: regular participation (max. 2 absences) and the timely submission of all exercises, 80% of them correct.

Competence Goal
The course aims at providing an in-depth understanding of the sedimentary basin evolution by considering external and internal forcing factors, and economically important geo-resources. This course will advance students' knowledge and experiences in analysis and interpretation of geological and geophysical data leading toward building numerical models required to predict and qualitatively assess sedimentary features (e.g., grain size distribution, thickness maps, key stratigraphic surfaces, porosity, permeability, etc.).

At the end of the course, students will: (1) have a physical understanding of the long- and short-term processes operating in the sedimentary basins; (2) be able to conceptualize sedimentary basin-related problems and turn them into modeling strategies; (3) be trained in the qualitative and quantitative analysis of 2D/3D seismic and well dataset; (4) learn how to use and develop parts of numerical models, and (5) critically evaluate their results to respond to specific scientific and industry-related questions.

The course will rely on active student involvement, where exercises will involve data analysis and visualization using Python/ Matlab and geological software and/or open-source codes (e.g., Petrel incl. GPM, OpendTect, landlab) and assignments will be prioritized over lectures. It is meant for students interested in combining numerical modeling and sedimentary basin analysis.

Content
In this module, students will learn about the mechanisms controlling the sedimentary basin architecture and how these can be studied by analyzing available geophysical (2D and 3D seismic lines, well logs) and geological data combined with numerical modeling techniques. The special focus will be on the rift and foreland basins as the most common hosts of ore deposits, hydrocarbons, water, and geothermal and storage sites. Each student will receive an assignment linked to the specific case study during the course.

Module grade calculation
The grade of the module is the grade of the examination of another type.

Annotation
The language of instruction is English. This is a third-semester module, the students are expected to have successfully passed the modules Geology (M-BGU-105744), Seismic Interpretation (M-BGU-105777), and Numerical Methods in Geosciences (M-BGU-105739).

The practical part of this course is carried out in the present. It requires a computer laboratory with the necessary hard- and software.

Workload
contact hours: 60

self study time: 90

Literature

Basin Analysis: Principles and Application to Petroleum Play Assessment
By: Philip A. Allen and John R. Allen, ISBN: 978-0-470-67377-5 August 2013 Wiley-Blackwell 632 Pages

Mathematical Modeling of Earth's Dynamical Systems
By: Slingerland, Rudy and Kump, Lee. Princeton University Press, 2011. ISBN: 978-0-691-14513-3

Seismic Data Analysis
By: Yilmaz, Oz, 2001, Freely available at: https://wiki.seg.org/wiki/Seismic_Data_Analysis

M 7.11 Module: Borehole Technology [M-BGU-105745]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each term	2 terms	English	4	2

Mandatory			
T-BGU-111471	Borehole Technology	5 CR	Kohl

Competence Certificate
The assessment consists of a written exam (90 min) according to §4 (2) of the examination regulations and a seminar presentation with the associated report.

Prerequisites
none

Competence Goal
- The students are able to characterize reservoirs from logging data.
- The students are able to explain the basics of different drillhole technologies and are able to present results graphically and to evaluate and present them scientifically.

Content
Logging (winter term)
Summary Petrophysics: Density / Porosity / Saturation
Electr. properties of rocks
Electrical survey - Resistivity distribution around Hydrocarbon / geothermal wells
Electrical survey - SP-Log
Electrical survey - Resistivity & Induction
Nuclear logs: Gamma Log
Nuclear logs: Density Log
Nuclear logs: Neutron Log
Image-Logs
Sonic-Logs
Logging software - introduction
Logging software - practical application

Driling (summer term)
Introduction Drill Rig
Blow-out Preventer
Gas Kick
Mud circuit
ROP / Mudlog
Drilling Fluid
Pressure Profile
Drill bit
Directional drilling
Rotary / downhole motor,
BHA Bottom Hole Assembly,
MWD & LWD
Casing design

Module grade calculation
The written exam component weights 75% of the overall module grade, the seminar component 25%.

Workload
regular attendance: 60h
seld study including exam: 90h

M 7.12 Module: Current Research Topics in Hydrogeology and Engineering Geology [M-BGU-105506]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	pass/fail	Each term	2 terms	German	4	1

Mandatory			
T-BGU-111067	Current Research Topics in Hydrogeology and Engineering Geology	5 CR	Goldscheider

Competence Certificate
Attendance at current lecture series, field exercise report(s) (1 page/day), presentation (20 min)

Prerequisites
none

Competence Goal
The students can name and explain current research topics in hydro- and engineering geology. They are able to analyze, discuss and present current research topics. They can recognize relevant phenomena and processes in the field

Content

- Selected lectures on current research topics in hydro- and engineering geology (e.g. Geologisches Fachgespräch, Karst Lecture, International Distinguished Lectures)
- Changing field exercises to current research regions
- Review of a current research topic on the basis of literature, presentation and discussion, accompanying mentoring program

Module grade calculation
not marked

Workload
150 h, of which 70 h attendance time and 80 h self-study time

M 7.13 Module: Diagenesis and Cores [M-BGU-103734]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	5	2

Mandatory			
T-BGU-107559	Diagenesis	3 CR	Hilgers
T-BGU-107624	Reservoir-Analogs and Core Description	2 CR	Hilgers

Competence Certificate
The assessment is a marked written report and an unmarked written report

1. Diagenesis: The assessment is based on a marked written report (10 pages) describing and interpreting a given thin section by independent practical microscopy over 4h on the day after completion of the course. This covers petrographic description of a sedimantary rock in thin section, its interpretation plus thin section images and raw data in the enclosure. Submission of report: 2 weeks after the end of the course.

2. Reservoir-Analogs and Core Description: The assessment is based on a passed report of 2 pages plus digital and hand-written enclosures of a core description (passed/not passed). Submission of report: 2 weeks after the end of the course.

Prerequisites
Entrance to the module examination requires the submission of homework (100%) within the given deadline, of which 80% are passed.

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-BGU-103742 - Reservoir Geology must have been passed.

Competence Goal
After this module, students will be able to apply basic industry standard analyses of sedimentary petrology and diagenesis, and core analysis for reservoir quality assessments.

Course 1: After this course students will be able to apply a industry-standard workflow of petrographic analyses of clastic sediments (description, quantification etc.), sandstone- and carbonate classification, evaporites, provenance, to derive diagenetic processes, evaluate reservoir characteristics and assess resevoir quality. They can critically assess data for sampling campaigns.

Course 2: After this course students are enabled to describe reservoir rocks in the field and in cores according to industry standards. They derive facies models and integrate data into state-of the art software

Content
detrital compenents, authigenic components, provenance assessment, point counting, reservoir quality assessment (geothermal, transitional hydrocarbons)

Module grade calculation
The grade of the module is the grade of the exam.

Annotation
Course 1 Diagenesis: You will work with thin sections from real reservoir rocks and understand the difference between analogs and reservoirs. The course considers to involve an industry expert.

Course 2 Reservoir Analogs and Cores: You will work on real reservoir cores which we obtained from wells in the North Sea and elsewhere.

The practical part of this course is carried out in presence. The attendance is obligatory. The microscopy exercises as well as the field course are essential for the study progress of the participants.

Workload
5CP (150h)

contact time: 45h (3SWS)

self-study time: 105h

Recommendation
The student shall have a basic knowledge of reservoir geology

Literature
• Stonecipher, S.A. 2000. Applied sandstone diagenesis - practical petrographic solutions for a variety of c ommon exploration, development, and production problems. SEPM Short Course No. 50
• Nader, F.H. 2020. Multi-scale Quantitative Diagenesis and Impacts on Heterogeneity of Carbonate Reservoir Rocks. Springer.
• Boggs, S. 2010. Petrology of sedimentary rocks. Cambridge Univ Press

M 7.14 Module: Earthworks and Foundation Engineering (bauiM5P2-ERDGB) [M-BGU-100068]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	3

Mandatory			
T-BGU-100068	Earthworks and Foundation Engineering	4 CR	Stutz
T-BGU-100178	Student Research Project 'Earthworks and Foundation Engineering'	2 CR	Stutz

Competence Certificate
- 'Teilleistung' T-BGU-100178 with not graded accomplishment according to § 4 Par. 3
- 'Teilleistung' T-BGU-100068 with written examination according to § 4 Par. 2 No. 1

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
With regard to geotechnical constructions the students are able to select and apply appropriate methods for exploration, modelling, dimensioning, realization and control in the case of complex requirements on average. They can apply this knowledge to earthworks and embankment engineering, can identify all geotechnically relevant problems occurring with dams and can apply self-reliantly design and dimensioning rules in outline. They gained geotechnical competence in solving problems for all kind of constructions in and with unconsolidated rocks, also with respect to the managerial organization, expense budgeting, use of documents and presentation of results.

Content
The module deepens the safety concepts in earthworks and foundation engineering and the project design for foundation problems by means of several examples (foundations on soft soil, variants of construction pit supporting system, stabilization and drainage of embankments, slope stabilization, retaining structure, underpinning) and explains the observation method. Basics of earthworks and foundation engineering are presented such as building materials for dams, design requirements, construction of dams, sealing and stability of filled dams. Further basics are computation of seepage and the evaluation of erosion, suffosion, piping, colmatation and joint erosion.

Module grade calculation
grade of the module is grade of the exam

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Foundation Types lecture/exercise: 30 h
- Basics in Earthworks and Embankment Dams lecture/exercise: 30 h

independent study:

- preparation and follow-up lecture/exercises Foundation Types: 10 h
- preparation and follow-up lecture/exercises Basics in Earthworks and Embankment Dams: 10 h
- preparation of student research project: 60 h
- examination preparation: 40 h

total: 180 h

Recommendation
basic knowledge of Soil Mechanics and Foundation Engineering;

compilation and submission of student research project as examination preparation until examination date

Literature

[1] Witt. K.J. (2008), Grundbau-Taschenbuch, Teil 1,
[2] Ernst & S. Smoltczyk, U. (2001), Grundbau-Taschenbuch, Teil 2-3,
[3] Ernst & S. Schmidt, H.G. & Seitz, J. (1998), Grundbau , Bilfinger & Berger
[4] Striegler (1998), Dammbau in Theorie und Praxis, Verlag für Bauwesen Berlin
[5] Kutzner (1996), Erd- und Steinschüttdämme für Stauanlagen, Enke Verlag Stuttgart

M 7.15 Module: Electron Microscopy I [M-PHYS-103760]

Responsible: TT-Prof. Dr. Yolita Eggeler
Organisation: KIT Department of Physics
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-PHYS-107599	Electron Microscopy I	5 CR	Eggeler

Literature

- D.B. Williams, C.B Carter, Transmission Electron Microscopy, 2nd edition, Springer
- L. Reimer, H. Kohl, Transmission Electron Microscopy, Springer Verlag

M 7.16 Module: Electron Microscopy II [M-PHYS-103761]

Responsible: TT-Prof. Dr. Yolita Eggeler
Organisation: KIT Department of Physics
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-PHYS-107600	Electron Microscopy II	5 CR	Eggeler

Literature

- D.B. Williams, C.B Carter, Transmission Electron Microscopy, 2nd edition, Springer
- L. Reimer, H. Kohl, Transmission Electron Microscopy, Springer Verlag

M 7.17 Module: Engineering Geology: Laboratory and Field Methods [M-BGU-105731]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-BGU-111448	Engineering Geologie: Laboratory and Field Methods	5 CR	Blum

Competence Certificate
The assessment consists of an oral exam (20 min) and two non-assessed reports (Laboratory and field methods).

Prerequisites
keine

Annotation
The practical part of this course is carried out in presence. The field courses and laboratory courses are essential for the progress of the participants.

M 7.18 Module: Engineering Geology: Mass Movements and Modelling [M-BGU-102442]

Responsible: Dr. Kathrin Menberg
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German	4	2

Mandatory			
T-BGU-110724	Engineering Geology: Mass Movements	2 CR	Menberg
T-BGU-110725	Engineering Geology: Modelling	3 CR	Blum

Prerequisites
none

M 7.19 Module: Environmental Geochemistry [M-BGU-105766]

Responsible: Dr. Elisabeth Eiche
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German/English	4	1

Mandatory			
T-BGU-111525	Environmental Geochemistry	5 CR	Eiche

Competence Certificate
The assessment consists of an examination of another type (ca. 10 exercise sheets in ILIAS for the lecture, a presentation of 30 min including discussion and a report related to the presentation of 10-20 pages) according to §4 (2) of the examination regulations.

Prerequisites
none

Competence Goal
The students can work out which natural and anthropogenic substance flows are relevant for selected elements. They know how and through which factors and processes the substance flow can change both over time and regionally to globally. They also understand the complex interactions between different spheres and different geochemical processes. They know selected methodological and analytical approaches to characterize substance flow. They are able to apply this knowledge to current environmental geochemical research results and develop well-founded interpretations and solutions. In addition, students can present selected issues of environmental geochemistry in an informative presentation and critically discuss them in a scientifically written seminar paper

Content
- Seminar with annually changing, selected topics that are related to aspects and prob-lems in environmental geochemistry
- Sources, sinks and substance flows of selected environmentally relevant elements such as As, Se, Hg, Cr
- Methods for characterizing the pollutant dynamics in the environment
- Process-oriented interpretation and discussion of current research results with regard to pollutant dynamics, including the development of adapted mitigation measures
- Special features of the pollutant dynamics in estuaries

Module grade calculation
The grade of the “ examination of another type ” is the module grade

Annotation
The course is carried out face-to-face.

Workload
150 h

Learning type
lecture and exercises

Literature
Alexandre, P. 2021. Practical Geochemistry. Springer Textbooks in Earth Sciences, Geography and Environment. Springer Nature Switzerland AG. https://doi.org/10.1007/978-3-030-72453-5
Holland, H.D., Turekian, K.K. 2014. Treatise on Geochemistry (Vol. 14) – Environmental Geochemistry. Elsevier Science.
Ryan, P. 2014. Environmental and Low Temperature Geochemistry. John Wiley & Sons, Incorporated.
Adriano, D.C. 2001. Trace elements in terrestrial environments: biogeochemistry, bioavailability, and risks of metals. 2nd edition. Springer New York, Berlin, Heidelberg.

M 7.20 Module: Environmental Geology: Radio- & Chemotoxic Elements [M-BGU-102455]

Responsible: Dr. Frank Heberling
Dr. Volker Metz

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German/English	5	3

Mandatory			
T-BGU-107560	Environmental Geology: Radio- & Chemotoxic Elements	3 CR	Heberling
T-BGU-107623	Radiogeochemical Field Excercise and Seminar	2 CR	Heberling

Competence Certificate
The assessment consists of

- a written exam (90 min) about the lecture and

- an ungraded coursework: Seminar as preparation for field excercise (15 min presentation) and report (15-20 pages, submission till 2 months after the excercise)

Prerequisites
None

Annotation
Depending on the auditorium, this module is held in German or English

The practical part of this course is carried out in presence. The field courses and laboratory courses are essential for the progress of the participants.

M 7.21 Module: Environmental Geotechnics (bauiM5S09-UMGEOTEC) [M-BGU-100079]

Responsible: Dr.-Ing. Andreas Bieberstein
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules) (Usage from 11/10/2023)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-BGU-100084	Landfills	3 CR	Bieberstein
T-BGU-100089	Brownfield Sites - Investigation, Evaluation, Rehabilitation	3 CR	Bieberstein

Competence Certificate
- 'Teilleistung' T-BGU-100084 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-100089 with oral examination according to § 4 Par. 2 No. 2

details about the learning control see at the 'Teilleistung'

Prerequisites
none

Competence Goal
The students can describe the legal guidelines regarding the disposal of wastes and the permitted threshold value for brownfields. They can outline the geotechnical concerns in the construction of landfill sites depending on the particular landfill classification, landfill elements, their relevant requirements and necessary certifications. They are able to interlink interdisciplinarily the chemical, mineralogical, biological, hydraulic and geotechnical aspects dealing with brownfileds. They can choose reasonably between the relevant remediation technologies and assess their limits of applications and risks.

Content
The module covers geotechnical techniques in dealing with waste and brownfields. The environmental engineering, scientific and legal basics are discussd. Working steps of project planning, building materials, ways of construction and proofs are presented. Techniques for burning and immobilisation are explained as well as different microbiological, electrokinetic, hydraulic and pneumatic soil remediation methods.

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Landfills lecture/exercise: 30 h
- Brownfield Sites - Investigation, Evaluation, Rehabilitation lecture: 30 h
- Excursion: 10 h

independent study:

- preparation and follow-up lecture/exercises Landfills: 25 h
- examination preparation Landfills (partial exam): 30 h
- preparation and follow-up lectures Brownfield Sites - Investigation, Evaluation, Rehabilitation: 25 h
- examination preparation Brownfield Sites - Investigation, Evaluation, Rehabilitation (partial exam): 30 h

total: 180 h

Recommendation
none

Literature

DGGT, GDA-Empfehlungen – Geotechnik der Deponien und Altlasten, Ernst und Sohn, Berlin
Drescher (1997), Deponiebau, Ernst und Sohn, Berlin
Reiersloh, D und Reinhard, M. (2010): Altlastenratgeber für die Praxis, Vulkan-V. Essen

M 7.22 Module: Field Seminar [M-BGU-105746]

Responsible: Prof. Dr. Armin Zeh
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules) (Usage from 5/31/2022)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	5	1

Mandatory			
T-BGU-111472	Field Seminar	5 CR	Zeh

Competence Certificate
The assessment is the participation of a 10 day (often international) field trip, taking notes in a geological field book, and depending on the respective lecturer a preliminary seminar, daily minutes during the trip, final report or some similar reporting.

Prerequisites
None

Competence Goal
After this module, the student can document and analyse new geological regions, and transfer knowledge.

Content
- Introduction to the geology of the region
- Recognition of rocks and their structures for the assessment of georeservoirs and georesources
- Derivation of geological processes

Module grade calculation
The grade of the module is the grade of the written report.

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Workload
Contact time: 100h
Self-study time: 50h

Recommendation
Students are requested to take this module in their final year.

Literature
• Tucker M 2011. Sedimentary rocks in the field. The Geological Field Guide Series.
• Lisle, R. et al 2011. Basic Geological Mapping. The Geological Field Guide Series.
• Jerram D, Petford N 2011. The field description of igneous rocks. The Geological Field Guide Series.
• Fry, N. 1991. The field description of metamorphic rocks. Geol.Soc.Lond.Prof. Handbook Series
• McClay, K. 1991. The mapping of geological structures. Geol.Soc.Lond.Prof. Handbook Series

M 7.23 Module: Fundamentals of Project Management [M-BGU-106717]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements (Usage from 4/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
1	pass/fail	see Annotations	1 term	German	4	1

Mandatory			
T-BGU-113492	Fundamentals of Project Management	1 CR	Hilgers

Competence Certificate
The assessment of the module consists of

- attending the course 1 (100%) and contributing to discussions and exercises (unmarked).
- submit a written report for course 2 Project Study (marked)

Prerequisites
none.

Content
The module consists of

- the course 1 Fundamentals of Project Management (1SWS): Lectures and exercises (1SWS) are conducted in the first half of the semester
- the course 2 Project Study

M 7.24 Module: Geochemical and Petrological Modeling [M-BGU-105747]

Responsible: Prof. Dr. Armin Zeh
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-BGU-111473	Geochemical and Petrological Modeling	5 CR	Drüppel, Eiche, Heberling, Zeh

Competence Certificate
The assessment consists of an oral examination (30 minutes duration)

Prerequisites
none

Competence Goal
The students have knowledge about fundamental principles of equilibrium thermodynamics and their application in geoscience. They are able to calculate phase diagrams in P-T-X space, and to model ionic speciations, mineral dissolution and -precipitation processes and mineral surface processes by applying appropriate thermodynamic software. Furthermore, the students will be enabled to evaluate calculation results in a geochemical-petrological context.

Content
(Part1) Introduction into geochemical thermodynamics

The components of Gibbs equation (H, S , V), equilibrium constant, excess energy, activity, fugacity, a-X relations, standard state, chemical potential, internally consistent thermodynamic datasets

Calculation of different kinds of thermodynamic equations: (i) simple mineral reactions, (ii) reactions with solid-solutions, (iii) reactions including fluid phases, (iv) Ionar reactions; (v) redox reactions, (vi) surface reactions with fluids

Basis of Gibbs minimization

Basics and terminology of phase diagram calculations

(Part 2) calculation of phase diagrams for petrological applications with software THERMOCALC, THERIAK-DOMINO and PERPLE-X

Basics and differences of the three programs, calculation of T-X diagrams and P-T pseudosections for complex systems comprising volatiles and melts, practical applications

(Part 3) calculation of equilibrium reactions between solids, liquids, and gases at low-T conditions with the software PHREEQC, with application to actual research problems

Module grade calculation
The grade of the “oral examination” is the module grade

Annotation
This module will be held for the first time in the winter term 2022/23.

The course is carried out face-to-face.

Workload
Contact Hours: Approx. 50 hours lectures and exercises

Self studying time:100 hours

Recommendation
none

Learning type
Lectures (1/3) and exercises (2/3)

Literature

1. Darrell Kirk Nordstrom, James L. Munoz (1985). Geochemical Thermodynamics.

Blackwell Scientific Publications

2. Powell, R. (1978). Equilibrium Thermodynamics in Petrology. An Introduction. Joanna Cotler Books.

3. Holland, T.J.B. & Powell, R. (1999). An internally consistent thermodynamic data set for phases of petrological interest. Journal of Metamorphic Geology, 16, 309-343.

M 7.25 Module: Geochemical Processes and Analytical Methods [M-BGU-103995]

Responsible: Dr. Elisabeth Eiche
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (mandatory)
Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	2 terms	German	5	4

Mandatory			
T-BGU-108192	Geochemical Processes and Analytical Methods	5 CR	Eiche

Competence Certificate
The assessment consists of an examination of another type (approx. 10 exercise sheets on ILIAS for geochemical material cycles; short lecture on an analysis method and final report on a given laboratory project for geochemical analysis).

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

Recommendation
none

M 7.26 Module: Geodata Analysis II – Big Data and Machine Learning [M-BGU-105634]

Responsible: Dr. Tanja Liesch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-BGU-111268	Geodata Analysis II – Big Data and Machine Learning	5 CR	Liesch

Competence Certificate
Other kind: Independent development of a given problem

Prerequisites
Choice of the profile Hydrogeology and Engineering Geology. To register for the exam, the module Geodata Analysis I - Programming and Geostatistics must have been passed.

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-BGU-105505 - Geospatial Data Analysis I – Programming and Geostatistics must have been passed.

Competence Goal
The students can handle large geospatial data sets (e.g. satellite data, climate data). They master basic machine learning methods and are able to program simple application cases independently.

Content

- Advanced programming
- Big data analysis (z.B. Satellitendaten, Klimaprojektionen)
- Google Earth Engine (Programming in Java Script)
- Fundamentals of Machine Learning (Supervised and Unsupervised Learning, Learning Algorithms, Classification and Regression)
- Neural Network Basics (Types on ANN, Learning Algorithms, Training, Validation, Testing, Over- and Underfitting)
- Feature Engineering
- Hyperparameter Tuning, Regularization, Ensembles
- Application Examples (Python)

Workload
50 h attendance time and 100 h self-study time

Learning type
Combined lecture and computer exercises

M 7.27 Module: Geological Storage of Gas [M-BGU-102445]

Responsible: Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German/English	5	2

Mandatory			
T-BGU-104841	Geological Storage of Gas	5 CR	Schilling

Competence Certificate
The assessment consists of an examination of another type (presentation).

Prerequisites
none

Module grade calculation
Module grade ist the grade of the examination of another type.

Annotation
Depending on the auditorium, this module is held in German or English

Workload
60 h contact time

90 h self studying time

Recommendation
The student shall have a basic knowledge of reservoir geology, mathematics and physics

Literature
IPCC Report zur CO2-Speicherung

EU Richtlinie zur CO2 Speicherung

Jaeger & Cook: Fundamentals of Rock Mechanics. Wiley-Blackwell ISBN 978-0-632-05759-7, 488 S.
Zoback: Reservoir Geomechanics, Cambrige University Press, ISBN 978-0-521-14619-7, 461 S.

M 7.28 Module: Geology [M-BGU-105744]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	5	1

Mandatory			
T-BGU-111470	Geology	5 CR	Hilgers

Competence Certificate
The assessment is a marked written exam over 120 minutes

Prerequisites
Entrance to the module examination requires the submission of homework (100%) within the given deadline, of which 80% are passed.

Competence Goal
After this module, student can apply structural geology using real world examples. Students will be trained to link rocks and depositional systems in different regional settings.

Content
Applied Structural Geology:
• Stress, Strain & Drilling
• Fractures and Mohr Circle
• Joints, Veins & Effective Stress
• Normal faults & Allen-Diagram
• Thrust faults & Balanced Cross Sections
• Strike slip fault & Scaling
• Inversion & Fault Reactivation
• Strain measurements
• Diapirs & Creep Laws
• Folds & Saddle Reefs
• Cleavage & Shear Zones
• Creep from Microstructures
• Maps / Structural Analysis

Depositional Systems of regions:
• Sea level change
• Sequence stratigraphy
• Overview, description of sediments
• Eolian systems
• Glacial Systems
• Fluvial systems
• Estuaries and incised valleys
• Deltas & Clastic Shorelines
• Evaporites
• Clastic shelves
• Reefs and platforms
• Submarine fans and Turbidites

Module grade calculation
The grade of the module is the grade of the written exam

Annotation
We consider to have one field practical near Karlsruhe.

Workload
60 h attendance time and 90 h self-study time

Literature

• Ameen M.S. 2018. Operational Geomechanics EAGE
• Fossen, H. 2016. Structural Geology. Cambridge Univ Press
• Jackson, M.P.A., Hudec, M.R. 2017. Salt Tectonics, Cambridge Univ Press
• Reading, H.G. 2012. Sedimentary Environments. Blackwell
• James, N.P., Dalrympie, R.W. 2010. Facies Models 4. Geol. Ass. of Canada.
• Boggs, S. 2010. Petrology of sedimentary rocks. Cambridge Univ Press

M 7.29 Module: Geospatial Data Analysis I – Programming and Geostatistics [M-BGU-105505]

Responsible: Dr. Kathrin Menberg
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	2

Mandatory			
T-BGU-111066	Geospatial Data Analysis I – Programming and Geostatistics	5 CR	Menberg

Competence Certificate
Student research project: programming of a code for data analysis, written documentation (ca. 5 pages)

Prerequisites
Assignment of the profile Hydrogeology and Engineering Geology

Competence Goal
Students can use the Python programming language to apply methods for statistical analysis to different geospatial datasets, prepare the results graphically, and discuss and summarize them.

Content
The course is divided into a lecture (1 SWS) and an exercise (2 SWS). The lecture teaches theoretical basics of programming in Python (program structures, database structures, data ethics & licenses, etc.), as well as methods for geostatistical analysis (regression analysis, uncertainty analysis, etc.) of spatial datasets.

The exercise covers the practical aspects of programming, data analysis, visualization and interpretation.

Workload
45 h attendance time and 105 h self-study time

Recommendation
This module should be attended and completed before the module Geodata Analysis II that builds on it

Learning type
Lecture and exercise, student research project

Base for
Geodata Analysis II – Big Data and Machine Learning

M 7.30 Module: Geotechnical Engineering (bauiBFP7-GEOING) [M-BGU-103698]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
11	Grade to a tenth	Each summer term	2 terms	German	3	2

Mandatory			
T-BGU-112814	Basics in Soil Mechanics	6 CR	Stutz
T-BGU-112815	Basics in Foundation Engineering	6 CR	Stutz

Competence Certificate
- 'Teilleistung' T-BGU-112814 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-112815 with written examination according to § 4 Par. 2 No. 1

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
The students have a scientifically sound understanding of the building material 'soil' with respect to its appearance and mechanical behaviour. They are able to describe the latter on base of soil mechanical and soil hydraulic models, to classify and to analyse respective field and laboratory tests. Because of their knowledge in usual geotechnical construction methods they can independently select, design and describe the construction process for standard applications, such as building foundations, construction pit linings and tunnels adapted to the respective ground and groundwater conditions. Further, they are able to proof independently ultimate limit states and serviceability limit states of those geotechnical constructions and natural slopes and to evaluate the results critically.

Content
The module imparts theoretical principles of soil behavior and demonstrates their practical application in designing of the most common geotechnical constructions. This covers:

- standards, codes and safety concepts in foundation engineering
- subsoil investigation, soil classification, soil properties and soil parameters
- permeability, seepage and groundwater management
- stress distributions in the subsoil, compression behavior and consolidation
- shear resistance of soils, stability of slopes and foundations
- design and settlement calculation of shallow foundations
- earth pressure and earth resistance, design of retaining structures and retaining walls for excavations
- pile foundations, deep foundations and caisson foundations in open water
- methods for soil improvement
- introduction to tunneling

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Basics in Soil Mechanics lecture, exercise, tutorial: 90 h
- Basics in Foundation Engineering lecture, exercise, tutorial: 90 h

independent study:

- preparation and follow-up lectures, exercises Basics in Soil Mechanics: 30 h
- preparation and follow-up lectures, exercises Basics in Foundation Engineering: 30 h
- examination preparation Basics in Soil Mechanics (partial examination): 45 h
- examination preparation Basics in Foundation Engineering (partial examination): 45 h

total: 330 h

Recommendation
The attendance of the lecture accompanied tutorials (6200417, 6200517) is recommended.

The not graded accomplishment Geology in Civil Engineering [T-BGU-103395] shall be passed.

Further, it is highly recommended to take the partial examination Basics in Soil Mechanics before taking the partial examination Basics in Foundation Engineering.

Literature
Gudehus, G (1981): Bodenmechanik, F. Enke

Grundwissen "Der Ingenieurbau" (1995) Bd. 2: Hydrotechnik – Geotechnik, Ernst u. Sohn

Lang, H-J, Huder, J, Amann, P, Puzrin A.M. (2011): Bodenmechanik und Grundbau, Springer Verlag

Kolymbas, D.: Geotechnik, Springer-Verlag 5. Auflage

M 7.31 Module: Geothermics I: Energy and Transport Processes [M-BGU-105741]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	2

Mandatory			
T-BGU-111466	Energy and Transport Processes	5 CR	Kohl, Schilling
T-BGU-111467	Geothermics in the Rhine Graben – Field Exercise	0 CR	Kohl

Competence Certificate
The assessment consists of a written exam (45 min) according to §4 (2) of the examination regulations and a non-assessed coursework (participation in field exercise and report) according to §4 (3) of the examination regulations.

Prerequisites
none

Competence Goal
- The students obtain knowledge in the field of geothermics and are able to integrate relevant physical processes into the subject field
- The students are able to apply methods for geothermal subsurface investigations and to make calculations with the obtained data

Content
- Heat budget of the Earth (influence of the sun, humans, stored heat, heat production)
- Heat transport in rocks (phonons, photons, elektrons, advective heat transport)
- Physical understanding of underlying mechanisms and processes
- Introduction into Geothermics, relations and boundaries to other related disciplines
- Energy conservation, thermal and petrophysical properties of rocks, temperature field of the Earth, influence of topography and climate on temperature distribution, Fourier law, stationary/instationary heat conduction, heat ransport in continental and oceanic crust, advection by flow (Darcy law), Kelvin problem, Gauss error function
- Introduction into methods and applications in geothermics: Bullard plot interpretation, measurement, Bottom Hole Temperature data
- Introduction into geophysical geodynamics

Module grade calculation
The grade of the module is the grade of the written exam

Annotation
The date for the excursion and the closing date for the field exercise report will be promptly announced.

The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Workload
45 hours regular attendance
105 hours field exercise, report and self study time

M 7.32 Module: Geothermics II: Application and Industrial Use [M-BGU-105742]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-BGU-111468	Application and Industrial Use	4 CR	Kohl
T-BGU-111469	Geothermal Exploitation – Field Exercise	1 CR	Kohl

Competence Certificate
The assessment consists of a written exam (45min) according to §4 (2) of the examination regulations and a non-assessed coursework (participation in field trip and report), see §4 (3) of the examination regulations.

Prerequisites
none

Competence Goal
- The students develop shallow and deep geothermal projects with cost estimates
- The students are able to explicate examples and case studies in theory and practice

Content
- Introduction into geothermal utilization
- Hydrothermal and enhanced (or engineered) geothermal systems (EGS)
- Stimulation methods
- Geothermal Exploration
- Thermodynamics and power plant processes
- Shallow geothermics
- Examples

Module grade calculation
The grade of the module is the grade of the written exam.

Annotation
The date for the field exercise and the closing date for the field exercise report will be promptly announced.

The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Workload
30 hours regular attendance,

2 days field exercise (30 hours),

90 hours self studying time

M 7.33 Module: Geothermics III: Reservoir Engineering and Modeling [M-BGU-105743]

Responsible: Dr. Emmanuel Gaucher
Prof. Dr. Thomas Kohl

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	3

Mandatory			
T-BGU-111523	Reservoir Engineering and Modeling Exercises	5 CR	Gaucher

Competence Certificate
The assessment consists of a written exam (90 min) according to §4 (2) of the examination regulations and a seminar presentation.

Prerequisites
See modeled conditions

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-BGU-105741 - Geothermics I: Energy and Transport Processes must have been passed.
2. The module M-BGU-105742 - Geothermics II: Application and Industrial Use must have been passed.

Competence Goal
- The students will be able to compare and to analyze geothermal systems.
- The students will be able to assess and discuss geothermal systems.
- The student will be able to acquire and to present in front of their peers specific knowledge of geothermal systems from the literature and to discuss.

Content
The content of this course contains basics, technologies, and exploration methods of geothermal systems.
- Introduction into geothermal reservoir engineering
- Reservoir geology of crystalline and sedimentary rocks
- Geothermal exploration
- Geothermometry of thermal water
- Scalings
- Induced seismicity
- Seismic monitoring
- Numerical reservoir modelling
- Well testing

Module grade calculation
The written exam component weights 60% of the overall module grade, the seminar component 40%.

Annotation
1.It is strongly recommended to follow the Geothermics I [M-BGU-105741] and Geothermics II [M-BGU-105742] modules before following this one.

2. Starting from the winter term 2021/2022 this is the new name for the former module

- M-BGU-105136 - Geothermal Reservoir Engineering

and even for the older module

- M-BGU-102448, Topics of Geothermal Research

Workload
regular attendance: 4 SWS, 60 hours

self study 90 hours

M 7.34 Module: Ground Water and Earth Dams (bauiM5S04-GWDAMM) [M-BGU-100073]

Responsible: Dr.-Ing. Andreas Bieberstein
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-BGU-100091	Ground Water and Earth Dams	6 CR	Bieberstein

Competence Certificate
- 'Teilleistung' T-BGU-100091 with oral examination according to § 4 Par. 2 No. 2

details about the learning control see at the 'Teilleistung'

Prerequisites
none

Competence Goal
The students can describe the deepened knowledge about different geotechnical groundwater problems. They can dimension dewatering under very different boundary conditions and demonstrate geohydraulic relationships by example calculations. They are able to develop own solution approaches for dam construction problems, to evaluate construction techniques and to conduct the requested geotechnical proofs.

Content
The module discusses the investigation of the groundwater conditions in laboratory and field. Geohydraulic fundamentals are extended with respect to anisotropy, saturation fronts, air permeability and groundwater drawdown under specific boundary conditions. The construction of flow nets is applied to seepage problems and the underseepage of dams. The hydrologic hydraulic and geotechnical design of dams is deepened. Hereby, the design of artificial sealings and filters is linked to the geo-mechanical proofs such as sliding, spread and uplift stability, deformation and earthquake design. Buried auxiliary structures, dams designed for overtopping as well as metrological monitoring of dams are mentioned, too.

Module grade calculation
grade of the module is grade of the exam

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Geotechnical Ground Water Problems lecture/exercise: 30 h
- Embankment Dams (Advanced) lecture/exercise: 30 h
- field trips: 10 h

independent study:

- preparation and follow-up lecture/exercises Geotechnical Ground Water Problems: 25 h
- preparation and follow-up lecture/exercises Embankment Dams (Advanced): 25 h
- examination preparation: 60 h

total: 180 h

Recommendation
module 'Earthworks and Foundation Engineering'

Literature
[1] Cedergren, H.R. (1989), Seepage, Drainage, and Flow Nets, 3. Aufl. Wiley
[2] Herdt, W. & Arndts, E. (1985), Theorie und Praxis der Grundwasserabsenkung, 2. Aufl. Ernst & S.

M 7.35 Module: Hydrogeology: Groundwater Modelling [M-BGU-102439]

Responsible: Dr. Tanja Liesch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-BGU-104757	Hydrogeology: Groundwater Modelling	5 CR	Liesch

Competence Certificate
The assessment consists of an examination of another type (working on a problem, submission ca. mid-February and a ca. 15 min presentation).

Prerequisites
The choice of the module "Hydrogeology: Methods and Application" (SPO 2016) or "Hydrogeology: Hydraulics & Isotopes" (SPO 2021) as well as the event "Digital Geoinformation Processing" (SPO 2016) or "GIS Cartography" (SPO 2021) is prerequisite for the choice/attendance of this module, as these form the theoretical and practical basis for it.

M 7.36 Module: Hydrogeology: Hydraulics and Isotopes [M-BGU-105726]

Responsible: Dr. Tanja Liesch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	5	1

Mandatory			
T-BGU-111402	Hydrogeology: Hydraulics and Isotopes	5 CR	Liesch

Competence Certificate
Written exam (90 min)

Competence Goal
The students are able to independently apply methods for the evaluation of hydraulic experiments and discuss their results. They can explain and apply relevant isotope methods in hydrogeology.

Content
- Advanced pump test evaluation
- Slug test, water pressure test
- Isotope methods in theory and practice

Annotation
The choice of the module "Hydrogeology: Hydraulics and Isotopes" as well as the active participation in it is a prerequisite for the choice/occupation of the modules Hydrogeology: Groundwater Modelling [M-BGU-102439] and Hydrogeology: Field and Laboratory Methods [M-BGU-102441], as it forms the theoretical and practical basis for them.

Workload
150 h, of which 38 h attendance time and 112 h self-study time

Learning type
Lectures with Exercises

M 7.37 Module: Industrial Minerals and Environment [M-BGU-103993]

Responsible: Prof. Dr. Jochen Kolb
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules) (Usage from 5/31/2022)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-BGU-108191	Industrial Minerals and Environment	5 CR	Kolb

Competence Certificate
The assessment consists of an examination of another type (graded module report incl. field seminar report)

Prerequisites
none

Competence Goal
The students know the fundamental characteristics of industrial mineral deposits. They know the different possibilities of industrial application and quality requirements of the respective raw material. They are able to describe samples from industrial mineral deposits, recognize the relevant structure, fabric, texture and mineral assemblage. They can use their observations to make interpretations regarding mineral deposit formation and ore deposit quality. The students know the principle ore deposit models and can use this knowledge in order to interpret their sample set. They are able to decide, which mineral exploration method would be required for exploration of the various deposits and they are able to make basic assumptions about the economy of the deposit. They know how to translate geological observations into key parameters for mineral exploration.

The students know how to analyze short scientific papers and are able to understand and present the main message. They can relate the message in the paper to own observations in the samples and present a joint interpretation.

The students know how to apply their theoretical knowledge in the field. They make interpretations at various scales (thin section, sample, outcrop, deposit, district). They know, how to make meaningful sketches and how to present their observations and interpretation in written and oral formats. They are able to analyze, interpret and discuss their data in conjunction with published ore deposit models and can decide on the style of mineralization and the way of mineral exploration.

The students know different environmental risks related to the extraction of metal ores, industrial minerals and energy resources and assign them to the respective stage (exploration, extraction, processing etc.). They are able to derive the potential environmental hazards of individual types of resources and propose suitable reclamation measures based on a sound knowledge of their geochemical and mineralogical characteristics. They can assess the positive and negative effects of extraction, processing and use of different resources on humans and the environment in a differentiated manner and are thus able to critically evaluate their own behaviour in the context of sustainable use of resources.

Content
The combined lectures and practicals start with an introduction into the industrial minerals raw material market and mineral deposit evaluation. The following lessons combine a lecture about the fundamental processes of deposit formation and the relationship to mineral exploration and quality of the industrial mineral resource with practical study of representative samples. In addition, scientific papers will be read and interpreted in some lessons.

During two days of field work the theoretical and practical skills will be applied in the field in selected industrial mineral deposits. Standard methods of geological field work will be applied and directed towards interpretation of the respective deposit.

It will be looked at different environmental impacts of ore extraction and processing like acid mine drainage, cyanide leaching, amalgamation or oil spillage with specific focus on the hydrosphere, pedosphere, atmosphere, human beings and society. Furthermore, different strategies on how to minimize environmental impacts will be discussed and different examples on renaturation and reclamation will be presented. Also legal aspects of mineral resources exploration and extraction will be addressed.

Module grade calculation
The grade of the module is the grade of the module report incl. field seminar report

Annotation
Students should be aware of harsh conditions during field work and should let the responsible person know, if they would have problems to work underground in old mines.

Depending on the auditorium, the course "Environmental Aspects of Mining" is held in German or English

The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Workload
67.5 hours lectures and practicals and 82.5 self-study time

Learning type
lecture, exercises, field seminar

Literature
Kesler, S.E. & Simon, A.C. (2015): Mineral Resources, Economics and the Environment. Cambrigde University Press, Cambridge, 434 pp.

Harben, P. (most recent edition): The Industrial Minerals HandyBook, a guide to markets, specifications and prices. Industrial Minerals Division, Metal Bulletin PLC, London.

Bewertungskriterien für Industrieminerale, Steine und Erden. Geologisches Jahrbuch Reihe H. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. Different publications of various authors; in German with English abstract.

Publications of the Geological Surveys: BGR, DERA, BGS, USGS, etc.

Brown, M., Barley, B., Wood, H. 2002. Mine Water Treatment: technology, application and policy. IWA publishing

Lottermoser, B.G. 2003. Mine wastes. Springer Verlag

M 7.38 Module: Internship [M-BGU-103996]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Internship or Project Study) Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German/English	4	2

Mandatory			
T-BGU-108210	Internship	5 CR	

Competence Certificate
The assessment consists of

- submission of an internship certificate from the employer with information about the internship, duration and the field of activity

- an examination of another type (graded internship report ca. 10-20 pages, equivalent to the report of the project study, and ca. 20 min presentation).

Prerequisites
The student is responsible for the acquisition and organization of the internship.
The following requirements apply to recognition:

- Before starting the internship, the student has to choose independently a lecturer from the AGW (in in case of doubt, the chairman of the examination board), who

1. confirms the geoscientific relevance based on the submission of a working plan (content, timeframe) which was planned with the company / institution and is responible for the grading of the final report.
2. The submission of an internship certificate from the internship office stating the completed internship, duration and field of activity is mandatory.

Competence Goal
• Students are able to use the skills they have acquired during their studies under realistic conditions.
• You are capable of applying and further developing technical and interdisciplinary skills such as project management in a professional environment.

Content
• Varies depending on the internship position.
• It should essentially be independent work.

Module grade calculation
The grading is done by the lecturer who approved the internship.

Annotation
The premises for the recognition of a professional internship are explained in the requirements.
The professional internship that requires approval can be chosen as one of 2 modules (project study or professional internship).

Workload
At least 4 weeks of full-time internship and preparation of an internship report.

M 7.39 Module: Introduction to Ceramics [M-BGU-105222]

Responsible: Prof. Dr. Michael Hoffmann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-MACH-100287	Introduction to Ceramics	6 CR	Schell

Competence Certificate
The assessment consists of an oral exam (30 min) taking place at a specific date.

The re-examination is offered at a specific date.

Workload
180 h

M 7.40 Module: Introduction to Computational Geodynamics: Part 1 [M-BGU-106898]

Responsible: Dr. Ali Ismail-Zade
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements (Usage from 10/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-BGU-113836	Introduction to Computational Geodynamics – Part 1	3 CR	Ismail-Zade

Competence Certificate
The assessment consists of an oral exam (each student will have 30 min to prepare answers to questions and 30 min to present their answers). To pass the exam, students should show their understanding of the lecture course topics and quantitative ways for solving geodynamical problems, comprehension of gained knowledge, and independent thinking.

Prerequisites
Basic knowledge about Earth dynamics, its surface processes, linear algebra, differential equations, tensor analysis.

Competence Goal
The students are able (i) to develop a geodynamic problem and describe the data associated with the problem; (ii) to formulate a mathematical and numerical model to solve the geodynamic problem; (iii) to suggest the computational method(s) for solving the numerical model and justify their choice; and (iv) to analyse the pre-processing, computer performance, and post-processing steps of a numerical simulation.

Content
Introduction to Geodynamics. Plate tectonics, lithosphere subduction, hotspots, tectonic stress and strain, seismicity, and volcanism. Heat transfer in the Earth interior.

Concepts of Fluid Mechanics and Heat Transfer. Basic equations of fluid mechanics and heat transfer. Gravitational and thermal instability. Rock rheology.

Computational Methods. The basic methodologies of computational fluid dynamics. Analytical and numerical modeling. Finite Difference Method. Finite Element Method. Meshless methods. Computational aspects of numerical modeling. Pre- and post-processing and computer performance. Serial versus parallel computing.

Inverse Problems and Data Assimilation. Inverse retrospective modeling. Optimization. Backward advection. Variational (adjoint) method. Quasi-reversibility method. Applications to lithosphere dynamics, lava flow, cloaking and illusion.

AI techniques for geodynamics problems. Computer vision and application to lava dome analysis**.** Machine learning and application to recognition of large earthquakes.

Sedimentary Basins. Formation mechanisms. Salt diapirism. Restoring deformed sedimentary cover. Thermal modeling. Nexus between mantle upwelling, basin evolution, and hydrocarbon (natural hydrogen) generation.

Dynamics of the Lithosphere. Viscoelastic stress modeling. Earthquake simulators. Application to earthquake-prone regions (Carpathians, Sunda arc, Tibet-Himalayan, Caucasus). Seismic hazards.

Module grade calculation
Grade of the oral exam is the module grade.

Annotation
The principal goal of the course is to introduce quantitative and interdisciplinary understanding of and thinking about geodynamical problems rather than just to provideknowledge. Enthusiasm is expected in cooperation, discussions, and debates. So, your physical presence at the lectures is advisable, but online option can be used as well (if required).

Workload
34 hours of attendance time
56 hours of self-study

Recommendation
This module will introduce general concepts of numerical modelling in geodynamics. Module M-BGU-105739 presents more specific knowledge and coding related to the numerical modelling in geothermal studies.

Literature
Textbooks

Ismail-Zadeh, A., and Tackley, P., *Computational Methods for Geodynamics*, Cambridge University Press, 2010.

Ismail-Zadeh, A., Korotkii, A., and Tsepelev, I. *Data-driven Numerical Modeling in Geodynamics: Methods and Applications*, Springer, 2016.

Turcotte, D. L., and Schubert, G., *Geodynamics*, Cambridge University Press, 3rd edition, 2014.

Multi-authored books

Fagents, S.A., Gregg, T.K.P., and Lopes, R.M.C. (eds.) *Modeling Volcanic Processes*. Cambridge University Press, 2021.

Ismail-Zadeh, A., Castelli, F., Jones, D., and Sanchez, S. (eds.) *Applications of Data Assimilation and Inverse Problems in the Earth Sciences*, Cambridge University Press, 2023.

M 7.41 Module: Introduction to Paleontology [M-BGU-106693]

Responsible: Dr. Julien Kimmig
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements (Usage from 4/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-BGU-113458	Introduction into Paleontology	5 CR	Kimmig

Competence Certificate
25% written exam, 25% presentation, 25% lab book, 25% work sheets

Prerequisites
none

Content
- Introduction
- Geologic time
- Theory of Evolution
- Beginning of Life
- Life in the Precambrian
- Life in the Paleozoic
- Life in the Mesozoic
- Extinction Events
- Taphonomy
- Quantitative Paleontology
- Biodiversity

Live and Climate

Annotation
Lecture and lab take place at the Natural History Museum Karlsruhe

Workload
12 hours: Lecture
12 hours: Labs
126 hours: self studying time

Learning type
Lecture and lab

Literature
Benton & Harper: Introduction to paleobiology and the fossil record

M 7.42 Module: Isotope Geochemistry and Geochronology [M-BGU-106025]

Responsible: Dr. Sara Rose Kimmig
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules) (Usage from 10/1/2022)
Specific Supplements (Usage from 10/1/2022)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-BGU-112211	Isotope Geochemistry and Geochronology	5 CR	Beranoaguirre

Competence Certificate
The assessment consists of a written exam (approx. 1.5 hours) + mandatory tests

Prerequisites
none

Competence Goal
At the end of the course the student will be able to I) collect and prepare samples independently; II) identify the appropriate isotopic system to use depending on the case of study; and III) evaluate and interpret the data.

Content
The course will provide the student with the knowledge of stable and radiogenic isotopes, which are powerful tools to track natural processes within the different Earth reservoirs. Likewise, the course also aims to allow the student to understand (and apply some of) the most used techniques for the geochronology of rock and minerals. Additionally, good lab practices will also be adquired.

Module grade calculation
The grade of the module is the grade of the written exam.

Workload
150 h: 60 hours of presence time (lecture, field and laboratory work), 90 hours of personal work (sample preparation, analysis, evaluation)

M 7.43 Module: Karst Hydrogeology [M-BGU-105790]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German	4	2

Mandatory			
T-BGU-111592	Karst Hydrogeology	3 CR	Goldscheider
T-BGU-110413	Field Trip Karst Hydrogeology	2 CR	Goldscheider

Competence Certificate
The assessment consists of a written exam (60 min) and a non-assessed coursework (non-assessed field exercise report).

Prerequisites
none

Competence Goal

- The students are able to understand and explain the hydrogeological characteristics of karst aquifer systems and recognize them in the field.
- They are familiar with the relevant investigation methods in karst hydrogeology for scientific research and professional practice.
- They can evaluate the vulnerability of karst groundwater resources and develop concepts for their sustainable management.

Content

- Geomorphology and hydrology of karst landscapes
- Mineralogy, stratigraphy and geologic structure of karst systems
- The carbonate equilibrium, calcite dissolution, karstification and speleogenesis
- Groundwater flow in karst aquifers
- Modeling approaches in karst hydrogeology
- Vulnerability and contaminant transport in karst
- Springs, wells and other drinking water abstraction structures in karst aquifers
- Field exercises in karst hydrogeology: Impact of climate change on karst groundwater resources, drinking water abstraction in karst areas

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

M 7.44 Module: Mineral Exploration [M-BGU-105357]

Responsible: Dr. Simon Hector
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	5	1

Mandatory			
T-BGU-110833	Mineral Exploration	5 CR	Eiche, Walter

Competence Certificate
The students will need to provide a report (~10 pages) on the specific project they have been assigned to. They need to show that they know the right methods of exploration. Deadline for the report is individually scheduled. The first version of the report has to be improved if necessary.

Prerequisites
Students need detailed knowledge on ore forming processes of metallic and non-metallic mineral resources. They also need detailed background in geochemistry and geochemical analytics. Basic knowledge of geophysical exploration methods will be expected.

Competence Goal
The students know the different geochemical methods applied to mineral resources exploration. They can choose the best-suited methods at the different stages of exploration for optimizing ore deposits discovery. They also know which exploration methods to use for specific ore deposit types.
The students know how to interpret geochemical data and how to correlate them with field and sample observations. They know how to write an exploration report.
The students will have the qualifications required for working in the ore mineral industry.

Content
-Theory for mineral exploration at regional, district, area, target and deposit scale (scientific approach, economics…).
-Geochemical distribution of metals and element of interests in the primary environment (i.e. during magmatism, metamorphism and alteration processes…).
-Geochemical dispersion of metals and element of interests in the secondary environment (i.e. soil, gossans, till, laterites…).
-Greenfield methods for exploration such as stream sediments, soil, rock and water survey.
-Brownfield methods for exploration at deposit scale with specific focus on drill core logging.
-Field sampling and laboratory data acquisition.
-Data interpretation from study cases and from data personally acquired by the stu-dents.

Module grade calculation
Grade of the report is the module grade.

Annotation
The course is held in 3 blocks (1. Block short course, 2. Block short course and project preparation, 3. Block data interpretation). See university calendar / course catalogue.

In the summer term 2022 the course Mineral Exploration 6321410 will take place from September 26th to September 30th.

Workload
40h Lectures, 2-3 field work or sample selection (ca. 25h), ca. 25h laboratory work, 60h self-study (report) = 150 h

Recommendation
The students should have done the course of “Ore Geology of Metals” and “Industrial Minerals and Environment” or have background knowledge in ore geology.

Learning type
Lecture, literature research, fieldwork and labwork, report

Literature
Papers presented in lectures

M 7.45 Module: Mineral Materials [M-BGU-102453]

Responsible: Dr. Matthias Schwotzer
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each term	2 terms	German	4	1

Mandatory			
T-BGU-104856	Mineral Materials	5 CR	Schwotzer

Competence Certificate
The assessment consists of an oral exam (30 min).

Prerequisites
None

Annotation
The practical part of this course is carried out in presence. The laboratory courses are essential for the progress of the participants.

M 7.46 Module: Mineralogical Analytics [M-BGU-105765]

Responsible: apl. Prof. Dr. Kirsten Drüppel
Prof. Dr. Frank Schilling

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-BGU-111524	Mineralogical Analytics	5 CR	Drüppel, Schilling

Competence Certificate
The assessment consists of an examination of another type, including colloquia and short reports for the laboratory exercises and a written examination.

Prerequisites
none

Module grade calculation
The grade of the “examination of another type” is the module grade.

Annotation
The course is carried out face-to-face

Recommendation
none

Learning type
Lectures (1/3) and exercises (2/3)

M 7.47 Module: Module Master's Thesis [M-BGU-105845]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Master's Thesis

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
30	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-BGU-111758	Master's Thesis	30 CR	Blum

Competence Certificate
The assessment consists of the Master's Thesis and a presentation. The maximum processing time for the Master's Thesis is six months. The presentation should take place within 8 weeks after the submission of the Master's Thesis.

Prerequisites
The prerequisite for admission to the master's thesis module is that the student has successfully passed module examinations for 70 CP, of which at least 10 CP are from the compulsory modules of the choosen profile in the subject “Geoscientific Specialization”.

Modeled Conditions
The following conditions have to be fulfilled:

1. You have to fulfill one of 3 conditions:
    1. You have to fulfill 2 of 5 conditions:
        1. The module M-BGU-105505 - Geospatial Data Analysis I – Programming and Geostatistics must have been passed.
        2. The module M-BGU-105731 - Engineering Geology: Laboratory and Field Methods must have been passed.
        3. The module M-BGU-105793 - Applied and Regional Hydrogeology must have been passed.
        4. The module M-BGU-102438 - Project Study must have been passed.
        5. The module M-BGU-103996 - Internship must have been passed.
    2. You have to fulfill 2 of 4 conditions:
        1. The module M-BGU-103995 - Geochemical Processes and Analytical Methods must have been passed.
        2. The module M-BGU-102430 - Applied Mineralogy: Geomaterials must have been passed.
        3. The module M-BGU-105747 - Geochemical and Petrological Modeling must have been passed.
        4. The module M-BGU-105765 - Mineralogical Analytics must have been passed.
    3. You have to fulfill 2 of 4 conditions:
        1. The module M-BGU-105739 - Numerical Methods in Geosciences must have been passed.
        2. The module M-BGU-105744 - Geology must have been passed.
        3. The module M-BGU-105745 - Borehole Technology must have been passed.
        4. The module M-BGU-105736 - Advanced Geological Mapping must have been passed.
2. You need to have earned at least 70 credits in your course of studies.

M 7.48 Module: Numerical Methods in Geosciences [M-BGU-105739]

Responsible: Dr. Emmanuel Gaucher
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (mandatory)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-BGU-111456	Numerical Methods in Geosciences	5 CR	Gaucher

Competence Certificate
The assessment consists of a written exam (90 min) according to §4 (2) of the examination regulations.

Prerequisites
none

Competence Goal
- The students can perform basic statistical analysis of geoscientific data including spatial statistics (geostatistics).
- The students can code simple programs in Python to process and plot data.
- Students are familiar with partial differential equations applied to fluid circulation in the subsurface and the numerical methods used to solve them (finite differences and finite elements).
- The students applied pre-processing, processing and post-processing steps of numerical simulations.

Content
Part 1
- Basic of algorithmic and programming
- Introduction to Python programming language, basic coding, exercises
- Statistical description of data: 1D, 2D and 3D data representation, comparative statistical testing, hypothesis testing
- Statistical analysis of data: uni-, bi- and multi-variate data analysis, regression, principal component analysis
- Spatial analysis of data: representation, spatial clustering, experimental variogram computation and analytical model fitting.
- Geostatistical kriging and simulation: Kriging theory and application, estimation vs. simulation, modeling strategy

Part 2
- Partial differential equations in geosciences (fluid flow, heat flow)
- Numerical methods: discretization, meshing, finite differences, finite elements
- Numerical modeling procedure: conceptual model, pre-processing, processing and post-processing
- Numerical modeling exercises: meshing, fluid flow (Theis radial flow) and heat flow in porous media

Module grade calculation
The module grade is the grade of the written exam.

Annotation
Python exercises will punctuate the course to illustrate the concepts presented. They are essential for the progress of the participants.

Due to the numerous practical exercises, this course is given primarily on-site unless circumstances require an online course.

Homework required.

Workload
regular attendance 60 hours

self study time 90 hours

Recommendation
Own laptop/PC

Learning type
- Lectures
- Exercises
- Self-study

M 7.49 Module: Ore Geology of Metals [M-BGU-103994]

Responsible: Prof. Dr. Jochen Kolb
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules) (Usage from 5/31/2022)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	5	1

Mandatory			
T-BGU-109345	Ore Geology of Metals	5 CR	Kolb

Competence Certificate
The assessment consists of an oral exam (30 min). A report on the field seminar has to be handed in before the oral exam..

Prerequisites
none

Competence Goal
The students know the fundamental approach of describing samples from ore deposits (hand specimen, drill core) and thin and polished sections. They can analyze the samples and relate them to the specific ore deposit type. They know the specific textures and are able to discuss them in order to develop a model for the mineralization or hydrothermal alteration processes.

The students know the principle ore deposit models and can use this knowledge in order to interpret their sample set that comes from different parts or zones of an ore deposit. They understand the different scales that are involved in ore deposit formation and are able to use their observations to interpret and discuss the scale-dependent processes involved in mineralization.

The students know the principle methods of mineral exploration and are able to translate geological observations into key parameters for mineral exploration.

The students know how to analyze short scientific papers and are able to understand and present the main message. They can relate the message in the paper to own observations and present a joint interpretation.

The students know how to apply their theoretical knowledge in the field. They make interpretations at various scales (thin section, sample, outcrop, deposit, district). They know, how to make meaningful sketches and how to present their observations and interpretation in written and oral formats. They are able to analyze, interpret and discuss their data in conjunction with published ore deposit models and can decide on the style of mineralization and the way of mineral exploration.

Content

- Detailed processes of ore deposit formation, including modern research advances.
- Ore petrology on sample, drill core, thin section and polished section.
- Reading and interpretation of short papers on ore deposit geology.
- Orthomagmatic Ni-PGE-Cu-Au deposits.
- Podiform Chromite deposits.
- Magmatic REE-Nb-Ta deposits.
- Copper Porphyry deposits.
- Epithermal Au-Ag deposits.
- Skarn deposits.
- VMS-SEDEX deposits.
- Orogenic Gold deposits.
- Iron Oxide Copper Gold deposits.
- MVT-SSC deposits.
- Fundamentals of recognizing and describing mineralization in the field.

Module grade calculation
The module grade is the grade of the oral exam, including the report on the field seminar.

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Workload
67.5 hours lectures and practicals and 82.5 self-study time

Recommendation
Students should have a basic level of understanding of ore-forming processes from a previous Economic Geology course.

Learning type
Lecture / Practicals / Field Seminar

(VÜ)

Literature
Books:

Robb, L., 2005: Introduction to Ore-Forming Processes. Blackwell Publishing, Oxford, 373 pp.
Ridley, J., 2013: Ore Deposit Geology. Cambridge University Press, Cambridge, 398 pp.
Guilbert, J.M. & Park, C.F., 2007: The Geology of Ore Deposits. Waveland Press, 985 pp.
Pirajno, F., 2009: Hydrothermal Processes and Mineral Systems. Springer, Heidelberg, 1250 pp.

M 7.50 Module: Petrology [M-BGU-102452]

Responsible: apl. Prof. Dr. Kirsten Drüppel
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-BGU-104854	Petrology	5 CR	Drüppel

Competence Certificate
The assessment consists of an examination of another type (graded homework).

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

M 7.51 Module: Petrophysics [M-BGU-105784]

Responsible: Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German/English	5	1

Mandatory			
T-BGU-104838	Mineral and Rock Physics	5 CR	Schilling

Competence Certificate
The assessment consists of an Examination of another type (partly based on the protocols of the exercises and reports).

Prerequisites
none

Module grade calculation
The module grade is the grade of the examination of another type

Annotation
Depending on the auditorium, this module is held in German or English

The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

Workload
70 hours attendance time and 80 hours self-studying time

Literature
will be communicated in the lecture

M 7.52 Module: Physical Chemistry for Applied Geosciences [M-CHEMBIO-104581]

Responsible: wechselnde Dozenten, siehe Vorlesungsverzeichnis
apl. Prof. Dr. Andreas-Neil Unterreiner

Organisation: KIT Department of Chemistry and Biosciences

Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
15	Grade to a tenth	Each term	2 terms	German	4	2

Mandatory			
T-CHEMBIO-103385	Physical Chemistry	9 CR	
T-CHEMBIO-109395	Laboratory Work in Physical Chemistry	6 CR	

Prerequisites
None

M 7.53 Module: Project Study [M-BGU-102438]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Internship or Project Study)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German/English	4	3

Mandatory			
T-BGU-104826	Project Study	5 CR	Blum

Competence Certificate
The assessment consists of an examination of another type (Project Study: graded report and presentation).

Prerequisites
none

Competence Goal
- The students are familiar with the basics of project management.
- You can plan time and resources for a given problem in applied geosciences.
- You work on the given problem according to your own plans.
- You work out the results in the form of a written project report.
- You present the most important results in a presentation.

Content
Project study: Working on a problem. This can be designed differently depending on the department.

Module grade calculation
The module grade corresponds to the grade of the project study.

Annotation
The project study takes the form of an independent piece of work in the course of the 2nd and 3rd semester. Topics will be published on time on the institute's website.

Workload
Project study: 150 hours of self-study (project planning, project processing, preparation of the report, preparation of the presentation)

M 7.54 Module: Raw Materials and Environment [M-BGU-105963]

Responsible: Dr. Elisabeth Eiche
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules) (Usage from 10/1/2022)
Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules) (Usage from 11/10/2023)
Specific Supplements (Usage from 10/1/2022)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German/English	4	1

Mandatory			
T-BGU-112118	Raw Materials and Environment	5 CR	Eiche

Competence Certificate
Oral exam (20-30 min) + report on characterization of mine waste deposit.

Prerequisites
none

Competence Goal
The students are able to name the different phases (exploration, mining, processing, etc.) of raw material extraction. They can assign environmental influences to the respective phases and describe them. In this context, they can present possible methods and strategies for minimizing and remediating the environmental impact and compare the individual options. With this knowledge, they are able to point out the advantages and disadvantages of the individual procedures and strategies and, based on this, to derive and justify selection criteria. The same applies to the selection and design of rehabilitation options, which the students can present and weigh against each other. For all phases of raw material extraction, there are legal bases at German and European level, which the students can name and whose relevance they can recognize.
The extraction of raw materials, especially in developing and emerging countries, is always caught between environmental pollution and social and economic benefits. Also, consumers are faced with the ethical question of how they themselves can contribute to minimizing the environmental and social impact of mining. The students are able to classify, discuss and evaluate various viewpoints and alternatives in this context.
The students can independently create a sampling concept to characterize a selected mining site. They can realize this concept independently in the field. They are able to prepare and analyze the samples with high quality. Furthermore, they are able to use the data to develop a risk assessment for the contaminated site with respect to environment and health and to propose suitable remediation concepts.

Content
- Effects of raw material extraction and processing on the hydrosphere, pedosphere, atmosphere as well as humans and society
- Historical mining and its effects
- Exemplary development of strategies for minimizing environmental impacts through raw material extraction and concepts for rehabilitation
- Effects of salt, lignite and uranium mining in Germany as well as measures to secure, remediate and restore
- Social and ethical aspects of raw material extraction
- Legal aspects of raw material extraction
- Geochemical characterization of contaminated sites including sampling, analysis and evaluation (field and laboratory work, changing locations)

Module grade calculation
The module grade is the grade of the oral exam which also covers the report.

Annotation
The course is carried out face-to-face.

Workload
150 h

Learning type
Lectures and Practise

Literature

• slides from lecture (webpage)
• Brown, M., Barley, B. & Wood, H. (2002). Mine Water Treatment: technology, application and policy. IWA publishing.
• Lottermoser, B.G. (2003). Mine wastes. Springer. Berlin
• Kausch, P., Ruhrmann, G. (2001). Environmental Management, Environmental Impact Assessment of Mines. Loga Vertragsbuchhandlung Köln
• Craig, J., Vaughan, D.J., Skinner, B.J. (2010). Earth Resources and the Environment. 4. Auflage. Prentice Hall Verlag.

M 7.55 Module: Reserve Modeling [M-BGU-105759]

Responsible: Dr. Simon Hector
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-BGU-111499	Reserve Modeling	5 CR	Walter

Competence Certificate
The assessment consists of an oral examination.

Competence Goal
The students know the fundamental principles of resource and reserve estimation in mining. They learn the rules and the basic approach of calculating resources and reserves. They will be introduced into the relevant topics for pre-feasibility and feasibility studies. They know how to write the respective reports and how to collect the relevant data. They can use their knowledge to evaluate the quality of pre-feasibility and feasibility studies. Based on this, students are able to do a basic economic risk evaluation on various exploration and mining projects. They will be taught by skilled persons from industry in block courses.

Content
The students will be taught the basic principles of resource and reserve estimation. They will learn to do this using at least one software package. They will be introduced to the contents of pre-feasibility and feasibility studies. The different international standards of resource estimation (JORC, National Instrument 43-101, etc.) will be presented. Standard methods of economic risk assessment will be tested with examples. The program will be completed in two targeted block courses with invovlment of skilled persons from industry.

Module grade calculation
The module grade is the grade of the the graded module report and presentation

Workload
6320101 Reserve Modeling - Feasibility Study of Mining Projects: 2 days, 35 h self study time

6320104 Economic and Risk Evaluation: 3 days, 65 h self study time

M 7.56 Module: Reservoir Geology [M-BGU-103742]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	5	1

Mandatory			
T-BGU-107563	Reservoir Geology	5 CR	Hilgers

Competence Certificate
The assessment is a marked written exam over 120 minutes, the participitation in the Field Seminar Reservoir-Geology and the submission of field book.

Prerequisites
Entrance to the module examination requires the submission of homework (100%) within the given deadline, of which 80% are passed.

Competence Goal
After this module, students are enabled to interpret fluid storage and migration in porous and fractured rock in 3D sedimentary bodies and caverns relevant for geothermal energy, renewable energy storage, transitional gas and others. It covers aspects from structural evolution to facies- and porosity-permeability development. Students are enabled to map and characterize sedimentary rocks properties in the field including structural- and petrophysical aspects. They work in teams and critically evaluate own data compared to published literature.

Content
Reservoir conditions from geological maps; methods: petrography, isotopy, microthermometry and cathodoluminescence; burial history and maturation; pore pressures, compaction and water saturation; diagenesis; well correlations; migration and traps; fault seal and top seal; reservoir characterization; reservoir quality prediction; plays and risks. Practical application of reservoir geology in a given field study area with special focus on structure, 3D geometries in sedimentary rocks and diagenesis.

Module grade calculation
The grade of the module is the grade of the written exam.

Annotation
Course Reservoir-Geology: We consider to visit a reservoir in production near Karlsruhe during the lecture.

Field Seminar Reservoir-Geology: The course will be conducted during the semester break, participitation is compulsary. For participants of field seminar Reservoir-Geology: Please mind the visa regulations e.g. if the trip is scheduled to SW-England.

Workload
5 CP =150 h

contact time: 90h (incl. Field seminar)

self-study time: 60h

Recommendation
The student shall have a basic knowledge of sedimentology and structural geology, such as presented in the module Geologie (Geology), MSc 1st semester

Learning type
lectures, exercises and field seminar

Literature
• Bjorlykke, K. 2015. Petroleum Geoscience. From sedimentary environments to rock physics. Springer

• Emery, D. & Robinson, A. 1993. Inorganic geochemistry geosciencece.

Base for
This course is required to enroll to the module Diagenesis and Cores M-BGU-103734

M 7.57 Module: Rock Mechanics and Tunneling (bauiM5P3-FMTUB) [M-BGU-100069]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-BGU-100069	Rock Mechanics and Tunneling	5 CR	Stutz
T-BGU-100179	Student Research Project 'Rock Mechanics and Tunneling'	1 CR	Stutz

Competence Certificate
- 'Teilleistung' T-BGU-100179 with not graded accomplishment according to § 4 Par. 3
- 'Teilleistung' T-BGU-100069 with written examination according to § 4 Par. 2 No. 1

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
The students understand the essential strength and deformation properties of rock and master the basic analytical methods to solve boundary value problems of surface and underground rock excavation. They can select basic construction methods and constructions in underground tunnel construction and apply self-reliantly the methods of rock mechanics and static calculation and safety assessments. With regard to the assessment of variants, costs, construction operation and safety aspects they gained geotechnical competence in solving problems for all kind of constructions in and with solid rocks.

Content
see German version

Module grade calculation
grade of the module is grade of the exam

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Basics in Rock Mechanics lecture/exercise: 30 h
- Basics in Tunnel Construction lecture/exercise: 30 h

independent study:

- preparation and follow-up lecture/exercises Basics in Rock Mechanics: 20 h
- preparation and follow-up lecture/exercises Basics in Tunnel Construction: 20 h
- preparation of student research project: 20 h
- examination preparation: 60 h

total: 180 h

Recommendation
basic knowledge of Soil Mechanics and Foundation Engineering (respective topics of the bachelor study progam 'Civil Engineering' are required);

basic knowledge of Engineering Geology;

Literature

[1] Brady, B. H. G. and Brown, E. T., (2004): Rock Mechanics for Underground Mining, 3rd. Edition, Kluwer Academic Publishers.
[2] Kolymbas, D. (1998), Geotechnik - Tunnelbau und Tunnelmechanik, Springer.
[3] Goodmann, R.E., (1989): Introduction to Rock Mechanics, John Wiley & Sons.
[4] Hoek, E., 2007: Practical Rock Engineering, kostenloser Download unter: http://www.rocscience.com/hoek/PracticalRockEngineering.asp.
[5] Jäger, J.C., Cook, N.G.W. and Zimmerman, R.W., 2007: Fundamentals of Rock Mechanics, Blackwell Publishing.
[6] Wittke, W., 1982: Felsmechanik, Springer-Verlag.
[7] Maidl, B. 1997: Tunnelbau im Sprengvortrieb
[8] Müller, L. 1978: Der Felsbau, Bd. 3 Tunnelbau
[9] Wittke, W.: Rock Mechanics Based on an Anisotropic Jointed Rock Model (AJRM), Ernst & Sohn, 2014

M 7.58 Module: Sedimentary Petrology [M-BGU-103733]

Responsible: Prof. Dr. Armin Zeh
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	5	1

Mandatory			
T-BGU-107558	Sedimentary Petrology	5 CR	Zeh

Competence Certificate
The assessment consists of a written exam (90 min).

Prerequisites
none

Module grade calculation
grade of the module is grade of the exam

Annotation
Depending on the auditorium, this module is held in German or English

Workload
contact hours: 60h (lecture and exercises)

self study time: 90h incl. exam

M 7.59 Module: Seismic Interpretation [M-BGU-105777]

Responsible: TT-Prof. Dr. Nevena Tomašević
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	5	3

Mandatory			
T-BGU-111720	Seismic & Sequence Stratigraphy	1 CR	Tomašević
T-PHYS-113453	Introduction to Reflection Seismics, Prerequisite	1 CR	Bohlen
T-BGU-113474	Seismic Interpretation, Examination	3 CR	Tomašević

Competence Certificate
The assessment consists of a graded end-term written exam (120 min) which will include knowledge obtained while attending lectures and exercises in the first and second brick, i.e. Reflective Seismic and Seismic & Sequence Stratigraphy.

Regular attendance of lectures and exercises; submission of exercises and/or homework assignments in which at least 60% of the total number of points available must be achieved for each Brick (Seismic & Sequence Stratigraphy, Introduction to Reflection Seismics).

Prerequisites
Requirements for participation in the graded exam: submission of all exercises on time, 60% of them correct for each Brick (Seismic & Sequence Stratigraphy, Introduction to Reflection Seismics).

Competence Goal
The course aims at providing students with the tools and methods required to (1) define architectural elements of the sedimentary basin fill and (2) be able to predict the location and quality of the targeted sedimentary body (e.g., reservoir).

At the end of the course, students will: (1) understand the fundamental concepts of seismic wave propagation, seismic data acquisition, and seismic data processing/imaging including method limitations and pitfalls; (2) be trained in the interpretation of seismic lines; (3) understand fundamental concepts of seismic and sequence stratigraphy, and (4) be able to define system tracts and sequences using the seismic and well log data.

Content

Part 1: Introduction to Reflection Seismics

(50%; Lecturers Thomas Bohlen & Thomas Hertweck): Lecture is followed by practical exercises.

In this part of the course students learn about the reflection seismic method, that means the general approach of generating and using seismic waves in applied geophysics to create an image of the subsurface. In order to achieve this, the course covers on the one hand basic theoretical concepts in physics that are required to understand seismic wave propagation or signal processing. On the other hand, the course deals with many practical aspects such as concepts of marine and land data acquisition, typical sources and receivers used in the field, the most important seismic data processing steps and ways to create a high-quality image of the subsurface.

Part 2: Seismic & sequence stratigraphy

(50%; LecturesNevena Tomašević): Lecture is followed by practical exercises.

This part of the course provides a link between seismic interpretation and high-resolution sequence analysis. The subject is tackled from a practical point of view with hands-on experience in the form of exercises. Both methods combine different scales of observation. The seismic interpretation is done basin wide, while individual outcrops have been the traditional starting point for high-resolution sequence stratigraphy. There is a considerable overlap of the methods because seismic stratigraphy corresponds more or less to low-resolution sequence stratigraphy. The merger between both methods provides the geoscientist both with concepts and a powerful prediction tool for the amount of geological change between and beyond subsurface calibration points.

Module grade calculation

The grade of the module is the grade of the graded written end-term exam.

Annotation

The language of instruction is English. This is a second semester module. The students are expected to have attended the module Geology (old number M-BGU-102431, new number M-BGU-105744), which is offered in the winter term.

The lecture will be accompanied by exercises that help students to understand the various aspects of dealing with seismic data. The practical part of this course is carried out in presence.

Workload

Regular attendance: 60 hours
self-studying time: 90 hours

Literature

- O. Yilmaz, “Seismic Data Analysis”, 2001: Society of Exploration Geophysicists.
- R. E. Sheriff and L. P. Geldart, “Exploration Seismology”, 1995: Cambridge University Press.
- Catuneanu, O. (2006): Principles of Sequence Stratigraphy, Elsevier, Amsterdam, The

Netherlands.

- Vail, P. A. et. al. (1993): Sequence Stratigraphy – A Global Theory for Local Success;

Oilfield Review, 1/93, p. 51-62; Elsevier, Amsterdam, NL.

- Van Wagoner, J. C. et. al. (1990): Siliciclastic Sequence Stratigraphy in Wells, Cores, and Outcrops: Concepts for High-Resolution Correlation of Time and Facies; AAPG Methods in Exploration Series 7; Tulsa, Okl., USA.

M 7.60 Module: Shallow Geothermal Energy [M-BGU-105730]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Engineering Geology and Hydrogeology (Specialisation in Geosciences: Engineering Geology and Hydrogeology Elective Modules)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	5	1

Mandatory			
T-BGU-111447	Shallow Geothermal Energy	5 CR	Blum

Competence Certificate
Oral exam (15 min)

Prerequisites
none

Competence Goal
The students will have the qualifications required for working in an environmental and energy consultancy, dealing with shallow geothermal energy. Furthermore, recent case studies will be presented (e.g. visiting a drill site of a ground source heat pump system).

Content
The basic course deals with the theory and application of shallow geothermal energy (2 SWS in winter term).

The basic course will be complemented by laboratory and field exercises for the determination of groundwater temperatures and thermal heat conductivities. In addition, heat transport modelling and energy planning will be performed. (1 SWS in winter term)

Module grade calculation
The grade of the module is the grade of the oral exam

Annotation
none

Workload
45h attendance time, 105h self-study time

Recommendation
The students should also take the course M-BGU-102439 “Hydrogeology: Groundwater Modelling”.

Learning type
Lecture, exercise and self-study

Literature
Stauffer et al. (2014) Thermal Use of Shallow Groundwater

Base for
none

M 7.61 Module: Structural and Phase Analysis [M-BGU-105236]

Responsible: Dr.-Ing. Susanne Wagner
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-MACH-102170	Structural and Phase Analysis	4 CR	Wagner

Competence Certificate
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation).

The re-examination is offered upon agreement.

Competence Goal
The students know the fundamentals of crystallography, the generation and detection of x-rays as well as their interaction with the microstructure of crystalline materials. They have detailed knowledge about the different methods of x-ray diffraction measurements and are able to analyse x-ray spectra using modern methods of x-ray analysis both qualitatively and quantitatively.

Content
The course gives an overview to generation and detection of x-rays as well as their interaction with matter. It provides an introduction to crystallography and describes modern measurement and analysis methods of x-ray diffraction.

It is arranged in the following units:

- Generation and properties of X-Ray's
- Crystallography
- Fundamentals and application of different measuring methods
- Qualitative and quantitative phase analysis
- Texture analysis (pole figures)
- Residual stress measurements

Module grade calculation
The grade of the module is the grade of of the oral examination.

Workload
regular attendance: 30 hours
self-study: 90 hours

Literature
Moderne Röntgenbeugung - Röntgendiffraktometrie für Materialwissenschaftler, Physiker und Chemiker, Spieß, Lothar / Schwarzer, Robert / Behnken, Herfried / Teichert, Gerd B.G. Teubner Verlag 2005
H. Krischner: Einführung in die Röntgenfeinstrukturanalyse. Vieweg 1990.
B.D. Cullity and S.R. Stock: Elements of X-ray diffraction. Prentice Hall New Jersey, 2001.

M 7.62 Module: Structural Geology [M-BGU-102451]

Responsible: apl. Prof. Dr. Agnes Kontny
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specialisation in Geoscience: Sustainable Energy-Resources-Storage (Specialisation in Geosciences: Sustainable Energy-Resources-Storage Elective Modules)
Specialisation in Geoscience: Mineralogy and Geochemistry (Specialisation in Geosciences: Mineralogy and Geochemistry Elective Modules) (Usage from 5/31/2022)
Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	4	2

Mandatory			
T-BGU-107507	Microstructures	3 CR	Kontny
T-BGU-107508	Field Course Applied Structural Geology	2 CR	Kontny

Competence Certificate
The success control in this module is carried out:

1. in form of an approx. 20 min graded presentation in the course microstructure at the end of the course.

Content: Geological framework, description of the microstructures and derivation of the deformation history based on exercise thin sections.

2. Participation in the field course (5-6 days) and ungraded presentation of a topic relevant to the geological field area (from literature and your own field data) depending on the location of the field course. The presentation is given either during the field course or approx. 4-6 weeks afterwards. The presentation consists either of a poster presentation or a 5-10 minutes talk with an approx. 8-page report. The revised field book records are necessary to pass the course.

Prerequisites
none

Competence Goal
• Students will be trained in microstructural analysis in order to gain fundamental understanding of rock deformation. They learn to evaluate their own observation in relation to a tectonic context.
• Practical application of structural analysis in a given field study area.

Content
• Microstructures: The students learn to describe and evaluate small scale structures in deformed rocks. They are enabled to describe and interprete rock fabric elements, foliation development, polyphase deformation, deformation mechanisms, porphyroblast growth-deformation relationship and shear zone fabrics.
• Field course Applied Structural Geology: The students learn to describe and interprete large scale structures in the field. They characterize the development of normal faults, folds, thrust systems, unconformities and explain polyphase deformation in space and time in different orogenic belts.

Module grade calculation
Module grade corresponds to grade from course microstructure

Annotation
The practical part of this course is carried out in presence. The field and microscopy exercises are essential for the participants to progress in their studies.

Workload
30h lecture,

50h field work as well as two presentations and report / field documentation

70h self studying time

Recommendation
Knowledge of basics in petrology and optical determination of rock-forming minerals

Literature
Passchier, C.W., Trouw, R.A.J. (2005): Microtectonics, 366 S., Springer.
Vernon, R.H. (2004): A practical guide to rock microstructure, 594 S., Cambridge.

Further references to the field course will be delivered in advance

M 7.63 Module: Supplementary Studies on Science, Technology and Society [M-FORUM-106753]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: Additional Examinations (Usage from 10/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
16	Grade to a tenth	Each term	3 terms	German	4	1

Election notes
Students have to self-record the achievements obtained in the Supplementary Studies on Science, Technology and Society in their study plan. FORUM (formerly ZAK) records the achievements as "non-assigned" under "ÜQ/SQ-Leistungen". Further instructions on self-recording of achievements can be found in the FAQ at https://campus.studium.kit.edu/ and on the FORUM homepage at https://www.zak.kit.edu/english/16495.php. The title of the examination and the amount of credits override the modules placeholders.

If you want to use FORUM achievements for both your Interdisciplinary Qualifications and for the Supplementary Studies, please record them in the Interdisciplinary Qualifications first. You can then get in contact with the FORUM study services (stg@zak.kit.edu) to also record them in your Supplementary Studies.

In the Advanced Unit you can choose examinations from three subject areas: "About Knowledge and Science", "Science in Society" and "Science in Social Debates". It is advised to complete courses from each of the three subject areas in the Advanced Unit.

To self-record achievements in the Advanced Unit, you have to select a free placeholder partial examination first. The placeholders' title do *not* affect which achievements the placeholder can be used for!

Mandatory			
T-FORUM-113578	Lecture Series Supplementary Studies on Science, Technology and Society - Self Registration	2 CR	Mielke, Myglas
T-FORUM-113579	Basic Seminar Supplementary Studies on Science, Technology and Society - Self Registration	2 CR	Mielke, Myglas
Advanced Unit Supplementary Studies on Science, Technology and Society (Election: at least 12 credits)			
T-FORUM-113580	Elective Specialization Supplementary Studies on Science, Technology and Society / About Knowledge and Science - Self-Registration	3 CR	Mielke, Myglas
T-FORUM-113581	Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Society - Self-Registration	3 CR	Mielke, Myglas
T-FORUM-113582	Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Public Debates - Self Registration	3 CR	Mielke, Myglas
Mandatory			
T-FORUM-113587	Registration for Certificate Issuance - Supplementary Studies on Science, Technology and Society	0 CR	Mielke, Myglas

Competence Certificate
The monitoring is explained in the respective partial achievement.

They are composed of:
- Protocols
- Reflection reports
- Presentations
- Preparation of a project work
- An individual term paper
- An oral examination
- A written exam

Upon successful completion of the supplementary studies, graduates receive a graded report and a certificate issued by the FORUM.

Prerequisites
The course is offered during the course of study and does not have to be completed within a defined period. Enrollment is required for all assessments of the modules in the supplementary studies.
Participation in the supplementary studies is regulated by § 3 of the statutes. KIT students register for the supplementary studies by selecting this module in the student portal and booking a performance themselves. Registration for courses, assessments, and exams is regulated by § 8 of the statutes and is usually possible shortly before the start of the semester.
The course catalog, module description (module manual), statutes (study regulations), and guidelines for creating the various written performance requirements can be downloaded from the FORUM homepage at https://www.zak.kit.edu/begleitstudium-wtg.

Competence Goal
Graduates of the Supplementary Studies on Science, Technology, and Society gain a solid foundation in understanding the interplay between science, the public, business, and politics. They develop practical skills essential for careers in media, political consulting, or research management. The program prepares them to foster innovation, influence social processes, and engage in dialogue with political and societal entities. Participants are introduced to interdisciplinary perspectives, encompassing social sciences and humanities, to enhance their understanding of science, technology, and society. The teaching objectives of this supplementary degree program include equipping participants with both subject-specific knowledge and insights from epistemological, economic, social, cultural, and psychological perspectives on scientific knowledge and its application in various sectors. Students are trained to critically assess and balance the implications of their actions at the intersection of science and society. This training prepares them for roles as students, researchers, future decision-makers, and active members of society.

Through the program, participants learn to contextualize in-depth content within broader frameworks, independently analyze and evaluate selected course materials, and communicate their findings effectively in both written and oral formats. Graduates are adept at analyzing social issues and problem areas, reflecting on them critically from a socially responsible and sustainable standpoint.

Content
The Supplementary Studies on Science, Technology and Society can be started in the 1st semester of the enrolled degree programme and is not limited in time. The wide range of courses offered by FORUM makes it possible to complete the program usually within three semesters. The supplementary studies comprises 16 or more credit points (LP). It consists of two modules: the Basic Module (4 LP) and the Advanced Module (12 LP).

The Advanced Module is divided into 3 thematic subject areas:

Subject area 1: About Knowledge and Science

This is about the internal perspective of science: students explore the creation of knowledge, distinguishing between scientific and non-scientific statements (e.g., beliefs, pseudo-scientific claims, ideological statements), and examining the prerequisites, goals, and methods of knowledge generation. They investigate how researchers address their own biases, analyze the structure of scientific explanatory and forecasting models in various disciplines, and learn about the mechanisms of scientific quality assurance.

After completing courses in the "Knowledge and Science" area, students can critically reflect on the ideals and realities of contemporary science. They will be able to address questions such as: How robust is scientific knowledge? What are the capabilities and limitations of predictive models? How effective is quality assurance in science, and how can it be improved? What types of questions can science answer, and what questions remain beyond its scope?

Subject area 2: Science in Society

This focuses on the interactions between science and different areas of society, such as how scientific knowledge influences social decision-making and how social demands impact scientific research. Students learn about the specific functional logics of various societal sectors and, based on this understanding, estimate where conflicts of goals and actions might arise in transfer processes—for example, between science and business, science and politics, or science and journalism. Typical questions in this subject area include: How and under what conditions does an innovation emerge from a scientific discovery? How does scientific policy advice work? How do business and politics influence science, and when is this problematic? According to which criteria do journalists incorporate scientific findings into media reporting? Where does hostility towards science originate, and how can social trust in science be strengthened?

After completing courses in the "Sciene in Society" area, students can understand and assess the goals and constraints of actors in different societal sectors. This equips them to adopt various perspectives of communication and action partners in transfer processes and to act competently at various social interfaces with research in their professional lives.

Subject area 3: Science in Public Debates

The courses in this subject area provide insights into current debates on major social issues such as sustainability, digitalization, artificial intelligence, gender equality, social justice, and educational opportunities. Public debates on complex challenges are often polarized, leading to oversimplifications, defamation, or ideological thinking. This can hinder effective social solution-finding processes and alienate people from the political process and from science. Debates about sustainable development are particularly affected, as they involve a wide range of scientific and technological knowledge in both problem diagnosis (e.g., loss of biodiversity, climate change, resource consumption) and solution development (e.g., nature conservation, CCS, circular economy).

By attending courses in "Science in Public Debates," students are trained in an application-oriented way to engage in factual debates—exchanging arguments, addressing their own prejudices, and handling contradictory information. They learn that factual debates can often be conducted more deeply and with more nuance than is often seen in public discourse. This training enables them to handle specific factual issues in their professional lives independently of their own biases and to be open to differentiated, fact-rich arguments.

Module grade calculation
The overall grade of the supplementary course is calculated as a credit-weighted average of the grades that were achieved in the advanced module.

Annotation
Climate change, biodiversity crisis, antibiotic resistance, artificial intelligence, carbon capture and storage, and gene editing are just a few areas where science and technology can diagnose and address numerous social and global challenges. The extent to which scientific findings are considered in politics and society depends on various factors, such as public understanding and trust, perceived opportunities and risks, and ethical, social, or legal considerations.
To enable students to use their expertise as future decision-makers in solving social and global challenges, we aim to equip them with the skills to navigate the interfaces between science, business, and politics competently and reflectively. In the Supplementary Studies, they acquire foundational knowledge about the interactions between science, technology, and society.

They learn:
- How reliable scientific knowledge is produced,
- how social expectations and demands influence scientific research, and
- how scientific knowledge is adopted, discussed, and utilized by society.

The program integrates essential insights from psychology, philosophy, economics, social sciences, and cultural studies into these topics. After completing the supplementary studies programme, students can place the content of their specialized studies within a broader social context. This prepares them, as future decision-makers, to navigate competently and reflectively at the intersections between science and various sectors of society, such as politics, business, or journalism, and to contribute effectively to innovation processes, public debates, or political decision-making.

Additional credit points (supplementary achievements), up to a maximum of 12, can be earned from interdisciplinary achievements and can be included in the supplementary course. Upon request, these supplementary achievements are listed in the certificate of the accompanying course, marked as such, and recorded with their grades as specified in paragraph 9. However, these supplementary achievements are **not** included in the calculation of the overall grade for the accompanying course.
The statutes for the accompanying study programme Science, Technology and Society apply.

Workload
The workload is made up of the number of hours of the individual modules:

- Basic Module approx. 120 hours
- Advanced Module approx. 390 hours
> Total: approx. 510 hours

In the form of supplementary services, up to approximately 390 hours of work can be added.

Recommendation
It is recommended to complete the supplementary study program in three or more semesters, beginning with the lecture series on science, technology, and society in the summer semester. Alternatively, you can start with the basic seminar in the winter semester and then attend the lecture series in the summer semester.

Courses in the Advanced Module can be taken simultaneously. It is also advised to complete courses from each of the three subject areas in the advanced unit.

Learning type
- Lectures
- Seminars/Project Seminars
- Workshops

M 7.64 Module: Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation [M-CIWVT-106680]

Responsible: Prof. Dr. Andrea Iris Schäfer
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specific Supplements (Usage from 4/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-CIWVT-113433	Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation	5 CR	

Competence Certificate
The Learning control is an examination of another type:
Research proposal of 10 pages and an oral presentation of 10 minutes (individual work). The grade will be a composite of the proposal (submission in week 13 before class) and oral & poster presentation (all day workshop with researcher participation).

Competence Goal
The goal of this course is to get an overview of current challenges in the circular economy focused on the water – energy – environment nexus. Based on individual student interest a topic will be identified and a research plan developed encompassing a thorough background research to establish the state-of-the-art, identification of a specific research problem and research questions suitable to solve this problem. Concepts of novelty and excellence will be explored in an international context. Following the individual topic choice, the research proposal will be developed individually in a tutor group (divided into water, energy, environment) while lectures on required skills will accompany this process. As an outlook beyond this course, criteria to consider when looking for research careers such as applying for funding/scholarships, considering choices in research environment and supervision, performance indicators in research and university rankings will be introduced to enable informed decisions. The proposal will be communicated in writing, as a brief presentation and as a poster, which equips students brilliantly not only for a masters thesis but also a future research publication or a PhD.

Content
In a time of limiting resources, climate change and ever increasing demand for resources the concept of a circular economy is inevitable to create a more sustainable utilization of our key resources, water, energy and ‘environment’. Concepts of zero liquid discharge, water reuse, carbon net zero, resource recovery and environmental pollution reduction are all part of this concept where where waste is returned to use. The water – energy – environment nexus is the particular focus of ths course. Global water issues, water and wastewater treatment, desalination, water reuse, micropollutants, decentralized systems, water & sanitation in international development, renewable energies, environmental pollution, climate change, resource recovery – and many more topics will inspire future research.

Module grade calculation
The module grade is the grade of the examination of another type.

Workload

- Contact time: lectures and tutorials 60 hrs (4 SWS)
- Group and self study: 50 hrs
- Preparation of assessments and participation at the group presentations (one full day): 30 hrs

M 7.65 Module: Water and Energy Cycles (bauiM2P8-WATENCYC) [M-BGU-103360]

Responsible: Prof. Dr.-Ing. Erwin Zehe
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-BGU-106596	Water and Energy Cycles	6 CR	Zehe

Competence Certificate
- 'Teilleistung' T-BGU-106596 with examination of other type according to § 4 Par. 2 No. 3

details about the learning control see at the 'Teilleistung'

Prerequisites
none

Competence Goal
Students are able to explain the most relevant processes of Hydrology including their feedbacks and limitations. They know the concepts to describe and predict these processes in the context of science and water management. Furthermore are they able to independently apply related computer-based tools for analysis and prediction for standard situations. Students are able to evaluate the required data and to quantify and evaluate the uncertainties related to the simulations and predictions.

Content
This module deepens the fundamentals of the water and energy cycles with particular regard to:

- the soil as the central control element of the water and energy cycle and the interplay of soil water and ground heat balance
- evaporation, energy balance and processes in the atmospheric boundary layer
- runoff and evaporation regimes in different hydro-climates;
- water balance and floods at the catchment scale and statistics for water management
- the interplay between runoff processes and soil water balance, and the soil as filter system
- concepts of hydrological similarity and comparative hydrology
- process-based and conceptual models to simulate water balances and predict flood

Module grade calculation
grade of the module is grade of the exam

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- lecture/exercise: 60 h

independent study:

- preparation and follow-up lecture/exercises: 40 h
- preparation of term paper (examination): 80 h

total: 180 h

Recommendation
course Hydrology (6200511) and module and Engineering Hydrology (6200617);
knowledge of programming with Matlab or another similar progamming language, otherwise the attendance of the course 'Introduction to Matlab' (6224907) is strongly recommended

Literature

Aryan, S. P. (2001): Introduction to Micrometeorology, 2nd Ed., Academic Press
Beven, K. (2004): Rainfall runoff modelling – The primer: John Wiley and Sons
Hornberger et al. (1998): Elements of physical hydrology. John Hopkins University Press
Kraus, H. (2000): Die Atmosphäre der Erde. Vieweg S. P.
Plate, E. J., ,Zehe, E. (2008): Hydrologie und Stoffdynamik kleiner Einzugsgebiete. Prozesse und Modelle, Schweizerbart, Stuttgart, 2008.

M 7.66 Module: Water Chemistry and Water Technology [M-CIWVT-103753]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specific Supplements

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
10	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-CIWVT-107585	Water Chemistry and Water Technology	10 CR	Horn

Prerequisites
None

Competence Goal

- Students get familiar with processes in aquatic systems. These include the determination, occurrence and behavior of geogenic and anthropogenic compounds as well as microorganisms in the different parts of the hydrological cycle.
- apart from the questions on the chemical and biological water quality, the focus also lies on technical aspects of water use, water treatment and water technology.

Content
Chemische und physikalische Eigenschaften des Wassers, Wasserkreislauf und Inhaltsstoffe, Kalk-Kohlensäure-Gleichgewicht, Sättigungsindex, Grundwasser, Oberflächenwasser, Umsetzungen, Trinkwasser, Grundlagen der Wasserbeurteilung, analytische Verfahren zur Wasseruntersuchung, wassertechnologische und wasserchemische Verfahren (Flockung, Fällung, Enteisenung, Entmanganung, Adsorption und Ionenaustausch, Gasaustausch, Enthärtung und/oder Entkarbonisierung, Oxidation und Entkeimung), Übungen

Recommendation
None

Literature

- Crittenden et al. (2005): Water Treatment, Principles and design. Wiley & Sons
- Skoog, D., A., Holler, F. J., Crouch, S., R. (2013): Instrumentelle Analytik, Springer Spektrum
- Vorlesungsskripte

8 Courses

T 8.1 Course: 3D Geological Modelling [T-BGU-111446]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105729 - 3D Geological Modelling

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339047	3D Geological Modeling	3 SWS	Lecture	Blum, Fuchs

T 8.2 Course: Advanced Analysis in GIS [T-BGU-101782]

Responsible: Prof. Dr. Martin Breunig
Dr.-Ing. Norbert Rösch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101053 - Advanced Analysis in GIS

Type	Credits	Grading scale	Version
Oral examination	4	Grade to a third	3

Events					
ST 2024	6026208	Advanced Analyses in GIS	2 SWS	Lecture / 🗣	Benz
Exams					
ST 2024	8220_101782	Advanced Analysis in GIS			Rösch, Benz

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam with appr. 20 min.

Prerequisites
None

Recommendation
None

Annotation
None

T 8.3 Course: Advanced Clay Mineralogy [T-BGU-104840]

Responsible: apl. Prof. Dr. Katja Emmerich
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102444 - Applied Mineralogy: Clay Science

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	2

Events					
ST 2024	6310430	Anwendungen von Tonen und Laboreinführung	2 SWS	Lecture / Practice (/	Emmerich

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

Obligation of attendance for the practical laboratory exercises from the beginning to the end of the course

T 8.4 Course: Advanced Geological Mapping [T-BGU-111455]

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105736 - Advanced Geological Mapping

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6310401	Advanced Geological Mapping (Field Course)	4 SWS	Practice / 🗣	Drüppel
WT 24/25	6310401	Advanced Geological Mapping (Field Course)	4 SWS	Practice / 🗣	Drüppel

Legend: 🖥 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an examination of another type, including field work, preparation of a geological mal and a mapping report

Prerequisites
none

Annotation
none

T 8.5 Course: Application and Industrial Use [T-BGU-111468]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105742 - Geothermics II: Application and Industrial Use

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6310425	Geothermics II: Application and Industrial Use	2 SWS	Lecture / Practice (/	Kohl
Exams					
ST 2024	8220_111468	Application and Industrial Use			Kohl
WT 24/25	8220-111468	Application and Industrial Use			Kohl

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of a written exam (45min) according to §4 (2) of the examination regulations.

Prerequisites
none

T 8.6 Course: Applied and Regional Hydrogeology [T-BGU-111593]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105793 - Applied and Regional Hydrogeology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	6339081	Applied Hydrogeology	2 SWS	Lecture / Practice (/	Goldscheider
WT 24/25	6339085	Regional Hydrogeology	1.5 SWS	Lecture /	Goldscheider
Exams					
ST 2024	8220_111593	Applied and Regional Hydrogeology			Goldscheider
WT 24/25	8220_111593	Applied and Regional Hydrogeology			Goldscheider

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Oral exam (30 min)

T 8.7 Course: Applied Mapping [T-BGU-111444]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105713 - Applied Mapping and Processing of Geospatial Data

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6310020	Applied Mapping	3 SWS	Practice / 🗣	Blum
Exams					
ST 2024	8220_111444	Applied Mapping			Blum

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an examination of another type. It consists of:
- the geological map
- a report of 15 pages
- an oral presentation of results of 15 minutes duration

Prerequisites
Study profile Engineering and Hydrogeology

T 8.8 Course: Applied Mineralogy: Geomaterials [T-BGU-104811]

Responsible: Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102430 - Applied Mineralogy: Geomaterials

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each winter term	3

Events					
WT 24/25	6339079	Mineral Physics	2 SWS	Lecture / Practice (/	Schilling, Kolchynska
WT 24/25	6339083	Crystallography applied to Geomaterials	2 SWS	Lecture / Practice (/	Schilling, de la Flor Martin, Kolchynska
Exams					
WT 24/25	8220_104811	Applied Mineralogy: Geomaterials			Schilling

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an examination of another type (worksheets).
To pass the worksheets, at least 50% of the points must be achieved.

Prerequisites
none

Annotation
Will be held in Englisch to improve language competence.
The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the course progress of the participants.

T 8.9 Course: Basic Seminar Supplementary Studies on Science, Technology and Society - Self Registration [T-FORUM-113579]

Responsible: Dr. Christine Mielke
Christine Myglas
Organisation:
Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	2	pass/fail	Each summer term	1 terms	1

Competence Certificate
Study achievement in the form of a presentation or a term paper or project work in the selected course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
It is recommended that the basic seminar be completed during the same semester as the lecture series "Science in Society". If it is not possible to attend the lecture series and the basic seminar in the same semester, the basic seminar can also be attended in the semesters before the lecture series.
However, attending courses in the advanced unit before attending the basic seminar should be avoided.

Annotation

T 8.10 Course: Basics in Foundation Engineering [T-BGU-112815]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103698 - Geotechnical Engineering
M-BGU-106523 - Basics in Foundation Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each term	1 terms	2

Events					
WT 24/25	6200515	Basics in Foundation Engineering	2 SWS	Lecture / 🗣	Stutz
WT 24/25	6200516	Exercises to Basics of Foundation Engineering	2 SWS	Practice / 🗣	Mitarbeiter/innen
WT 24/25	6200517	Tutorial to Basics in Foundation Engineering	2 SWS	Tutorial (/ 🗣	Mitarbeiter/innen
Exams					
ST 2024	8235112815	Basics in Foundation Engineering			Stutz

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 75 min.

Prerequisites
none

Recommendation
module 'Basics in Soil Mechanics' (M-BGU-106521)

Annotation
none

Below you will find excerpts from events related to this course:

V Basics in Foundation Engineering

6200515, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Kolymbas, D. (2019): Geotechnik

Lang, H.; Huder, J.; Amann, P.; Purin A. (2010): Bodenmechanik und Grundbau - Das Verhalten von Böden und Fels und die wichtigsten grundbaulichen Konzepte

Gudehus, G. (1981): Bodenmechanik, F. Enke

T 8.11 Course: Basics in Soil Mechanics [T-BGU-112814]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103698 - Geotechnical Engineering
M-BGU-106521 - Basics in Soil Mechanics

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each term	1 terms	2

Events					
ST 2024	6200415	Basics in Soil Mechanics	2 SWS	Lecture /	Stutz
ST 2024	6200416	Exercises to Basics in Soil Mechanics	2 SWS	Practice /	Mitarbeiter/innen
ST 2024	6200417	Tutorials to Basics in Soil Mechanics	2 SWS	Tutorial (/	Mitarbeiter/innen
Exams					
ST 2024	8234112814	Basics in Soil Mechanics			Stutz

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
written exam, 75 min.

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V Basics in Soil Mechanics

6200415, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Kolymbas, D. (2019): Geotechnik

Lang, H.; Huder, J.; Amann, P.; Purin A. (2010): Bodenmechanik und Grundbau - Das Verhalten von Böden und Fels und die wichtigsten grundbaulichen Konzepte

Gudehus, G. (1981): Bodenmechanik, F. Enke

T 8.12 Course: Basin Analysis and Modeling [T-BGU-111543]

Responsible: TT-Prof. Dr. Nevena Tomašević
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105773 - Basin Analysis and Modeling

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339072	Basin Analysis and Modelling	4 SWS	Lecture / Practice (/	Tomašević

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an end-term examination of another type (graded written report up to 10 pages, submitted 4 weeks after the end of the lecture period and a final oral presentation (and discussion). Each of the two components weighs 50 %.

T 8.13 Course: Borehole Technology [T-BGU-111471]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105745 - Borehole Technology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each term	2 terms	1

Events					
ST 2024	6310426	Borehole Technology: Drilling	2 SWS	Lecture / Practice (/	Kohl, Gaucher
WT 24/25	6339095	Borehole Technology: Logging	2 SWS	Lecture / Practice (/	Kohl, Gaucher
Exams					
ST 2024	8220_111471	Borehole Technology			Kohl
WT 24/25	8220-111471	Borehole Technology			Kohl, Gaucher

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of a written exam (90 min) according to §4 (2) of the examination regulations and a seminar presentation with the associated report.

Prerequisites
none

T 8.14 Course: Brownfield Sites - Investigation, Evaluation, Rehabilitation [T-BGU-100089]

Responsible: Dr.-Ing. Andreas Bieberstein
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100079 - Environmental Geotechnics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	6251915	Brownfield Sites - Investigation, Evaluation, Rehabilitation	2 SWS	Lecture / 🗣	Bieberstein, Eiche, Würdemann, Mohrlok
Exams					
ST 2024	8247100089	Brownfield Sites - Investigation, Evaluation, Rehabilitation			Bieberstein

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 20 min.

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V Brownfield Sites - Investigation, Evaluation, Rehabilitation

6251915, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
teilweise bis 13:00, siehe Aushang

Literature
Reiersloh, D und Reinhard, M. (2010): Altlastenratgeber für die Praxis, Vulkan-V. Essen

T 8.15 Course: Clay Mineralogy Introduction [T-BGU-104839]

Responsible: apl. Prof. Dr. Katja Emmerich
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102444 - Applied Mineralogy: Clay Science

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	2	pass/fail	Each winter term	2

Events					
WT 24/25	6339084	Clay Mineralogy Introduction	2 SWS	Lecture / Practice (	Emmerich

Prerequisites
none

T 8.16 Course: Current Research Topics in Hydrogeology and Engineering Geology [T-BGU-111067]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105506 - Current Research Topics in Hydrogeology and Engineering Geology

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	5	pass/fail	Each term	1

Events					
ST 2024	6339041	Fachgespräch Hydrogeologie und Ingenieurgeologie	1 SWS	Seminar / 🗣	Goldscheider, Fuchs
ST 2024	6339042	Field Trip Hydrogeology and Engineering Geology	1.5 SWS	Practice / 🗣	Goldscheider, Blum
WT 24/25	6339051	Advanced Seminar Hydrogeology/ Engineering Geology	1.5 SWS	Advanced Graduate Seminar (/ 🗣	Fuchs, Blum
WT 24/25	6339052	Expert Discussion on Hydrogeology and Engineering Geology	1 SWS	Lecture / 🗣	Eingeladene Gäste, Goldscheider, Fuchs
Exams					
WT 24/25	8220_111067	Current Research Topics in Hydrogeology and Engineering Geology			Goldscheider

Legend: 🖥 Online, 🖥🗣 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Attendance at current lecture series, field exercise report(s) (1 page/day), presentation (20 min)

T 8.17 Course: Diagenesis [T-BGU-107559]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103734 - Diagenesis and Cores

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	6339070	Diagenesis	2 SWS	Seminar / 🗣	Felder, Busch
Exams					
WT 24/25	8220_107559	Diagenesis			Busch, Hilgers

Legend: 💻 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is a marked written report

Diagenesis: The assessment is based on a marked written report (10 pages) describing and interpreting a given thin section by independent practical microscopy over 4h on the day after completion of the course. This covers petrographic description of a sedimantary rock in thin section, its interpretation plus thin section images and raw data in the enclosure. Submission of report: 2 weeks after the end of the course.

Prerequisites
successfully passed Module Reservoir-Geology

Annotation
Diagenesis: Seminar as block course during winter term due to requirement of microscope lab and involvement of external lecturer

The practical part of this course is carried out in presence. The microscopy exercises are essential for the study progress of the participants.

T 8.18 Course: Earthworks and Foundation Engineering [T-BGU-100068]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100068 - Earthworks and Foundation Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each term	2

Events					
WT 24/25	6251701	Foundation Types	2 SWS	Lecture / Practice (/ 🗣	Stutz
WT 24/25	6251703	Basics in Earthworks and Embankment Dams	2 SWS	Lecture / Practice (/ 🗣	Bieberstein
Exams					
ST 2024	8247100068	Earthworks and Foundation Engineering			Bieberstein, Stutz

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 90 min.

Prerequisites
none

Recommendation
preparation of the student research project for examination preparation

Annotation
none

Below you will find excerpts from events related to this course:

V Foundation Types

6251701, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Witt. K.J. (2008), Grundbau-Taschenbuch, Teil 1,

U. Smoltczyk, U. (2001), Grundbau-Taschenbuch, Teil 2-3,

S. Schmidt, H.G. & Seitz, J. (1998), Grundbau , Bilfinger & Berger

V Basics in Earthworks and Embankment Dams

6251703, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Striegler (1998), Dammbau in Theorie und Praxis, Verlag für Bauwesen Berlin

Kutzner (1996), Erd- und Steinschüttdämme für Stauanlagen, Enke Verlag Stuttgart

T 8.19 Course: Elective Specialization Supplementary Studies on Science, Technology and Society / About Knowledge and Science - Self-Registration [T-FORUM-113580]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Competence Certificate
Another type of examination assessment under § 5, section 3 involves a presentation, term paper, or project work within the chosen course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
The contents of the basic module are helpful. The basic module should be completed or attended in parallel, but not after the advanced module.
The reading recommendations for primary and specialist literature are determined individually by the respective lecturers according to the subject area and course.

Annotation
This placeholder can be used for any achievement in the Advanced Unit of the Supplementary Studies.

T 8.20 Course: Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Public Debates - Self Registration [T-FORUM-113582]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Competence Certificate
Another type of examination assessment under § 5, section 3 involves a presentation, term paper, or project work within the chosen course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
The contents of the basic module are helpful. The basic module should be completed or attended in parallel, but not after the advanced module.
The reading recommendations for primary and specialist literature are determined individually by the respective lecturers according to the subject area and course.

Annotation
This placeholder can be used for any achievement in the Advanced Unit of the Supplementary Studies.

T 8.21 Course: Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Society - Self-Registration [T-FORUM-113581]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Competence Certificate
Another type of examination assessment under § 5, section 3 involves a presentation, term paper, or project work within the chosen course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
The contents of the basic module are helpful. The basic module should be completed or attended in parallel, but not after the advanced module.
The reading recommendations for primary and specialist literature are determined individually by the respective lecturers according to the subject area and course.

Annotation
This placeholder can be used for any achievement in the Advanced Unit of the Supplementary Studies.

T 8.22 Course: Electron Microscopy I [T-PHYS-107599]

Responsible: TT-Prof. Dr. Yolita Eggeler
Organisation: KIT Department of Physics
Part of: M-PHYS-103760 - Electron Microscopy I

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
WT 24/25	4027011	Electron Microscopy I	2 SWS	Lecture /	Eggeler
WT 24/25	4027012	Exercises to Electron Microscopy I	2 SWS	Practice /	Eggeler

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Oral Exam, ca. 45 min

Prerequisites
none

T 8.23 Course: Electron Microscopy II [T-PHYS-107600]

Responsible: TT-Prof. Dr. Yolita Eggeler
Organisation: KIT Department of Physics
Part of: M-PHYS-103761 - Electron Microscopy II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
ST 2024	4027021	Electron Microscopy II	2 SWS	Lecture /	Eggeler
ST 2024	4027022	Exercises to Electron Microscopy II	2 SWS	Practice /	Eggeler

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Oral Exam, ca. 45 min

Prerequisites
none

T 8.24 Course: Energy and Transport Processes [T-BGU-111466]

Responsible: Prof. Dr. Thomas Kohl
Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105741 - Geothermics I: Energy and Transport Processes

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339091	Geothermics I: Transport of Heat and Fluids	2 SWS	Lecture / Practice (/	Kohl, Nitschke
WT 24/25	6339196	Geothermics I: Energy Budget of the Earth	2 SWS	Lecture / Practice (/	Schilling
Exams					
ST 2024	8220_111466	Energy and Transport Processes			Gaucher, Kohl
ST 2024	8220_111466	Energy and Transport Processes			Kohl
WT 24/25	8220-111466	Energy and Transport Processes			Kohl

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of a written exam (45 min) according to §4 (2) of the examination regulations

Prerequisites
none

T 8.25 Course: Engineering Geologie: Laboratory and Field Methods [T-BGU-111448]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105731 - Engineering Geology: Laboratory and Field Methods

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each term	1

Events					
ST 2024	6310404	Engineering Geological Field Course	1.5 SWS	Practice / 🗣	Blum, Menberg, Fuchs
WT 24/25	6339112	Engineering Geology Laboratory Practical Course	1.5 SWS	Practice / 🗣	Blum, Menberg, Fuchs
Exams					
ST 2024	8220_111448	Engineering Geologie: Laboratory and Field Methods			Blum

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The field courses and laboratory courses are essential for the progress of the participants.

T 8.26 Course: Engineering Geology: Mass Movements [T-BGU-110724]

Responsible: Dr. Kathrin Menberg
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102442 - Engineering Geology: Mass Movements and Modelling

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	2	pass/fail	Each winter term	1

Events					
WT 24/25	6339082	Mass Movements	2 SWS	Lecture / 🗣	Menberg

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 8.27 Course: Engineering Geology: Modelling [T-BGU-110725]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102442 - Engineering Geology: Mass Movements and Modelling

Type	Credits	Grading scale	Expansion	Version
Examination of another type	3	Grade to a third	1 terms	1

Events					
ST 2024	6310413	Numerische Modellierung in der Ingenieurgeologie	2 SWS	Lecture / Practice (/ 🗣	Blum, Menberg
Exams					
ST 2024	8220_110725	Engineering Geology: Modelling			Blum, Menberg

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 8.28 Course: Environmental Geochemistry [T-BGU-111525]

Responsible: Dr. Elisabeth Eiche
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105766 - Environmental Geochemistry

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each winter term	2 terms	2

Events					
ST 2024	6310407	Substance flow in the environment	2 SWS	Lecture / 🗣	Eiche, Rühr
WT 24/25	6330104	Environmental Geochemistry Seminar	1 SWS	Seminar / 🗣	Eiche, Rühr, Gil Diaz, Kimmig

Legend: 💻 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an examination of another type (ca. 10 exercise sheets in ILIAS for the lecture, a presentation of 30 min including discussion and a report related to the presentation of 10-20 pages) according to §4 (2) of the examination regulations.

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V Substance flow in the environment

6310407, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Sources, sinks and substance flows of selected environmentally relevant elements such as As, Se, Hg, Cr

Methods for characterizing the pollutant dynamics in the environment

Process-oriented interpretation and discussion of current research results with regard to pollutant dynamics, including the development of adapted mitigation measures

Special features of the pollutant dynamics in estuaries

Organizational issues
Blockkurs nach Vereinbarung

T 8.29 Course: Environmental Geology: Radio- & Chemotoxic Elements [T-BGU-107560]

Responsible: Dr. Frank Heberling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102455 - Environmental Geology: Radio- & Chemotoxic Elements

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	6339088	Geoscientific Aspects of the Disposal of Radio- and Chemotoxic Waste	2 SWS	Lecture	Heberling, Metz

Prerequisites
none

T 8.30 Course: Field Course Applied Structural Geology [T-BGU-107508]

Responsible: apl. Prof. Dr. Agnes Kontny
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102451 - Structural Geology

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (oral)	2	pass/fail	Each summer term	2

Events					
ST 2024	6310406	Geländeübung zur Strukturgeologie	3 SWS	Practice / 🗣	Kontny
Exams					
ST 2024	8230_107508	Field Course Applied Structural Geology			Kontny

Legend: 📱 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an examination of another type:

Participation in the field course (5-6 days) and ungraded presentation of a topic relevant to the geological field area (from literature and your own field data) depending on the location of the field course. The presentation is given either during the field course or approx. 4-6 weeks afterwards. The presentation consists either of a poster presentation or a 5-10 minutes talk with an approx. 8-page report. The revised field book records are necessary to pass the course.

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

T 8.31 Course: Field Seminar [T-BGU-111472]

Responsible: Prof. Dr. Armin Zeh
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105746 - Field Seminar

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6310460	Geowissenschaftliche Geländeübung/ Exkursion / Master	5 SWS	Practice / 🗣	Zeh, Hilgers, Kontny
WT 24/25	6310124	Industrial Minerals	2 SWS	Lecture / Practice (/ 🗣	Kolb, Hector
WT 24/25	6310460	Field Seminar	5 SWS	Practice / 🗣	Zeh
Exams					
ST 2024	8220_111472	Field Seminar			Zeh, Hilgers, Kontny

Legend: 🖥 Online, 🌐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is the participation of a 10 day (often international) field trip, taking notes in a geological field book, and depending on the respective lecturer a preliminary seminar, daily minutes during the trip, final report or some similar reporting.

Prerequisites
none

Recommendation
Students are requested to take this module in their final year.

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Below you will find excerpts from events related to this course:

V Industrial Minerals

6310124, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The combined lectures and practicals start with an introduction into the industrial minerals raw material market and mineral deposit evaluation. The following lessons combine a lecture about the fundamental processes of deposit formation and the relationship to mineral exploration and quality of the industrial mineral resource with practical study of representative samples. In addition, scientific papers will be read and interpreted in some lessons. It will be looked at different environmental impacts of ore extraction and processing. Also legal aspects of mineral resources exploration and extraction will be addressed.

Organizational issues
Field trips will be organized during the course. Details and deadlines of the exam will also be discussed during the course.

Literature
Kesler, S.E. & Simon, A.C. (2015): Mineral Resources, Economics and the Environment. Cambrigde University Press, Cambridge, 434 pp.
Harben, P. (most recent edition): The Industrial Minerals HandyBook, a guide to markets, specifications and prices. Industrial Minerals Division, Metal Bulletin PLC, London.
Bewertungskriterien für Industrieminerale, Steine und Erden. Geologisches Jahrbuch Reihe H. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. Different publications of various authors; in German with English abstract.
Publications of the Geological Surveys: BGR, DERA, BGS, USGS, etc.

T 8.32 Course: Field Trip Karst Hydrogeology [T-BGU-110413]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105790 - Karst Hydrogeology

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	2	pass/fail	Each summer term	1

Events					
ST 2024	6339078	Field Trip Karst Hydrogeology	1 SWS	Practice / 🗣	Goldscheider
Exams					
ST 2024	8220_110413	Field Trip Karst Hydrogeology			Goldscheider

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

T 8.33 Course: Fundamentals of Project Management [T-BGU-113492]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106717 - Fundamentals of Project Management

Type	Credits	Grading scale	Expansion	Version
Completed coursework	1	pass/fail	1 terms	1

Events					
ST 2024	6339083	Fundamentals of Project Management	1 SWS	Lecture / Practice (/	Hilgers
Exams					
ST 2024	8220113492	Fundamentals of Project Management			Hilgers

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Coursework in accordance with Section 4 Paragraph 3 SPO Master Applied Geosciences: Compulsory participation in the course "Fundamentals of Project Management" and presentation.

Below you will find excerpts from events related to this course:

V Fundamentals of Project Management

6339083, SS 2024, 1 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
content:

- Vision Mission Values
- PESTEL & SWOT
- strategy, balanced scorecards, KIPs
- decision making & finances
- project- & quality management
- leadership & intercultural management

Competence Goals / Learning Objectives:

- After this course you apply the fundamental project management tools and related processes.

Prerequisites:

- none, master students in their second semester can enroll.

Assessment (competence certificate):

- attending the course (100%) and contributing to discussions and exercises.

Organizational issues
Termine: 10.05.24 17.05.24 07.06.24 14.06.24

50.40, Room 157, 14:00 - 17:00 Uhr

The module consists of

- the course 1 Fundamentals of Project Management (1SWS): Lectures and exercises (1SWS) are conducted in the first half of the semester
- the course 2 Project Study

The assessment of the module consists of

- attending the course 1 (100%) and contributing to discussions and exercises (unmarked).
- submit a written report for course 2 Project Study (marked)

Prerequisite to enroll in the examination of another type is

- none

Literature
Hill, CW.L., McShane, S.L. 2008. Principles of management. McGraw Hill 511 pp.

Hogan, C. 2007. Facilitating multicultural groups. Kogan Page. 342 pp.

Kerzner, H. 2017. Project management metrics. Wiley

Pfeiffer, T,. Schmitt, R. 2014. Handbuch Qualitätsmanagement. Carl Hanser Verlag

T 8.34 Course: Geochemical and Petrological Modeling [T-BGU-111473]

Responsible: apl. Prof. Dr. Kirsten Drüppel
Dr. Elisabeth Eiche
Dr. Frank Heberling
Prof. Dr. Armin Zeh

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: M-BGU-105747 - Geochemical and Petrological Modeling

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339043	Geochemical and Petrological Modeling	2 SWS	Lecture / 🗣	Zeh, Drüppel, Heberling, Eiche, Gil Diaz

Legend: 📱 Online, 🎛 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral examination (30 minutes duration)

Prerequisites
none

Annotation
Will be held first in in the winter term 2022/2023

T 8.35 Course: Geochemical Processes and Analytical Methods [T-BGU-108192]

Responsible: Dr. Elisabeth Eiche
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103995 - Geochemical Processes and Analytical Methods

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	3

Events					
ST 2024	6310405	Geochemical Element Cycling	2 SWS	Lecture / 🗣	Eiche
ST 2024	6310410	Analytical Geochemistry (Advanced Level)	2 SWS	Practical course / 🧩	Eiche
Exams					
ST 2024	82-20_108192	Geochemical Processes and Analytical Methods			Eiche, Kimmig, Hector, Gil Diaz

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Annotation
The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

Below you will find excerpts from events related to this course:

V Analytical Geochemistry (Advanced Level)

6310410, SS 2024, 2 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
-

Organizational issues
Findet an keinem festen Termin statt. Alle Terminabsprachen über ILIAS.

T 8.36 Course: Geodata Analysis II – Big Data and Machine Learning [T-BGU-111268]

Responsible: Dr. Tanja Liesch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105634 - Geodata Analysis II – Big Data and Machine Learning

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6310505	Geodatenanalyse II - Big Data und Maschinelles Lernen	3 SWS	Lecture / Practice (/	Liesch, Rau
Exams					
ST 2024	8200005	Geodata Analysis II – Big Data and Machine Learning			Liesch

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Prerequisites
Choice of the profile Hydrogeology and Engineering Geology. To register for the exam, the module Geodata Analysis I - Programming and Geostatistics must have been passed.

T 8.37 Course: Geological Storage of Gas [T-BGU-104841]

Responsible: Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102445 - Geological Storage of Gas

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	3

Events					
ST 2024	6339094	Fundamentals of Reservoir Geomechanics	2 SWS	Lecture / 🗣	Schilling, Müller
Exams					
ST 2024	8220_104841	Geological Storage of Gas			Schilling

Legend: 🖥 Online, 🖥🗣 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an examination of another type (presentation).

Prerequisites
none

Recommendation
The student shall have a basic knowledge of reservoir geology, mathematics and physics

Annotation
Depending on the auditorium, this course is held in German or English

T 8.38 Course: Geology [T-BGU-111470]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105744 - Geology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339080	Analysis of Geological Structures	3 SWS	Lecture / Practice (/ 🗣	Hilgers
WT 24/25	6339086	Depositional Systems of Regions	1 SWS	Lecture / Practice (/ 🗣	Hilgers
Exams					
ST 2024	8220_111470	Geology			Hilgers

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is a marked written exam over 120 minutes

Prerequisites
none

Annotation
We consider to have one field practical near Karlsruhe.

Below you will find excerpts from events related to this course:

V Analysis of Geological Structures

6339080, WS 24/25, 3 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Content:

- Stress, Strain & Drilling
- Fractures and Mohr Circle
- Joints, Veins & Effective Stress
- Normal faults & Allen-Diagram
- Thrust faults & Balanced Cross Sections
- Strike slip fault, Scaling
- Inversion & Fault Reactivation
- Strain measurements
- Diapirs & Creep Laws
- Folds & Saddle Reefs
- Cleavage & Shear Zones
- Creep from Microstructures
- Maps / Structural Analysis

Competence Goals / Learning Objectives:

- After this course, student can apply structural geology using real world examples.
- calculate pore pressure, stress, strain and creep

Prerequisites:

- none, master students in their first semester can register for the module.

Assessment (competence certificate):

- The assessment of the module is a marked written exam over 90 minutes.

Organizational issues
The module Geology consists of

the course 1 Structural Geology (3SWS)

the course 2 Depositional Systems (1SWS), block course

Literature
Ameen M.S. 2018. Operational Geomechanics EAGE

Fossen, H. 2016. Structural Geology. Cambridge Univ Press [Hardcopy]

Jackson, M.P.A., Hudec, M.R. 2017. Salt Tectonics, Cambridge Univ Press [Hardcopy]

Vernon, R. 2018. A practical guide to rock microstructures. Cambridge Univ Press

V Depositional Systems of Regions

6339086, WS 24/25, 1 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Content:

- Sea level change and sequence stratigraphy
- Description of sediments
- case studies of regions with:
- Eolian systems
- Glacial Systems
- Fluvial systems
- Estuaries and incised valleys
- Deltas & Clastic Shorelines
- Evaporites
- Clastic shelves
- Reefs and platforms
- Submarine fans and Turbidites

Competence Goals / Learning Objectives:

- After this course, student can apply depositional systems to regions using real world examples.

Prerequisites:

- none, master students in their first semester can register for the module.

Assessment (competence certificate):

- The assessment of the module is a marked written exam over 90 minutes.

Organizational issues
The module Geology consists of

- the course 1 Structural Geology (3SWS)
- the course 2 Depositional Systems (1SWS), detailed here.

The assessment of the module consists of

- a 90 minutes written examination covering the content of the two courses

Prerequisite to enroll in the written examination is

- the timely submission of homework (100%), thereof minimum 80% passed (unmarked) of course 1 and 2.

Field Seminar Geology:

- will generally be conducted near Karlsruhe, if Corona-restrictions allow.
- students shall bring their geological hammer, geological hand lens, geological field book and solid mountain boot covering your ankles.

Literature
Reading, H.G. 2012. Sedimentary Environments. Blackwell

James, N.P., Dalrympie, R.W. 2010. Facies Models 4. Geol. Ass. of Canada.

Boggs, S. 2010. Petrology of sedimentary rocks. Cambridge Univ Press

T 8.39 Course: Geospatial Data Analysis I – Programming and Geostatistics [T-BGU-111066]

Responsible: Dr. Kathrin Menberg
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105505 - Geospatial Data Analysis I – Programming and Geostatistics

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	6339042	Geodata Analysis I - Programming and Geostatistics	3 SWS	Lecture / Practice (/ 🗣	Menberg

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Student research project: programming of a code for data analysis, written documentation (ca. 5 pages)

Prerequisites
Choice of the profile Engineering and Hydrogeology

Recommendation
This module should be attended and completed before the module Geodata Analysis II that builds on it.

T 8.40 Course: Geothermal Exploitation – Field Exercise [T-BGU-111469]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105742 - Geothermics II: Application and Industrial Use

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework (written)	1	pass/fail	Each summer term	1 terms	1

Events					
ST 2024	6310427	Geothermics II: Geothermal Exploitation - Field Exercises (2 Days)	1 SWS	Practice / 🗣	Kohl
Exams					
ST 2024	8220_111469	Geothermal Exploitation – Field Exercise			Kohl

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Non-assessed coursework (participation in field trip and report), see §4 (3) of the examination regulations.

Prerequisites
none

Annotation
The date for the field exercise and the closing date for the field exercise report will be announced in the sumer term.

The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

T 8.41 Course: Geothermics in the Rhine Graben – Field Exercise [T-BGU-111467]

Responsible: Prof. Dr. Thomas Kohl
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105741 - Geothermics I: Energy and Transport Processes

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	0	pass/fail	Each winter term	1 terms	1

Events					
WT 24/25	6339092	Geothermics I: Geothermics in the Rhine Graben - Field Exercise	1 SWS	Excursion (E / 🗣)	Kohl, Nitschke
Exams					
WT 24/25	8220-111467	Geothermics in the Rhine Graben – Field Exercise			Kohl

Legend: 💻 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
non-assessed coursework (participation in field exercise and report) according to §4 (3) of the examination regulations

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The field course is essential for the progress of the participants.

T 8.42 Course: GIS Cartography [T-BGU-111445]

Responsible: Dr. Kathrin Menberg
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105713 - Applied Mapping and Processing of Geospatial Data

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework (written)	1	pass/fail	Each summer term	1 terms	1

Events					
ST 2024	6310399	Processing of Geospatial Data	2 SWS	Practice / 🗣	Menberg
Exams					
ST 2024	8200006	GIS Cartography			Menberg

Legend: 🖳 Online, 🖳🗣 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Four unmarked exercise sheets

Prerequisites
none

T 8.43 Course: Ground Water and Earth Dams [T-BGU-100091]

Responsible: Dr.-Ing. Andreas Bieberstein
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100073 - Ground Water and Earth Dams

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each term	1

Events					
ST 2024	6251814	Geotechnical Ground Water Problems	2 SWS	Lecture / Practice (/ 🗣	Bieberstein
ST 2024	6251816	Embankment Dams (Advanced)	2 SWS	Lecture / Practice (/ 🗣	Bieberstein
Exams					
ST 2024	8247100091	Ground Water and Earth Dams			Bieberstein

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 40 min.

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V Geotechnical Ground Water Problems

6251814, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Cedergren, H.R. (1989), Seepage, Drainage, and Flow Nets, 3. Aufl. Wiley

Herdt, W. & Arndts, E. (1985), Theorie und Praxis der Grundwasserabsenkung, 2. Aufl. Ernst & S.

V Embankment Dams (Advanced)

6251816, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Cedergren, H.R. (1989), Seepage, Drainage, and Flow Nets, 3. Aufl. Wiley

Herdt, W. & Arndts, E. (1985), Theorie und Praxis der Grundwasserabsenkung, 2. Aufl. Ernst & S.

T 8.44 Course: Hydrogeology: Groundwater Modelling [T-BGU-104757]

Responsible: Dr. Tanja Liesch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102439 - Hydrogeology: Groundwater Modelling

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each winter term	2

Events					
WT 24/25	6339113	Groundwater Modeling	2 SWS	Lecture /	Liesch, Schäfer
WT 24/25	6339114	Practice Groundwater Modeling	2 SWS	Practice /	Liesch, Schäfer

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Prerequisites
none

T 8.45 Course: Hydrogeology: Hydraulics and Isotopes [T-BGU-111402]

Responsible: Dr. Tanja Liesch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105726 - Hydrogeology: Hydraulics and Isotopes

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each summer term	1 terms	2

Events					
ST 2024	6310411	Isotope Methods in Hydrologeology	1 SWS	Lecture / Practice (/ 🗣	Himmelsbach, Liesch
ST 2024	6339081	Hydraulic Methods	1.5 SWS	Lecture / Practice (/ 🏵	Liesch
Exams					
ST 2024	8220_111402	Hydrogeology: Hydraulics and Isotopes			Liesch
WT 24/25	8220_111402	Hydrogeology: Hydraulics and Isotopes			Liesch

Legend: 🖥 Online, 🏵 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam (90 min)

Prerequisites
none

Annotation
The choice of the module "Hydrogeology: Hydraulics and Isotopes" as well as the active participation in it is a prerequisite for the choice/occupation of the modules Hydrogeology: Groundwater Modelling [M-BGU-102439] and Hydrogeology: Field and Laboratory Methods [M-BGU-102441], as it forms the theoretical and practical basis for them.

T 8.46 Course: Industrial Minerals and Environment [T-BGU-108191]

Responsible: Prof. Dr. Jochen Kolb
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103993 - Industrial Minerals and Environment

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each winter term	2

Events					
WT 24/25	6310124	Industrial Minerals	2 SWS	Lecture / Practice (/	Kolb, Hector
WT 24/25	6310125	Field Seminar Industrial Minerals	2 SWS	Seminar /	Kolb, Hector
Exams					
ST 2024	82-20_108191	Industrial Minerals and Environment			Kolb, Hector

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an examination of another type (graded module report incl. field seminar report)

Prerequisites
keine

Annotation
The course "Field Seminar Industrial Minerlas" is part of this module, duration: 2,5 days. The date will be announced during the winter term.

The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Below you will find excerpts from events related to this course:

V Industrial Minerals

6310124, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The combined lectures and practicals start with an introduction into the industrial minerals raw material market and mineral deposit evaluation. The following lessons combine a lecture about the fundamental processes of deposit formation and the relationship to mineral exploration and quality of the industrial mineral resource with practical study of representative samples. In addition, scientific papers will be read and interpreted in some lessons. It will be looked at different environmental impacts of ore extraction and processing. Also legal aspects of mineral resources exploration and extraction will be addressed.

Organizational issues
Field trips will be organized during the course. Details and deadlines of the exam will also be discussed during the course.

Literature
Kesler, S.E. & Simon, A.C. (2015): Mineral Resources, Economics and the Environment. Cambrigde University Press, Cambridge, 434 pp.
Harben, P. (most recent edition): The Industrial Minerals HandyBook, a guide to markets, specifications and prices. Industrial Minerals Division, Metal Bulletin PLC, London.
Bewertungskriterien für Industrieminerale, Steine und Erden. Geologisches Jahrbuch Reihe H. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. Different publications of various authors; in German with English abstract.
Publications of the Geological Surveys: BGR, DERA, BGS, USGS, etc.

V Field Seminar Industrial Minerals

6310125, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
During two and a half days of field work the theoretical and practical skills will be applied in the field in selected industrial mineral deposits. Standard methods of geological field work will be applied and directed towards interpretation of the respective deposit. The visited deposits will vary depending on weather and availability.

Organizational issues
Students should be aware of harsh conditions during field work and should let the responsible person know, if they would have problems to work underground in old mines.

The dates will be discussed during the Industrial Minerals course.

T 8.47 Course: Internship [T-BGU-108210]

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103996 - Internship

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Irregular	2

Exams			
ST 2024	8220_108210	Internship	Blum, Zeh

Competence Certificate
see module description

T 8.48 Course: Introduction into Paleontology [T-BGU-113458]

Responsible: Dr. Julien Kimmig
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106693 - Introduction to Paleontology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6339097	Introduction to Paleontology	4 SWS	Lecture / 🗣	Kimmig
Exams					
ST 2024	8210_20_113458	Introduction into Paleontology			Kimmig

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The competence is tested in form of:

- A written exam of 90 minutes
- Presentation of 20 minutes
- Lab book
- Worksheets

50% of the points need to be reached to pass the worksheet portion.

Prerequisites
Interest in paleontology

T 8.49 Course: Introduction to Ceramics [T-MACH-100287]

Responsible: apl. Prof. Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering

Part of: M-BGU-105222 - Introduction to Ceramics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2125757	Introduction to Ceramics	3 SWS	Lecture /	Schell
Exams					
ST 2024	76-T-MACH-100287	Introduction to Ceramics			Schell, Bucharsky, Wagner
WT 24/25	76-T-MACH-100287	Introduction to Ceramics			Schell, Bucharsky, Wagner

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an oral exam (30 min) taking place at a specific date.

The re-examination is offered at a specific date.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Introduction to Ceramics

2125757, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature

- H. Salmang, H. Scholze, "Keramik", Springer
- Kingery, Bowen, Uhlmann, "Introduction To Ceramics", Wiley
- Y.-M. Chiang, D. Birnie III and W.D. Kingery, "Physical Ceramics", Wiley
- S.J.L. Kang, "Sintering, Densification, Grain Growth & Microstructure", Elsevier

T 8.50 Course: Introduction to Computational Geodynamics – Part 1 [T-BGU-113836]

Responsible: Dr. Ali Ismail-Zade
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106898 - Introduction to Computational Geodynamics: Part 1

Type	Credits	Grading scale	Expansion	Version
Oral examination	3	Grade to a third	1 terms	1

Events					
WT 24/25	6339135	Introduction to Computational Geodynamics	2 SWS	Lecture / 🗣	Ismail-Zade

Legend: 🖳 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (each student will have 30 min to pre-pare answers to questions and 30 min to present their answers). To pass the exam, students should show their understanding of the lecture course topics and quantitative ways for solving geodynamical problems, comprehension of gained knowledge, and independent thinking.

Prerequisites
Basic knowledge about Earth dynamics, its surface processes, linear algebra, differential equations, tensor analysis.

Recommendation
This module will introduce general concepts of numerical modelling in geodynamics. Module M-BGU-105739 presents more specific knowledge and coding related to the numerical modelling in geothermal studies.

Annotation
The principal goal of the course is to introduce quantitative and interdisciplinary understanding of and thinking about geodynamical problems rather than just to provide knowledge. Enthusiasm is expected in cooperation, discussions, and debates. So, your physical presence at the lectures is advisable, but online op-tion can be used as well (if required).

T 8.51 Course: Introduction to Reflection Seismics, Prerequisite [T-PHYS-113453]

Responsible: Prof. Dr. Thomas Bohlen
Organisation: KIT Department of Physics
Part of: M-BGU-105777 - Seismic Interpretation

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	1	pass/fail	Each summer term	1 terms	1

Events					
ST 2024	4060431	Introduction to Reflection Seismics	1 SWS	Lecture / 🗣	Bohlen, Hertweck
ST 2024	4060432	Exercises to Introduction to Reflection Seismics	1 SWS	Practice / 🗣	Bohlen, Hertweck
Exams					
ST 2024	7800141	Introduction to Reflection Seismics, Prerequisite			Bohlen

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Regular attendance of lectures and exercises; submission of exercises and/or homework assignments in which at least 60% of the total number of points available must be achieved.

Prerequisites
See module description.

T 8.52 Course: Isotope Geochemistry and Geochronology [T-BGU-112211]

Responsible: Dr. Aratz Beranoaguirre
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106025 - Isotope Geochemistry and Geochronology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each summer term	1 terms	1

Exams			
ST 2024	8220_112211	Isotope Geochemistry and Geochronology	Kimmig, Bilau
WT 24/25	8220_112211	Isotope Geochemistry and Geochronology	Kimmig, Bilau

Competence Certificate
The assessment consists of a written exam (multiple choice, ~45min, ~30 questions).

Prerequisites
none

Annotation
This module will start in the summer term of 2023, the courses will be added to the course catalog by then.

T 8.53 Course: Karst Hydrogeology [T-BGU-111592]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105790 - Karst Hydrogeology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each winter term	1 terms	3

Events					
WT 24/25	6339076	Karst Hydrogeology	2 SWS	Lecture / Practice (	Goldscheider
Exams					
ST 2024	8220_111592	Karst Hydrogeology			Goldscheider
WT 24/25	8220_111592	Karst Hydrogeology			Goldscheider

Competence Certificate
Written Exam, 60 min

T 8.54 Course: Laboratory Work in Physical Chemistry [T-CHEMBIO-109395]

Organisation: KIT Department of Chemistry and Biosciences
Part of: M-CHEMBIO-104581 - Physical Chemistry for Applied Geosciences

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	6	Grade to a third	Each winter term	1 terms	2

Events					
ST 2024	5229	Physikalisch-chemisches Praktikum für Angewandte Geowissenschaften	8 SWS	Practical course / 🗣	Höfener, Bickel, Unterreiner, Die Dozenten des Instituts
WT 24/25	5229	Physikalisch-chemisches Praktikum für Angewandte Geowissenschaften	8 SWS	Practical course	Höfener, Unterreiner, Die Dozenten des Instituts

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
acc. to lecturer

T 8.55 Course: Landfills [T-BGU-100084]

Responsible: Dr.-Ing. Andreas Bieberstein
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100079 - Environmental Geotechnics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	6251913	Landfills	2 SWS	Lecture / Practice (/	Bieberstein
Exams					
ST 2024	8247100084	Landfills			Bieberstein

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
oral exam, appr. 20 min.

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V **Landfills** — **Lecture / Practice (VÜ) On-Site**
6251913, WS 24/25, 2 SWS, Language: German, Open in study portal

Literature
DGGT, GDA-Empfehlungen – Geotechnik der Deponien und Altlasten, Ernst und Sohn, Berlin

Drescher (1997), Deponiebau, Ernst und Sohn, Berlin

T 8.56 Course: Lecture Series Supplementary Studies on Science, Technology and Society - Self Registration [T-FORUM-113578]

Responsible: Dr. Christine Mielke
Christine Myglas
Organisation:
Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	2	pass/fail	Each summer term	1 terms	1

Competence Certificate
Active participation, learning protocols, if applicable.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
It is recommended that you complete the lecture series "Science in Society" before attending events in the advanced module and in parallel with attending the basic seminar.
If it is not possible to attend the lecture series and the basic seminar in the same semester, the lecture series can also be attended after attending the basic seminar.
However, attending events in the advanced module before attending the lecture series should be avoided.

Annotation
The basic module consists of the lecture series "Science in Society" and the basic seminar. The lecture series is only offered during the summer semester.
The basic seminar can be attended in the summer or winter semester.

T 8.57 Course: Master's Thesis [T-BGU-111758]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105845 - Module Master's Thesis

Type	Credits	Grading scale	Recurrence	Version
Final Thesis	30	Grade to a third	Each term	1

Final Thesis
This course represents a final thesis. The following periods have been supplied:

Submission deadline	6 months
Maximum extension period	3 months
Correction period	8 weeks

T 8.58 Course: Microstructures [T-BGU-107507]

Responsible: apl. Prof. Dr. Agnes Kontny
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102451 - Structural Geology

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2024	6339085	Microstructures	2 SWS	Lecture / Practice (/	Kontny
Exams					
ST 2024	8230_107507_SS	Microstructures			Kontny

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The success control is carried in form of an approx. 20 min graded presentation in the course microstructure at the end of the course.
Content: Geological framework, description of the microstructures and derivation of the deformation history based on exercise thin sections.

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The microscopy courses are essential for the progress of the participants.

T 8.59 Course: Mineral and Rock Physics [T-BGU-104838]

Responsible: Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105784 - Petrophysics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	4

Events					
ST 2024	6310428	Mineral and Rock Physics	4 SWS	Lecture / Practice (/	Schilling, Kontny
Exams					
ST 2024	8220_104838	Mineral and Rock Physics			Schilling

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an examination of another type

Prerequisites
none

Annotation
From the summer term 2022 on the lecture in this course will be named "Mineral and Rock Physics" (till now Petrophysics II)

The practical part of this course is carried out in presence. It requires special rooms (laboratory) and is essential for the study progress of the participants.

T 8.60 Course: Mineral Exploration [T-BGU-110833]

Responsible: Dr. Elisabeth Eiche
Dr. Benjamin Walter
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105357 - Mineral Exploration

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6321410	Mineral Exploration	4 SWS	Lecture / Practice (/	Kolb, Hector
Exams					
ST 2024	82_20_110833	Mineral Exploration			Kolb, Hector

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Report (after preliminary review), see module description

Prerequisites
see module description

Recommendation
see module description

Annotation
Starting from the summer term 2022, in this brick 3 courses are given:

Course 1: Geochemical and Environmental Analysis (5 days), Lecture and Practical
Course 2: Geochemical Field Analysis and Sampling Techniques, Field Seminar
Course 3: Geochemical Core Analysis and Lab Techniques (3 days), Practical

T 8.61 Course: Mineral Materials [T-BGU-104856]

Responsible: Dr. Matthias Schwotzer
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102453 - Mineral Materials

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each term	1

Events					
ST 2024	6310419	Werkstoffschädigende Reaktionen	2 SWS	Lecture / 🗣	Schwotzer
WT 24/25	6339089	Mineral Binders in the Construction Industry	2 SWS	Lecture / 🧩	Schwotzer
Exams					
ST 2024	8220_104859	Mineral materials			Schwotzer

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The laboratory courses are essential for the progress of the participants.

T 8.62 Course: Mineralogical Analytics [T-BGU-111524]

Responsible: apl. Prof. Dr. Kirsten Drüppel
Prof. Dr. Frank Schilling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105765 - Mineralogical Analytics

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2024	6339090	Mineralogical Analytics	4 SWS	Lecture / Practice (/	Zeh, Schwotzer, Göttlicher, Heberling, Drüppel, de la Flor Martin

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an examination of another type, including colloquia (15 Min) and short reports (1-2 pages each) for the laboratory exercises and a written examination (60 min).

Prerequisites
none

Recommendation
none

Annotation
none

T 8.63 Course: Numerical Methods in Geosciences [T-BGU-111456]

Responsible: Dr. Emmanuel Gaucher
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105739 - Numerical Methods in Geosciences

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	1

Events					
WT 24/25	6339078	Numerical Methods in Geosciences	4 SWS	Lecture / Practice (/	Gaucher, Baville
Exams					
ST 2024	8220_111456	Numerical Methods in Geosciences			Gaucher
WT 24/25	8220-111456	Numerical Methods in Geosciences			Gaucher

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of a written exam (90 min).

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The exercises are partly conducted in the computing lab and are essential for the progress of the participants.

T 8.64 Course: Ore Geology of Metals [T-BGU-109345]

Responsible: Prof. Dr. Jochen Kolb
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103994 - Ore Geology of Metals

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339096	Field Seminar Ore Geology	2 SWS	Seminar / 🗣	Kolb, Hector
WT 24/25	6339097	Ore Microscopy and Ore Analysis	2 SWS	Practice / 🗣	Kolb, Hector
WT 24/25	6339099	Ore-forming processes	1 SWS	Lecture / 🗣	Kolb, Hector
Exams					
ST 2024	8220_109345	Ore Geology of Metals			Kolb, Hector

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Competence Certificate
The assessment consists of an oral exam (30 min). A report on the field seminar has to be handed in before the oral exam.

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Below you will find excerpts from events related to this course:

V Field Seminar Ore Geology

6339096, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Field trips to local deposits and mineral occurrences will be organized during the semester. Depending on weather and availability, we will visit different places close to Karlsruhe. Students have to deliver a field report for every day.

The students know how to apply their theoretical knowledge in the field. They make interpretations at various scales (thin section, sample, outcrop, deposit, district). They know, how to make meaningful sketches and how to present their observations and interpretation in written and oral formats. They are able to analyze, interpret and discuss their data in conjunction with published ore deposit models and can decide on the style of mineralization and the way of mineral exploration.

Organizational issues
Field trips will be organized during the semester. Dates will be discussed during the related courses in the same module.

V Ore Microscopy and Ore Analysis

6339097, WS 24/25, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
The students know the fundamental approach of describing samples from ore deposits (hand specimen, drill core) and thin and polished sections. They can analyze the samples and relate them to the specific ore deposit type. They know the specific textures and are able to discuss them in order to develop a model for the mineralization or hydrothermal alteration processes. The students know the principle ore deposit models and can use this knowledge in order to interpret their sample set that comes from different parts or zones of an ore deposit. They understand the different scales that are involved in ore deposit formation and are able to use their observations to interpret and discuss the scale-dependent processes involved in mineralization. They know, how to make meaningful sketches and how to present their observations and interpretation in written and oral formats.

67.5 hours lectures and practicals and 82.5 self-study time

Organizational issues
This course is directly connected to the lectures ore-forming processes.

Literature
Robb, L., 2005: Introduction to Ore-Forming Processes. Blackwell Publishing, Oxford, 373 pp.
Ridley, J., 2013: Ore Deposit Geology. Cambridge University Press, Cambridge, 398 pp.
Guilbert, J.M. & Park, C.F., 2007: The Geology of Ore Deposits. Waveland Press, 985 pp.
Pirajno, F., 2009: Hydrothermal Processes and Mineral Systems. Springer, Heidelberg, 1250 pp

V

Ore-forming processes

6339099, WS 24/25, 1 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
The students know the principle ore deposit models and can use this knowledge in order to interpret their sample set that comes from different parts or zones of an ore deposit. They understand the different scales that are involved in ore deposit formation and are able to use their observations to interpret and discuss the scale-dependent processes involved in mineralization. The students know the principle methods of mineral exploration and are able to translate geological observations into key parameters for mineral exploration.
The students know how to analyze short scientific papers and are able to understand and present the main message. They can relate the message in the paper to own observations and present a joint interpretation.

Copper Porphyry-Epithermal Au-Ag deposits

Skarn deposits

VMS deposits

SEDEX deposits

MVT-SSC deposits

Orogenic gold deposits

Lateritic Al & Fe deposits, BIF

Orthomagmatic Ni-PGE-Cu-Au deposits

Pegmatite-related deposits

Magmatic REE-Nb-Ta deposits

Magmatic Cr & V-Ti deposits

67.5 hours lectures and practicals and 82.5 self-study time

Literature
Robb, L., 2005: Introduction to Ore-Forming Processes. Blackwell Publishing, Oxford, 373 pp.
Ridley, J., 2013: Ore Deposit Geology. Cambridge University Press, Cambridge, 398 pp.
Guilbert, J.M. & Park, C.F., 2007: The Geology of Ore Deposits. Waveland Press, 985 pp.
Pirajno, F., 2009: Hydrothermal Processes and Mineral Systems. Springer, Heidelberg, 1250 pp.

T 8.65 Course: Petrology [T-BGU-104854]

Responsible: apl. Prof. Dr. Kirsten Drüppel
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102452 - Petrology

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	1

Events					
ST 2024	6339104	Rock Forming Processes	3 SWS	Lecture /	Drüppel
ST 2024	6339108	Field Course	1 SWS	Practice /	Drüppel
Exams					
ST 2024	8220_104854	Petrology			Drüppel

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
see module description

Prerequisites
none

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

T 8.66 Course: Physical Chemistry [T-CHEMBIO-103385]

Organisation: KIT Department of Chemistry and Biosciences
Part of: M-CHEMBIO-104581 - Physical Chemistry for Applied Geosciences

Type	Credits	Grading scale	Version
Written examination	9	Grade to a third	2

Events					
WT 24/25	5206	Physikalische Chemie I	4 SWS	Lecture	Elstner, Schuster
WT 24/25	5207	Übungen zur Vorlesung Physikalische Chemie I	2 SWS	Practice	Elstner, Schuster, Assistenten
Exams					
ST 2024	7100007AngGeo_2	Physical Chemistry			Elstner, Kappes, Olzmann, Schuster
ST 2024	718200008_2	Physical Chemistry			Kappes, Schuster, Olzmann, Elstner

Prerequisites
none

T 8.67 Course: Project Study [T-BGU-104826]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102438 - Project Study

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each term	1

Events					
ST 2024	6339082	Projektstudie/ Project Study	6 SWS	Practice /	Dozenten der Geowissenschaften, Zeh
Exams					
ST 2024	8220_104826	Project Study			Zeh

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
see module description

Prerequisites
none

T 8.68 Course: Radiogeochemical Field Excercise and Seminar [T-BGU-107623]

Responsible: Dr. Frank Heberling
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-102455 - Environmental Geology: Radio- & Chemotoxic Elements

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	2	pass/fail	Each summer term	2

Events					
ST 2024	6339089	Radiogeochemische Geländeübung und Radiogeochemisches Seminar	2 SWS	Practice / 🗣	Heberling, Metz
Exams					
ST 2024	8230_107623	Radiogeochemical Field Excercise and Seminar			Heberling

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an ungraded coursework: seminar as preparation for the field excercise (15 min presentation) and report (15-20 pages, submission till 2 months after the excercise).

Annotation
The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

T 8.69 Course: Raw Materials and Environment [T-BGU-112118]

Responsible: Dr. Elisabeth Eiche
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105963 - Raw Materials and Environment

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	2 terms	2

Events					
WT 24/25	6339090	Assessment of Mine Waste	2 SWS	Practice / 🗣	Eiche, Eigler
WT 24/25	6339197	Raw Materials and Environment	2 SWS	Lecture / 🗣	Eiche, Stutz

Legend: 💻 Online, Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Competence Certificate
Oral exam (20-30 min) + report on characterization of mine waste deposit

Prerequisites
none

Annotation
none

Below you will find excerpts from events related to this course:

V Assessment of Mine Waste

6339090, WS 24/25, 2 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
The students can independently create a sampling concept to characterize a selected mining site. They can realize this concept independently in the field. They are able to prepare and analyze the samples with high quality. Furthermore, they are able to use the data to develop a risk assessment for the contaminated site with respect to environment and health and to propose suitable remediation concepts.

Organizational issues
Dieser Teil des Moduls wird eine Mischung aus Gelände und Laborarbeit sein. Die Probenahme wird dann nach dem Semester stattfinden.

V Raw Materials and Environment

6339197, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The students are able to name the different phases (exploration, mining, processing, etc.) of raw material extraction. They can assign environmental influences to the respective phases and describe them. In this context, they can present possible methods and strategies for minimizing and remediating the environmental impact and compare the individual options. With this knowledge, they are able to point out the advantages and disadvantages of the individual procedures and strategies and, based on this, to derive and justify selection criteria. The same applies to the selection and design of rehabilitation options, which the students can present and weigh against each other. For all phases of raw material extraction, there are legal bases at German and European level, which the students can name and whose relevance they can recognize.

The extraction of raw materials, especially in developing and emerging countries, is always caught between environmental pollution and social and economic benefits. Also, consumers are faced with the ethical question of how they themselves can contribute to minimizing the environmental and social impact of mining. The students are able to classify, discuss and evaluate various viewpoints and alternatives in this context.

Literature

Appelo, C. A. J., Postma, D. 2005. Geochemistry, groundwater and pollution. 2. Auflage. Balkema Verlag.

Brown, M., Barley, B., Wood, H. 2002. Mine Water Treatment: technology, application and policy. IWA publishing

Craig, J., Vaughan, D.J., Skinner, B.J. 2010. Earth Resources and the Environment. 4. Auflage. Prentice Hall Verlag.

Johnson, D.B., Hallberg, K.B. 2005. Acid mine drainage remediation: a review. Science of Total Environment 338, 3-14.

Kesler, S.E. & Simon, A.C. 2015. Mineral Resources, Economics and the Environment. Cambrigde University Press, Cambridge, 434 pp.

Lottermoser, B.G. 2003. Mine wastes. Springer Verlag

Pohl, W.L. 2005. Mineralische und Energie-Rohstoffe: eine Einführung zur Entstehung und nachhaltigen Nutzung von Lagerstätten. W&WE Petrascheck´s Lagerstättenlehre. 5. Auflage

Wall, F., Rollat, A., Pell, R.S., 2017. Responsible Sourcing of Critical Metals. Elements 13, 131-318.

T 8.70 Course: Registration for Certificate Issuance - Supplementary Studies on Science, Technology and Society [T-FORUM-113587]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each term	1

Prerequisites
In order to register, it is mandatory that the basic module and the advanced module have been completed and that the grades for the partial performances in the advanced module are available.

T 8.71 Course: Reserve Modeling [T-BGU-111499]

Responsible: Dr. Benjamin Walter
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105759 - Reserve Modeling

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	6320101	Reserve Modeling - Feasibility Study of Mining Projects (2 days)	2 SWS	Seminar / 🗣	Steinmüller, Hector
WT 24/25	6320104	Economic- and Risk Evaluation (3 Days)	2 SWS	Seminar / 🗣	Frenzel, Hector

Legend: 💻 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral examination

T 8.72 Course: Reservoir Engineering and Modeling Exercises [T-BGU-111523]

Responsible: Dr. Emmanuel Gaucher
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105743 - Geothermics III: Reservoir Engineering and Modeling

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339117	Geothermics III: Reservoir Engineering and Modeling	4 SWS	Lecture / Practice (/ 🗣	Gaucher, Kohl, Grimmer, Nitschke
Exams					
ST 2024	8220_111523	Reservoir Engineering and Modeling Exercises			Kohl, Gaucher
WT 24/25	8220_111523	Reservoir Engineering and Modeling Exercises			Kohl

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam (90 min.) with completion of a scientific seminar (20+10 min.)

Prerequisites
none.

T 8.73 Course: Reservoir Geology [T-BGU-107563]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103742 - Reservoir Geology

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2024	6310600	Reservoir-Geology	2 SWS	Lecture / Practice (/	Hilgers, Busch
ST 2024	6310601	Field Seminar Reservoir-Geology	4 SWS	Seminar /	Hilgers
Exams					
ST 2024	8230_107563	Reservoir-Geology			Hilgers
WT 24/25	8220_107563	Reservoir-Geology			Hilgers

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment is a marked written exam over 120 minutes, the participitation in the Field Seminar Reservoir-Geology and the submission of field book.

Prerequisites
Entrance to the module examination requires the submission of homework (100%) within the given deadline, of which 80% are passed

Recommendation
The student shall have a basic knowledge of sedimentology and structural geology, such as presented in the module Geology, MSc 1st semester

Annotation
Field Seminar Reservoir-Geology: For participants of field seminar Reservoir-Geology: Please mind the visa regulations.

The practical part of this course is carried out in presence. The field courses are essential for the progress of the participants.

Below you will find excerpts from events related to this course:

V Reservoir-Geology

6310600, SS 2024, 2 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
Blended (On-Site/Online)

Content
Content:

- reservoir conditions from geological maps
- methods: petrography, isotopy, microthermometry and cathodoluminescence
- burial history and maturation
- pore pressures, compaction and water saturation
- porosity and permeability
- porous and fractured reservoirs, caverns
- well correlations; migration and traps
- fault seal and top seal
- diagenesis and reservoir characterization
- reservoir quality prediction
- plays and risks

Competence Goals / Learning Objectives:

- After this course students can interpret fluid migration in porous and fractured rock in 3D sedimentary bodies over time, covering aspects from structural evolution to facies- and porosity-permeability development,
- interpret and transfer subsurface data for different applications, required for geothermal energy, transitional gas, subsurface storage and groundwater.

Prerequisites:

- none, master students in their second semester can register for the module.

Assessment (competence certificate):

- The assessment of the module is a marked written exam over 90 minutes.

Organizational issues
The module Reservoir-Geology consists of

- the course 1 Reservoir-Geology: Lectures and exercises (2SWS) are conducted in the first half of the semester as 4SWS.
- the course 2 Field Seminar Reservoir-Geology with practical application of reservoir geology in a given field study area with special focus on structure, 3D geometries in sedimentary rocks and diagenesis, detailed here.

The assessment of the module consists of

- a 90 minutes written examination covering the content of the two courses

Prerequisite to enroll in the written examination is

- the timely submission of homework (100%), thereof minimum 80% passed (unmarked) of course 1,
- the compulsory participation in the field seminar (Geländeseminar, 100%) including submission of the worked-over field book (unmarked, passed/failed) of course 2.

Field Seminar Reservoir-Geology:

- The one-week course will be conducted during the semester break, participation is compulsory. Dates and travel details will be given on Campus and during the lecture. Please mind the visa regulations e.g. if the trip is scheduled to SW-England.
- will generally be conducted in SW-England; 16.-20.09.2024, Spain alternatively Rhine Graben rift valley or elsewhere
- students shall bring their geological hammer, geological hand lens, geological field book and solid mountain boot covering your ankles.

Literature
Bjorlykke, K. 2015. Petroleum Geoscience. From sedimentary environments to rock physics. Springer

Emery, D. & Robinson, A. 1993. Inorganic geochemistry. Blackwell

Bentley, M., Ringrose P. 2015. Reservoir model design. A practitioner's guide. Springer

V **Field Seminar Reservoir-Geology** **Seminar (S)**
6310601, SS 2024, 4 SWS, Language: English, Open in study portal **On-Site**

Content
Content:

field work in small groups conducting given tasks on

- fractured carbonates
- porous reservoirs
- fault seal, clay smear and fault reactivation
- diagenetic overprint
- using lithologs and stereonets

Competence Goals:

- After this course "Field Seminar Reservoir-Geology" students are able to
- quantitatively describe fractured carbonate reservoirs and siliciclastic porous reservoirs, faults and seals, source- and reservoir rocks, and their lateral heterogeneity, and are able to
- transfer observations to subsurface data, required for geothermal energy, transitional gas and subsurface storage.

Requirements:

- none; enrolled master students in their second semester can register for the module.

Assessment (competence certificate):

- Admission to the module examination requires the compulsory attendance at the field trip, and submission of the documented data and interpretation in the field book (unmarked) not later than 14 days after the end of the course.

Organizational issues
The module Reservoir-Geology consists of

- the course 1 Reservoir-Geology: Lectures and exercises (2SWS) are conducted in the first half of the semester as 4SWS.
- The course 2 Field Seminar Reservoir-Geology with practical application of reservoir geology in a given field study area with special focus on structure, 3D geometries in sedimentary rocks and diagenesis, detailed here.

The assessment of the module consists of

- a marked written written examination covering the content of the two courses

Prerequisite to enroll in the written examination is

- the timely submission of homework (100%), thereof minimum 80% passed (unmarked) of course 1,
- the compulsory participation in the field seminar (Geländeseminar, 100%) including submission of the worked-over field book (unmarked, passed/failed) of course 2.

Field Seminar Reservoir-Geology timing and duties:

- 16.-20.09.2024, in SW-England if Corona-restrictions allow, departure early morning, overnight at campsites, return Sun night, alternatively Rhine Graben rift valley or elsewhere
- participation is compulsory
- small student groups will work at geological outcrops and cliffs
- students shall bring their geological hammer, geological hand lens, geological field book and solid mountain boot covering your ankles.

Literature
Bjorlykke, K. 2015. Petroleum Geoscience. From sedimentary environments to rock physics. Springer

Emery, D. & Robinson, A. 1993. Inorganic geochemistry. Blackwell

T 8.74 Course: Reservoir-Analogs and Core Description [T-BGU-107624]

Responsible: Prof. Dr. Christoph Hilgers
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103734 - Diagenesis and Cores

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	2	pass/fail	Each summer term	2

Events					
WT 24/25	6339071	Reservoir Analogs & Core Description	2 SWS	Seminar / 🗣	Hilgers, Busch
Exams					
ST 2024	8220_107624	Reservoir-Analogs and Core Description			Hilgers

Legend: 💻 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is based on a passed report of 2 pages plus digital and hand-written enclosures of a core description (passed/ not passed). Submission of report: 2 weeks after the end of the course.

Prerequisites
Module Reservoir-Geology successfully passed

Annotation
Seminar as block course during winter term due to visit of industry core shed.
The practical part of this course is carried out in presence. The field course is essential for the study progress of the participants.

Below you will find excerpts from events related to this course:

V Reservoir Analogs & Core Description

6339071, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Content:

- paper based description and documentation of reservoir cores which we obtained from wells in the North Sea Core and elsewhere.
- state of the art software such as EasyCore
- well correlation

Competence Goals / Learning Objectives:

- After this course students are enabled to describe reservoir rocks in the field and in cores according to industry standards.
- They derive facies models and integrate data into state-of the art software

Prerequisites:

- master students have have passed Reservoir-Geology
- master students in their third semester can register for the module.

Assessment (competence certificate):

- The assessment is a written report of 2 page plus digital and hand-written enclosures of a core description (unmarked).
- Submission of report: 2 weeks after the end of the course

Organizational issues
Block course: 11. - 13.03.2024, R 157

The module Diagenesis & Cores consists of

- the course 1 Diagenesis (3SWS)
- the course 2 Reservoir Analogs & Core Description 1SWS), detailed here.

The assessment of the module consists of

- a marked written report and an unmarked (passed) report

Prerequisite to enroll in the examination is

- the compulsory participation in the microscopy practical (course 1)
- the compulsory participation in core analysis (course 2)
- the timely submission of the written reports

Seminar timing and duties:

- daee tbc, block course, on our premises if Corona-restrictions allow
- participation is compulsory
- small student groups will work at North Sea core kindly provided by North Sea Core CIC
- students shall bring their geological hand lens

Literature
Boggs, S. 2010. Petrology of sedimentary rocks. Cambridge Univ Press

McPhee 2015. Core analysis - a best practice guide. Elsevier

Tavakoli, V. 2018. Geological core analysis. Application to reservoir characterization. Springer

T 8.75 Course: Rock Mechanics and Tunneling [T-BGU-100069]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100069 - Rock Mechanics and Tunneling

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each term	2

Events					
ST 2024	6251804	Basics in Rock Mechanics	2 SWS	Lecture / Practice (/ 🗣	Schneider
ST 2024	6251806	Basics in Tunnel Construction	2 SWS	Lecture / Practice (/ 🗣	Wagner
Exams					
ST 2024	8247100069	Rock Mechanics and Tunnelling			Wagner, Schneider

Legend: 🖥 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 90 min.

Prerequisites
none

Recommendation
preparation of the student research project for examination preparation

Annotation
none

Below you will find excerpts from events related to this course:

V Basics in Rock Mechanics

6251804, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Brady, B. H. G. and Brown, E. T., (2004): Rock Mechanics for Underground Mining, 3rd. Edition, Kluwer Academic Publishers.

Kolymbas, D. (1998), Geotechnik - Tunnelbau und Tunnelmechanik, Springer.

Goodmann, R.E., (1989): Introduction to Rock Mechanics, John Wiley & Sons.

Hoek, E., 2007: Practical Rock Engineering, kostenloser Download unter: http://www.rocscience.com/hoek/PracticalRockEngineering.asp.

Jäger, J.C., Cook, N.G.W. and Zimmerman, R.W., 2007: Fundamentals of Rock Mechanics, Blackwell Publishing.

Wittke, W., 1982: Felsmechanik, Springer-Verlag.

Wittke, W.: Rock Mechanics Based on an Anisotropic Jointed Rock Model (AJRM), Ernst & Sohn, 2014.

V Basics in Tunnel Construction

6251806, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Maidl, B. 1997: Tunnelbau im Sprengvortrieb
Müller, L. 1978: Der Felsbau, Bd. 3 Tunnelbau

T 8.76 Course: Sedimentary Petrology [T-BGU-107558]

Responsible: Prof. Dr. Armin Zeh
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103733 - Sedimentary Petrology

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	1

Events					
WT 24/25	6339040	Sedimentary Petrology	4 SWS	Lecture / Practice (	Zeh
Exams					
ST 2024	8220_107558	Sedimentary Petrology			Zeh

Competence Certificate
see module description

Prerequisites
none

T 8.77 Course: Seismic & Sequence Stratigraphy [T-BGU-111720]

Responsible: TT-Prof. Dr. Nevena Tomašević
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105777 - Seismic Interpretation

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework (written)	1	pass/fail	Each summer term	1 terms	2

Events					
ST 2024	6339014	Seismic and Sequence Stratigraphy	2 SWS	Lecture / Practice (/	Tomašević
Exams					
ST 2024	8220_ 111720	Seismic & Sequence Stratigraphy			Tomašević

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of an ungraded completed coursework.

Prerequisites
See module description.

T 8.78 Course: Seismic Interpretation, Examination [T-BGU-113474]

Responsible: TT-Prof. Dr. Nevena Tomašević
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105777 - Seismic Interpretation

Type	Credits	Grading scale	Expansion	Version
Written examination	3	Grade to a third	1 terms	3

Exams			
ST 2024	8220113474	Seismic Interpretation, Examination	Tomašević
ST 2024	8220113474_A	Seismic Interpretation, Examination	Tomašević

Competence Certificate
The assessment consists of graded written end-term exam.

Prerequisites
Successfully passed T-BGU-111720 and T-PHYS-113453.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-BGU-111720 - Seismic & Sequence Stratigraphy must have been passed.
2. The course T-PHYS-113453 - Introduction to Reflection Seismics, Prerequisite must have been passed.
3. The course T-BGU-113474 - Seismic Interpretation, Examination must not have been started.

T 8.79 Course: Shallow Geothermal Energy [T-BGU-111447]

Responsible: Prof. Dr. Philipp Blum
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105730 - Shallow Geothermal Energy

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6339115	Thermal Use of Groundwater	2 SWS	Lecture / Practice (	Blum, Menberg
WT 24/25	6339116	Exercises to Shallow Geothermal Energy	1 SWS	Practice	Blum

Competence Certificate
Oral exam (15 min.)

Prerequisites
none

Recommendation
Basic programming skills in Matlab are recommended, e.g. by completing the course “Introduction to Matlab (CC772)”.

Annotation
The basic course with 2 SWS will be complemented by laboratory and field exercises, heat transport modelling and energy planning will be performed. (1 SWS in winter term).

T 8.80 Course: Structural and Phase Analysis [T-MACH-102170]

Responsible: Dr.-Ing. Susanne Wagner
Organisation: KIT Department of Mechanical Engineering

Part of: M-BGU-105236 - Structural and Phase Analysis

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Exams			
ST 2024	76-T-MACH-102170	Structural and Phase Analysis	Wagner
WT 24/25	76-T-MACH-102170	Structural and Phase Analysis	Wagner, Hinterstein

Competence Certificate
Oral examination

Prerequisites
none

T 8.81 Course: Student Research Project 'Earthworks and Foundation Engineering' [T-BGU-100178]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100068 - Earthworks and Foundation Engineering

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	2	pass/fail	Each winter term	2

Events					
WT 24/25	6251701	Foundation Types	2 SWS	Lecture / Practice (/	Stutz
WT 24/25	6251703	Basics in Earthworks and Embankment Dams	2 SWS	Lecture / Practice (/	Bieberstein
Exams					
ST 2024	8247100178	Student research project "Earth Dams and Foundation Engineering"			Bieberstein, Stutz

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
report appr. 45 pages

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V Foundation Types

6251701, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Witt. K.J. (2008), Grundbau-Taschenbuch, Teil 1,
U. Smoltczyk, U. (2001), Grundbau-Taschenbuch, Teil 2-3,
S. Schmidt, H.G. & Seitz, J. (1998), Grundbau , Bilfinger & Berger

V Basics in Earthworks and Embankment Dams

6251703, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Striegler (1998), Dammbau in Theorie und Praxis, Verlag für Bauwesen Berlin
Kutzner (1996), Erd- und Steinschüttdämme für Stauanlagen, Enke Verlag Stuttgart

T 8.82 Course: Student Research Project 'Rock Mechanics and Tunneling' [T-BGU-100179]

Responsible: Prof. Dr.-Ing. Hans Henning Stutz
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
University
Part of: M-BGU-100069 - Rock Mechanics and Tunneling

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1	pass/fail	Each summer term	2

Events					
ST 2024	6251804	Basics in Rock Mechanics	2 SWS	Lecture / Practice (/ 🗣	Schneider
ST 2024	6251806	Basics in Tunnel Construction	2 SWS	Lecture / Practice (/ 🗣	Wagner
Exams					
ST 2024	8247100179	Student research project "Rock Mechanics and Tunneling"			Wagner, Schneider

Legend: 💻 Online, 🌐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
report appr. 15 pages

Prerequisites
none

Recommendation
none

Annotation
none

Below you will find excerpts from events related to this course:

V Basics in Rock Mechanics

6251804, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Brady, B. H. G. and Brown, E. T., (2004): Rock Mechanics for Underground Mining, 3rd. Edition, Kluwer Academic Publishers.

Kolymbas, D. (1998), Geotechnik - Tunnelbau und Tunnelmechanik, Springer.

Goodmann, R.E., (1989): Introduction to Rock Mechanics, John Wiley & Sons.

Hoek, E., 2007: Practical Rock Engineering, kostenloser Download unter: http://www.rocscience.com/hoek/PracticalRockEngineering.asp.

Jäger, J.C., Cook, N.G.W. and Zimmerman, R.W., 2007: Fundamentals of Rock Mechanics, Blackwell Publishing.

Wittke, W., 1982: Felsmechanik, Springer-Verlag.

Wittke, W.: Rock Mechanics Based on an Anisotropic Jointed Rock Model (AJRM), Ernst & Sohn, 2014.

V Basics in Tunnel Construction

6251806, SS 2024, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Literature
Maidl, B. 1997: Tunnelbau im Sprengvortrieb
Müller, L. 1978: Der Felsbau, Bd. 3 Tunnelbau

T 8.83 Course: Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation [T-CIWVT-113433]

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-106680 - Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	1

Events					
ST 2024	2233130	Circular Economy Water Energy Environment: Research Proposal Preparation	4 SWS	Lecture / 🗣	Schäfer
Exams					
ST 2024	7233130	Water – Energy – Environment Nexus in a Circular Economy: Research Proposal Preparation			Schäfer

Legend: 💻 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The Learning control is an examination of another type:
Research proposal of 10 pages and an oral presentation of 10 minutes (individual work). The grade will be a composite of the proposal (submission in week 13 before class) and oral & poster presentation (all day workshop with researcher participation).

Prerequisites
None

T 8.84 Course: Water and Energy Cycles [T-BGU-106596]

Responsible: Prof. Dr.-Ing. Erwin Zehe
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-103360 - Water and Energy Cycles

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	3

Events					
WT 24/25	6224702	Water and Energy Cycles in Hydrological Systems: Processes, Predictions and Management	4 SWS	Lecture / Practice (/	Zehe
Exams					
ST 2024	8244106596	Water and Energy Cycles			Zehe

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
submission of at least 50% of the weekly exercises plus a written term paper on a given topic, approx. 10 to 15 pages

Prerequisites
none

Recommendation
none

Annotation
none

T 8.85 Course: Water Chemistry and Water Technology [T-CIWVT-107585]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-103753 - Water Chemistry and Water Technology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	10	Grade to a third	Each term	1

Events					
WT 24/25	2233030	Water Technology	2 SWS	Lecture / 🗣	Horn
WT 24/25	2233031	Exercises to Water Technology	1 SWS	Practice / 🗣	Horn, und Mitarbeitende
WT 24/25	2233230	Fundamentals of Water Quality	2 SWS	Lecture / 🗣	Wagner
WT 24/25	2233231	Fundamentals of Water Quality - Exercises	1 SWS	Practice / 🗣	Wagner, und Mitarbeitende
Exams					
ST 2024	7232004	Water Chemistry and Water Technology			Horn, Abbt-Braun

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Die Forschungsuniversität in der Helmholtz-Gemeinschaft

Karlsruher Institut für Technologie

Amtliche Bekanntmachung

2021 **Ausgegeben Karlsruhe, den 11. August 2021** **Nr. 54**

I n h a l t **Seite**

196

Studien- und Prüfungsordnungdes Karlsruher Instituts für Technologie (KIT) für den Masterstudiengang Angewandte Geowissenschaften

vom 10. August 2021

Aufgrund von § 10 Absatz 2 Ziff. 4 und § 20 Absatz 2 des Gesetzes über das Karlsruher Institut für Technologie (KIT-Gesetz - KITG) in der Fassung vom 14. Juli 2009 (GBl. S. 317 f), zuletzt geändert durch Artikel 1 des Zweiten KIT-Weiterentwicklungsgesetzes (2. KIT-WG) vom 04. Februar 2021 (GBl S. 77, 83 ff), und § 32 Absatz 3 Satz 1 des Gesetzes über die Hochschulen in Baden-Württemberg (Landeshochschulgesetz - LHG) in der Fassung vom 1. Januar 2005 (GBl. S. 1 f), zuletzt geändert durch Artikel 1 des Vierten Hochschulrechtsänderungsgesetzes (4. HRÄG) vom 17. Dezember 2020 (GBl S. 1204 ff) hat der KIT-Senat am 19. Juli 2021 die folgende Studien- und Prüfungsordnung für den Masterstudiengang Angewandte Geowissenschaften beschlossen.

Der Präsident hat seine Zustimmung gemäß § 20 Absatz 2 Satz 1 KITG i.V.m. § 32 Absatz 3 Satz 1 LHG am 10. August 2021 erteilt.

Inhaltsverzeichnis

198

Präambel

[1]Das KIT hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss des Studiums am KIT der Mastergrad stehen soll. [2]Das KIT sieht daher die am KIT angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

I. Allgemeine Bestimmungen

§ 1 Geltungsbereich

[1]Diese Masterprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Masterstudiengang Angewandte Geowissenschaften am KIT.

§ 2 Ziel des Studiums, akademischer Grad

(1) [1]Im konsekutiven Masterstudium sollen die im Bachelorstudium erworbenen wissenschaftlichen und fachlichen Qualifikationen weiter vertieft, verbreitert, erweitert oder ergänzt werden. [2]Ziel des Studiums ist die Fähigkeit, die wissenschaftlichen und fachlichen Erkenntnisse und Methoden selbstständig anzuwenden und ihre Bedeutung und Reichweite für die Lösung komplexer wissenschaftlicher und gesellschaftlicher Problemstellungen zu bewerten.

(2) [1]Aufgrund der bestandenen Masterprüfung wird der akademische Grad „Master of Science (M.Sc.)“ für den Masterstudiengang Angewandte Geowissenschaften verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

(1) [1]Die Regelstudienzeit beträgt vier Semester.

(2) [1]Das Lehrangebot des Studiengangs ist in Fächer, die Fächer sind in Module, die jeweiligen Module in Lehrveranstaltungen gegliedert. [2]Die Fächer und ihr Umfang werden in § 19 festgelegt. [3]Näheres beschreibt das Modulhandbuch.

(3) [1]Der für das Absolvieren von Lehrveranstaltungen und Modulen vorgesehene Arbeitsaufwand wird in Leistungspunkten (LP) ausgewiesen. [2]Die Maßstäbe für die Zuordnung von Leistungspunkten entsprechen dem European Credit Transfer System (ECTS). [3]Ein Leistungspunkt entspricht einem Arbeitsaufwand von etwa 30 Zeitstunden. [4]Die Verteilung der Leistungspunkte auf die Semester hat in der Regel gleichmäßig zu erfolgen.

(4) [1]Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studien- und Prüfungsleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 120 Leistungspunkte.

(5) [1]Lehrveranstaltungen werden in deutscher oder englischer Sprache angeboten.

§ 4 Modulprüfungen, Studien- und Prüfungsleistungen

(1) [1]Die Masterprüfung besteht aus Modulprüfungen. [2]Modulprüfungen bestehen aus einer oder mehreren Erfolgskontrollen.

[3]Erfolgskontrollen gliedern sich in Studien- oder Prüfungsleistungen.

(2) [1]Prüfungsleistungen sind:

1. schriftliche Prüfungen,
2. mündliche Prüfungen oder

3. Prüfungsleistungen anderer Art.

(3) [1]Studienleistungen sind schriftliche, mündliche oder praktische Leistungen, die von den Studierenden in der Regel lehrveranstaltungsbegleitend erbracht werden. [2]Die Masterprüfung darf nicht mit einer Studienleistung abgeschlossen werden.

(4) [1]Von den Modulprüfungen sollen mindestens 70 % benotet sein.

(5) [1]Bei sich ergänzenden Inhalten können die Modulprüfungen mehrerer Module durch eine auch modulübergreifende Prüfungsleistung (Absatz 2 Nr.1 bis 3) ersetzt werden.

§ 5 Anmeldung und Zulassung zu den Modulprüfungen und Lehrveranstaltungen

(1) [1]Um an den Modulprüfungen teilnehmen zu können, müssen sich die Studierenden online im Studierendenportal zu den jeweiligen Erfolgskontrollen anmelden. [2]In Ausnahmefällen kann eine Anmeldung schriftlich beim Prüfungssekretariat des Masterstudiengangs Angewandte Geowissenschaften erfolgen. [3]Für die Erfolgskontrollen können durch die Prüfenden Anmeldefristen festgelegt werden. [4]Die Anmeldung der Masterarbeit ist im Modulhandbuch geregelt.

(2) [1]Sofern Wahlmöglichkeiten bestehen, müssen Studierende, um zu einer Prüfung in einem bestimmten Modul zugelassen zu werden, vor der ersten Prüfung in diesem Modul mit der Anmeldung zu der Prüfung eine bindende Erklärung über die Wahl des betreffenden Moduls und dessen Zuordnung zu einem Fach abgeben. [2]Auf Antrag des/der Studierenden an den Prüfungsausschuss kann die Wahl oder die Zuordnung nachträglich geändert werden.

(3) [1]Zu einer Erfolgskontrolle ist zuzulassen, wer

1. in den Masterstudiengang Angewandte Geowissenschaften am KIT eingeschrieben ist; die Zulassung beurlaubter Studierender ist auf Prüfungsleistungen beschränkt und
2. nachweist, dass er die im Modulhandbuch für die Zulassung zu einer Erfolgskontrolle festgelegten Voraussetzungen erfüllt und
3. nachweist, dass er in dem Masterstudiengang Angewandte Geowissenschaften den Prüfungsanspruch nicht verloren hat.

(4) [1]Nach Maßgabe von § 30 Abs. 5 LHG kann die Zulassung zu einzelnen Pflichtveranstaltungen beschränkt werden. [2]Der/die Prüfende entscheidet über die Auswahl unter den Studierenden, die sich rechtzeitig bis zu dem von dem/der Prüfenden festgesetzten Termin angemeldet haben unter Berücksichtigung des Studienfortschritts dieser Studierenden und unter Beachtung von § 13 Abs. 1 Satz 1 und 2, sofern ein Abbau des Überhangs durch andere oder zusätzliche Veranstaltungen nicht möglich ist. [3]Für den Fall gleichen Studienfortschritts sind durch die KIT-Fakultäten weitere Kriterien festzulegen. [4]Das Ergebnis wird den Studierenden rechtzeitig bekannt gegeben.

(5) [1]Die Zulassung ist zu versagen, wenn die in Absatz 3 und 4 genannten Voraussetzungen nicht erfüllt sind. [2]Die Zulassung kann versagt werden, wenn die betreffende Erfolgskontrolle bereits in einem grundständigen Bachelorstudiengang am KIT erbracht wurde, der Zulassungsvoraussetzung für diesen Masterstudiengang gewesen ist. [3]Dies gilt nicht für Mastervorzugsleistungen. [4]Zu diesen ist eine Zulassung nach Maßgabe von Satz 1 ausdrücklich zu genehmigen.

§ 6 Durchführung von Erfolgskontrollen

(1) [1]Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach, durchgeführt.

(2) [1]Die Art der Erfolgskontrolle (§ 4 Abs. 2 Nr. 1 bis 3, Abs. 3) wird von der/dem Prüfenden der betreffenden Lehrveranstaltung in Bezug auf die Lerninhalte der Lehrveranstaltung und die Lernziele des Moduls festgelegt. [2]Die Art der Erfolgskontrolle, ihre Häufigkeit, Reihenfolge und Gewichtung sowie gegebenenfalls die Bildung der Modulnote müssen mindestens sechs Wochen vor Vorlesungsbeginn im Modulhandbuch bekannt gemacht werden. [3]Im Einvernehmen von Prüfendem und Studierender bzw. Studierendem können die Art der Prüfungsleistung sowie

die Prüfungssprache auch nachträglich geändert werden; im ersten Fall ist jedoch § 4 Abs. 4 zu berücksichtigen. [4]Bei der Prüfungsorganisation sind die Belange Studierender mit Behinderung oder chronischer Erkrankung gemäß § 13 Abs. 1 zu berücksichtigen. [5]§ 13 Abs. 1 Satz 3 und 4 gelten entsprechend.

(3) [1]Bei unvertretbar hohem Prüfungsaufwand kann eine schriftlich durchzuführende Prüfungsleistung auch mündlich oder eine mündlich durchzuführende Prüfungsleistung auch schriftlich abgenommen werden. [2]Diese Änderung muss mindestens sechs Wochen vor der Prüfungsleistung bekannt gegeben werden.

(4) [1]Bei Lehrveranstaltungen in englischer Sprache (§ 3 Abs. 5) können die entsprechenden Erfolgskontrollen in dieser Sprache abgenommen werden. § 6 Abs. 2 gilt entsprechend.

(5) [1]*Schriftliche Prüfungen* (§ 4 Abs. 2 Nr. 1) sind in der Regel von einer/einem Prüfenden nach § 17 Abs. 2 oder 3 zu bewerten. [2]Sofern eine Bewertung durch mehrere Prüfende erfolgt, ergibt sich die Note aus dem arithmetischen Mittel der Einzelbewertungen. [3]Entspricht das arithmetische Mittel keiner der in § 7 Abs. 2 Satz 2 definierten Notenstufen, so ist auf die nächstliegende Notenstufe auf- oder abzurunden. [4]Bei gleichem Abstand ist auf die nächstbessere Notenstufe zu runden. [5]Das Bewertungsverfahren soll sechs Wochen nicht überschreiten. [6]Schriftliche Prüfungen dauern mindestens 60 und höchstens 300 Minuten.

(6) [1]*Mündliche Prüfungen* (§ 4 Abs. 2 Nr. 2) sind von mehreren Prüfenden (Kollegialprüfung) oder von einer/einem Prüfenden in Gegenwart einer oder eines Beisitzenden als Gruppen- oder Einzelprüfungen abzunehmen und zu bewerten. [2]Vor der Festsetzung der Note hört die/der Prüfende die anderen an der Kollegialprüfung mitwirkenden Prüfenden an. [3]Mündliche Prüfungen dauern in der Regel mindestens 15 Minuten und maximal 60 Minuten pro Studierender/Studierendem.

[1]Die wesentlichen Gegenstände und Ergebnisse der *mündlichen Prüfung* sind in einem Protokoll festzuhalten. [2]Das Ergebnis der Prüfung ist den Studierenden im Anschluss an die mündliche Prüfung bekannt zu geben.

[1]Studierende, die sich in einem späteren Semester der gleichen Prüfung unterziehen wollen, werden entsprechend den räumlichen Verhältnissen und nach Zustimmung des Prüflings als Zuhörerinnen und Zuhörer bei mündlichen Prüfungen zugelassen. [2]Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse.

(7) [1]Für *Prüfungsleistungen anderer Art* (§ 4 Abs. 2 Nr. 3) sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. [2]Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Prüfungsleistung dem/der Studierenden zurechenbar ist. [3]Die wesentlichen Gegenstände und Ergebnisse der Erfolgskontrolle sind in einem Protokoll festzuhalten.

[1]Bei *mündlich* durchgeführten *Prüfungsleistungen anderer Art* muss neben der/dem Prüfenden ein/e Beisitzende/r anwesend sein, die/der zusätzlich zum/zur Prüfenden das Protokoll zeichnet.

[1]*Schriftliche Arbeiten* im Rahmen einer *Prüfungsleistung anderer Art* haben dabei die folgende Erklärung zu tragen: [2]„Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde.“ [3]Trägt die Arbeit diese Erklärung nicht, wird sie nicht angenommen. [4]Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

§ 6 a Erfolgskontrollen im Antwort-Wahl-Verfahren

[1]Für die Durchführung von Erfolgskontrollen im Antwort-Wahl-Verfahren findet die Satzung des Karlsruher Instituts für Technologie (KIT) zur Durchführung von Erfolgskontrollen im Antwort-Wahl-Verfahren in der jeweils gültigen Fassung Anwendung.

§ 6 b Computergestützte Erfolgskontrollen

(1) [1]Erfolgskontrollen können computergestützt durchgeführt werden. [2]Dabei wird die Antwort bzw. Lösung der/des Studierenden elektronisch übermittelt und, sofern möglich, automatisiert ausgewertet. [3]Die Prüfungsinhalte sind von einer/einem Prüfenden zu erstellen.

(2) [1]Vor der computergestützten Erfolgskontrolle hat die/der Prüfende sicherzustellen, dass die elektronischen Daten eindeutig identifiziert und unverwechselbar und dauerhaft den Studierenden zugeordnet werden können. [2]Der störungsfreie Verlauf einer computergestützten Erfolgskontrolle ist durch entsprechende technische Betreuung zu gewährleisten, insbesondere ist die Erfolgskontrolle in Anwesenheit einer fachlich sachkundigen Person durchzuführen. [3]Alle Prüfungsaufgaben müssen während der gesamten Bearbeitungszeit zur Bearbeitung zur Verfügung stehen.

(3) [1]Im Übrigen gelten für die Durchführung von computergestützten Erfolgskontrollen die §§ 6 bzw. 6 a.

§ 7 Bewertung von Studien- und Prüfungsleistungen

(1) [1]Das Ergebnis einer Prüfungsleistung wird von den jeweiligen Prüfenden in Form einer Note festgesetzt.

(2) [1]Folgende Noten sollen verwendet werden:

sehr gut (very good)	:	hervorragende Leistung,
gut (good)	:	eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
befriedigend (satisfactory)	:	eine Leistung, die durchschnittlichen Anforderungen entspricht,
ausreichend (sufficient)	:	eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
nicht ausreichend (failed)	:	eine Leistung, die wegen erheblicher Mängel nicht den Anforderungen genügt.

[2]Zur differenzierten Bewertung einzelner Prüfungsleistungen sind nur folgende Noten zugelassen:

1,0; 1,3	:	sehr gut
1,7; 2,0; 2,3	:	gut
2,7; 3,0; 3,3	:	befriedigend
3,7; 4,0	:	ausreichend
5,0	:	nicht ausreichend

(3) [1]Studienleistungen werden mit „bestanden“ oder mit „nicht bestanden“ gewertet.

(4) [1]Bei der Bildung der gewichteten Durchschnitte der Modulnoten, der Fachnoten und der Gesamtnote wird nur die erste Dezimalstelle hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.

(5) [1]Jedes Modul und jede Erfolgskontrolle darf in demselben Studiengang nur einmal gewertet werden.

(6) [1]Eine Prüfungsleistung ist bestanden, wenn die Note mindestens „ausreichend“ (4,0) ist.

(7) [1]Die Modulprüfung ist bestanden, wenn alle erforderlichen Erfolgskontrollen bestanden sind. [2]Die Modulprüfung und die Bildung der Modulnote sollen im Modulhandbuch geregelt werden. [3]Sofern das Modulhandbuch keine Regelung über die Bildung der Modulnote enthält, errechnet sich die Modulnote aus einem nach den Leistungspunkten der einzelnen Teilmodule gewichteten Notendurchschnitt. [4]Die differenzierten Noten (Absatz 2) sind bei der Berechnung der Modulnoten als Ausgangsdaten zu verwenden.

(8) [1]Die Ergebnisse der Erfolgskontrollen sowie die erworbenen Leistungspunkte werden durch den Studierendenservice des KIT verwaltet.

(9) [1]Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein.

(10) [1]Die Gesamtnote der Masterprüfung, die Fachnoten und die Modulnoten lauten:

		bis	1,5	=	sehr gut
von	1,6	bis	2,5	=	gut
von	2,6	bis	3,5	=	befriedigend
von	3,6	bis	4,0	=	ausreichend

§ 8 Wiederholung von Erfolgskontrollen, endgültiges Nichtbestehen

(1) [1]Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Absatz 2 Nr. 1) einmal wiederholen. [2]Wird eine schriftliche Wiederholungsprüfung mit „nicht ausreichend“ (5,0) bewertet, so findet eine mündliche Nachprüfung im zeitlichen Zusammenhang mit dem Termin der nicht bestandenen Prüfung statt. [3]In diesem Falle kann die Note dieser Prüfung nicht besser als „ausreichend“ (4,0) sein.

(2) [1]Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Absatz 2 Nr. 2) einmal wiederholen.

(3) [1]Wiederholungsprüfungen nach Absatz 1 und 2 müssen in Inhalt, Umfang und Form (mündlich oder schriftlich) der ersten entsprechen. [2]Ausnahmen kann der zuständige Prüfungsausschuss auf Antrag zulassen.

(4) [1]Prüfungsleistungen anderer Art (§ 4 Absatz 2 Nr. 3) können einmal wiederholt werden.

(5) [1]Studienleistungen können mehrfach wiederholt werden.

(6) [1]Die Wiederholung von Prüfungsleistungen hat spätestens bis zum Ende des Prüfungszeitraumes des übernächsten Semesters zu erfolgen.

(7) [1]Die Prüfungsleistung ist endgültig nicht bestanden, wenn die mündliche Nachprüfung einer schriftlichen Wiederholungsprüfung im Sinne des Absatzes 1 mit „nicht ausreichend“ (5,0) bewertet wurde. [2]Die Prüfungsleistung ist ferner endgültig nicht bestanden, wenn die mündliche Prüfung im Sinne des Absatzes 2 oder die Prüfungsleistung anderer Art gemäß Absatz 4 zweimal mit „nicht bestanden“ bewertet wurde.

(8) [1]Das Modul ist endgültig nicht bestanden, wenn eine für sein Bestehen erforderliche Prüfungsleistung endgültig nicht bestanden ist.

(9) [1]Eine zweite Wiederholung derselben Prüfungsleistung gemäß § 4 Abs. 2 ist nur in Ausnahmefällen auf Antrag des/der Studierenden zulässig („Antrag auf Zweitwiederholung“). [2]Der Antrag ist schriftlich beim Prüfungsausschuss in der Regel bis zwei Monate nach Bekanntgabe der Note zu stellen.

[1]Über den ersten Antrag eines/einer Studierenden auf Zweitwiederholung entscheidet der Prüfungsausschuss, wenn er den Antrag genehmigt. [2]Wenn der Prüfungsausschuss diesen Antrag ablehnt, entscheidet ein Mitglied des Präsidiums. [3]Über weitere Anträge auf Zweitwiederholung entscheidet nach Stellungnahme des Prüfungsausschusses ein Mitglied des Präsidiums. [4]Wird der Antrag genehmigt, hat die Zweitwiederholung spätestens zum übernächsten Prüfungstermin zu erfolgen. [5]Absatz 1 Satz 2 und 3 gelten entsprechend.

(10) [1]Die Wiederholung einer bestandenen Prüfungsleistung ist nicht zulässig.

(11) [1]Die Masterarbeit kann bei einer Bewertung mit „nicht ausreichend“ (5,0) einmal wiederholt werden. [2]Eine zweite Wiederholung der Masterarbeit ist ausgeschlossen.

§ 9 Verlust des Prüfungsanspruchs

[1]Ist eine nach dieser Studien- und Prüfungsordnung erforderliche Studien- oder Prüfungsleistung endgültig nicht bestanden oder eine Wiederholungsprüfung nach § 8 Abs. 6 nicht rechtzeitig erbracht oder die Masterprüfung bis zum Ende des Prüfungszeitraums des 8. Fachsemesters einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Masterstudiengang Angewandte Geowissenschaften, es sei denn, dass die Fristüberschreitung nicht selbst zu vertreten ist. [2]Die Entscheidung über eine Fristverlängerung und über Ausnahmen von der Fristregelung trifft der Prüfungsausschuss unter Beachtung der in § 32 Abs. 6 LHG genannten Tätigkeiten auf Antrag des/der Studierenden. [3]Der Antrag ist schriftlich in der Regel bis sechs Wochen vor Ablauf der Frist zu stellen.

§ 10 Abmeldung; Versäumnis, Rücktritt

(1) [1]Studierende können ihre Anmeldung zu *schriftlichen Prüfungen* ohne Angabe von Gründen bis zur Ausgabe der Prüfungsaufgaben widerrufen (Abmeldung). [2]Eine Abmeldung kann online im Studierendenportal bis 24:00 Uhr des Vortages der Prüfung oder in begründeten Ausnahmefällen beim Studierendenservice innerhalb der Geschäftszeiten erfolgen. [3]Erfolgt die Abmeldung gegenüber dem/der Prüfenden, hat diese/r Sorge zu tragen, dass die Abmeldung im Campus Management System verbucht wird.

(2) [1]Bei *mündlichen Prüfungen* muss die Abmeldung spätestens drei Werktage vor dem betreffenden Prüfungstermin gegenüber dem/der Prüfenden erklärt werden. Der Rücktritt von einer mündlichen Prüfung weniger als drei Werktage vor dem betreffenden Prüfungstermin ist nur unter den Voraussetzungen des Absatzes 5 möglich. [2]Der Rücktritt von mündlichen Nachprüfungen im Sinne von § 9 Abs. 1 ist grundsätzlich nur unter den Voraussetzungen von Absatz 5 möglich.

(3) [1]Die Abmeldung von *Prüfungsleistungen anderer Art* sowie von *Studienleistungen* ist im Modulhandbuch geregelt.

(4) [1]Eine Erfolgskontrolle gilt als mit „nicht ausreichend“ (5,0) bewertet, wenn die Studierenden einen Prüfungstermin ohne triftigen Grund versäumen oder wenn sie nach Beginn der Erfolgskontrolle ohne triftigen Grund von dieser zurücktreten. [2]Dasselbe gilt, wenn die Masterarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, der/die Studierende hat die Fristüberschreitung nicht zu vertreten.

(5) [1]Der für den Rücktritt nach Beginn der Erfolgskontrolle oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. [2]Bei Krankheit des/der Studierenden oder eines allein zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann die Vorlage eines ärztlichen Attestes verlangt werden.

§ 11 Täuschung, Ordnungsverstoß

(1) [1]Versuchen Studierende das Ergebnis ihrer Erfolgskontrolle durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Erfolgskontrolle als mit „nicht ausreichend“ (5,0) bewertet.

(2) [1]Studierende, die den ordnungsgemäßen Ablauf einer Erfolgskontrolle stören, können von der/dem Prüfenden oder der Aufsicht führenden Person von der Fortsetzung der Erfolgskontrolle ausgeschlossen werden. [2]In diesem Fall gilt die betreffende Erfolgskontrolle als mit „nicht ausreichend“ (5,0) bewertet. [3]In schwerwiegenden Fällen kann der Prüfungsausschuss diese Studierenden von der Erbringung weiterer Erfolgskontrollen ausschließen.

(3) [1]Näheres regelt die Allgemeine Satzung des KIT zur Redlichkeit bei Prüfungen und Praktika in der jeweils gültigen Fassung.

§ 12 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten

(1) [1]Es gelten die Vorschriften des Gesetzes zum Schutz von Müttern bei der Arbeit, in der Ausbildung und im Studium (Mutterschutzgesetz – MuSchG) in seiner jeweils geltenden Fassung. [2]Die Mutterschutzfristen unterbrechen jede Frist nach dieser Prüfungsordnung. [3]Die Dauer des Mutterschutzes wird nicht in die Frist eingerechnet.

(2) [1]Gleichfalls sind die Fristen der Elternzeit nach Maßgabe des jeweils gültigen Gesetzes (Bundeselterngeld- und Elternzeitgesetz - BEEG) auf Antrag zu berücksichtigen. [2]Der/die Studierende muss bis spätestens vier Wochen vor dem Zeitpunkt, von dem an die Elternzeit angetreten werden soll, dem Prüfungsausschuss, unter Beifügung der erforderlichen Nachweise, schriftlich mitteilen, in welchem Zeitraum die Elternzeit in Anspruch genommen werden soll. [3]Der Prüfungsausschuss hat zu prüfen, ob die gesetzlichen Voraussetzungen vorliegen, die bei einer Arbeitnehmerin bzw. einem Arbeitnehmer den Anspruch auf Elternzeit auslösen würden, und teilt dem/der Studierenden das Ergebnis sowie die neu festgesetzten Prüfungszeiten unverzüglich mit. [4]Die Bearbeitungszeit der Masterarbeit kann nicht durch Elternzeit unterbrochen werden. [5]Die gestellte Arbeit gilt als nicht vergeben. [6]Nach Ablauf der Elternzeit erhält der/die Studierende ein neues Thema, das innerhalb der in § 14 festgelegten Bearbeitungszeit zu bearbeiten ist.

(3) [1]Der Prüfungsausschuss entscheidet auf Antrag über die flexible Handhabung von Prüfungsfristen entsprechend den Bestimmungen des Landeshochschulgesetzes, wenn Studierende Familienpflichten wahrzunehmen haben. [2]Absatz 2 Satz 4 bis 6 gelten entsprechend.

§ 13 Studierende mit Behinderung oder chronischer Erkrankung

(1) [1]Bei der Gestaltung und Organisation des Studiums sowie der Prüfungen sind die Belange von Studierenden mit Behinderung oder chronischer Erkrankung zu berücksichtigen. [2]Insbesondere ist Studierenden mit Behinderung oder chronischer Erkrankung bevorzugter Zugang zu teilnahmebegrenzten Lehrveranstaltungen zu gewähren und die Reihenfolge für das Absolvieren bestimmter Lehrveranstaltungen entsprechend ihrer Bedürfnisse anzupassen. [3]Studierende sind gemäß Bundesgleichstellungsgesetz (BGG) und Sozialgesetzbuch Neuntes Buch (SGB IX) behindert, wenn ihre körperliche Funktion, geistige Fähigkeit oder seelische Gesundheit mit hoher Wahrscheinlichkeit länger als sechs Monate von dem für das Lebensalter typischen Zustand abweichen und daher ihre Teilhabe am Leben in der Gesellschaft beeinträchtigt ist. [4]Der Prüfungsausschuss entscheidet auf Antrag der/des Studierenden über das Vorliegen der Voraussetzungen nach Satz 2 und 3. [5]Die/der Studierende hat die entsprechenden Nachweise vorzulegen.

(2) [1]Weisen Studierende eine Behinderung oder chronische Erkrankung nach und folgt daraus, dass sie nicht in der Lage sind, Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen Zeit oder Form abzulegen, kann der Prüfungsausschuss gestatten, die Erfolgskontrollen in einem anderen Zeitraum oder einer anderen Form zu erbringen. [2]Insbesondere ist Studierenden mit Behinderung oder chronischer Erkrankung zu gestatten, notwendige Hilfsmittel zu benutzen.

(3) [1]Weisen Studierende eine Behinderung oder chronische Erkrankung nach und folgt daraus, dass sie nicht in der Lage sind, die Lehrveranstaltungen regelmäßig zu besuchen oder die gemäß § 19 erforderlichen Studien- und Prüfungsleistungen zu erbringen, kann der Prüfungsausschuss auf Antrag gestatten, dass einzelne Studien- und Prüfungsleistungen nach Ablauf der in dieser Studien- und Prüfungsordnung vorgesehenen Fristen absolviert werden können.

§ 14 Modul Masterarbeit

(1) [1]Voraussetzung für die Zulassung zum Modul Masterarbeit ist, dass die/der Studierende Modulprüfungen im Umfang von 70 LP erfolgreich abgelegt hat, davon mindestens 10 LP aus den Pflichtmodulen des Fachs „Geowissenschaftliche Spezialisierung“. [2]Näheres regelt das Modulhandbuch.

[3]Über Ausnahmen entscheidet der Prüfungsausschuss auf Antrag der/des Studierenden.

(1 a) [1]Dem Modul Masterarbeit sind 30 LP zugeordnet. Es besteht aus der Masterarbeit.

(2) [1]Die Masterarbeit kann von Hochschullehrern/Hochschullehrerinnen, leitenden Wissenschaftlern/Wissenschaftlerinnen gemäß § 14 Abs. 3 Ziff. 1 KITG in Fassung vor Inkrafttreten des 2. KIT-WG vom 04. Februar 2021 und habilitierten Mitgliedern der KIT-Fakultät vergeben werden. [2]Darüber hinaus kann der Prüfungsausschuss weitere Prüfende gemäß § 17 Abs. 2 und 3 zur Vergabe des Themas berechtigen. [3]Den Studierenden ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. [4]Soll die Masterarbeit außerhalb der KIT-Fakultät für Angewandte Geowissenschaften angefertigt werden, so bedarf dies der Genehmigung durch den Prüfungsausschuss. [5]Die Masterarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag der einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 4 erfüllt. [6]In Ausnahmefällen sorgt die/der Vorsitzende des Prüfungsausschusses auf Antrag der oder des Studierenden dafür, dass die/der Studierende innerhalb von vier Wochen ein Thema für die Masterarbeit erhält. [7]Die Ausgabe des Themas erfolgt in diesem Fall über die/den Vorsitzende/n des Prüfungsausschusses.

(3) [1]Thema, Aufgabenstellung und Umfang der Masterarbeit sind von dem Betreuer bzw. der Betreuerin so zu begrenzen, dass sie mit dem in Absatz 4 festgelegten Arbeitsaufwand bearbeitet werden kann.

(4) [1]Die Masterarbeit soll zeigen, dass die Studierenden in der Lage sind, ein Problem aus ihrem Studienfach selbstständig und in begrenzter Zeit nach wissenschaftlichen Methoden zu bearbeiten. [2]Der Umfang der Masterarbeit entspricht 30 Leistungspunkten. Die maximale Bearbeitungsdauer beträgt 6 Monate. [3]Thema und Aufgabenstellung sind an den vorgesehenen Umfang anzupassen. [4]Die Masterarbeit kann auf Deutsch oder Englisch geschrieben werden. [5]Auf Antrag der/des Studierenden kann der Prüfungsausschuss genehmigen, dass die Masterarbeit auch in einer anderen Sprache geschrieben werden kann.

(5) [1]Bei der Abgabe der Masterarbeit haben die Studierenden schriftlich zu versichern, dass sie die Arbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt haben, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht und die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet haben. [2]Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. [3]Die Erklärung kann wie folgt lauten: [4]„Ich versichere wahrheitsgemäß, die Arbeit selbstständig verfasst, alle benutzten Quellen und Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde sowie die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet zu haben.“ [5]Bei Abgabe einer unwahren Versicherung wird die Masterarbeit mit „nicht ausreichend“ (5,0) bewertet.

(6) [1]Der Zeitpunkt der Ausgabe des Themas der Masterarbeit ist durch die Betreuerin/ den Betreuer und die/den Studierenden festzuhalten und dies beim Prüfungsausschuss aktenkundig zu machen. [2]Der Zeitpunkt der Abgabe der Masterarbeit ist durch den/die Prüfende/n beim Prüfungsausschuss aktenkundig zu machen. [3]Das Thema kann nur einmal und nur innerhalb des ersten Monats der Bearbeitungszeit zurückgegeben werden. [4]Macht der oder die Studierende einen triftigen Grund geltend, kann der Prüfungsausschuss die in Absatz 4 festgelegte Bearbeitungszeit auf Antrag der oder des Studierenden um höchstens drei Monate verlängern. [5]Wird die Masterarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend“ (5,0) bewertet, es sei denn, dass die Studierenden dieses Versäumnis nicht zu vertreten haben.

206

(7) [1]Die Masterarbeit wird von mindestens einem/einer Hochschullehrer/in, einem/einer leitenden Wissenschaftler/in gemäß § 14 Abs. 3 Ziff. 1 KITG in Fassung vor Inkrafttreten des 2. KIT-WG vom 04. Februar 2021 oder einem habilitierten Mitglied der KIT-Fakultät und einem/einer weiteren Prüfenden bewertet. [2]In der Regel ist eine/r der Prüfenden die Person, die die Arbeit gemäß Absatz 2 vergeben hat. [3]Bei nicht übereinstimmender Beurteilung dieser beiden Personen setzt der Prüfungsausschuss im Rahmen der Bewertung dieser beiden Personen die Note der Masterarbeit fest; er kann auch eine/n weitere/n Gutachter/in bestellen. [4]Die Bewertung hat innerhalb von acht Wochen nach Abgabe der Masterarbeit zu erfolgen.

§ 15 Zusatzleistungen

(1) [1]Es können auch weitere Leistungspunkte (Zusatzleistungen) im Umfang von höchstens 30 LP aus dem Gesamtangebot des KIT erworben werden. [2]§ 3 und § 4 der Prüfungsordnung bleiben davon unberührt. [3]Diese Zusatzleistungen gehen nicht in die Festsetzung der Gesamt- und Modulnoten ein. [4]Die bei der Festlegung der Modulnote nicht berücksichtigten LP werden als Zusatzleistungen im Transcript of Records aufgeführt und als Zusatzleistungen gekennzeichnet. [5]Auf Antrag der/des Studierenden werden die Zusatzleistungen in das Masterzeugnis aufgenommen und als Zusatzleistungen gekennzeichnet. [6]Zusatzleistungen werden mit den nach § 7 vorgesehenen Noten gelistet.

(2) [1]Die Studierenden haben bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren. [2]Auf Antrag der Studierenden kann die Zuordnung des Moduls später geändert werden.

§ 16 Prüfungsausschuss

(1) [1]Für den Masterstudiengang Angewandte Geowissenschaften wird ein Prüfungsausschuss gebildet. [2]Er besteht aus 6 stimmberechtigten Mitgliedern: 4 Hochschullehrern/Hochschullehrerinnen / leitenden Wissenschaftlern/Wissenschaftlerinnen gemäß § 14 Abs. 3 Ziff. 1 KITG in Fassung vor Inkrafttreten des 2. KIT-WG vom 04. Februar 2021 / Privatdozentinnen bzw. -dozenten, 2 akademischen Mitarbeiterinnen und Mitarbeitern nach § 52 LHG / wissenschaftlichen Mitarbeitern/Mitarbeiterinnen gemäß § 14 Abs. 3 Ziff. 2 KITG in Fassung vor Inkrafttreten des 2. KIT-WG vom 04. Februar 2021 und einer bzw. einem Studierenden mit beratender Stimme. [3]Im Falle der Einrichtung eines gemeinsamen Prüfungsausschusses für den Bachelor- und den Masterstudiengang Angewandte Geowissenschaften erhöht sich die Anzahl der Studierenden auf zwei Mitglieder mit beratender Stimme, wobei je eine bzw. einer dieser Beiden aus dem Bachelor- und aus dem Masterstudiengang stammt. [4]Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.

(2) [1]Die/der Vorsitzende, ihre/sein Stellvertreter/in, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter/innen werden von dem KIT-Fakultätsrat bestellt, die akademischen Mitarbeiter/innen nach § 52 LHG, die wissenschaftlichen Mitarbeiter/innen gemäß § 14 Abs. 3 Ziff. 2 KITG in Fassung vor Inkrafttreten des 2. KIT-WG vom 04. Februar 2021 und die Studierenden auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. [2]Die/der Vorsitzende und deren/dessen Stellvertreter/in müssen Hochschullehrer/innen, leitende Wissenschaftler/innen § 14 Abs. 3 Ziff. 1 KITG in Fassung vor Inkrafttreten des 2. KIT-WG vom 04. Februar 2021 oder Privatdozenten/Privatdozentinnen des KIT sein. [3]Die/der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch das jeweilige Prüfungssekretariat unterstützt.

(3) [1]Der Prüfungsausschuss achtet auf die Einhaltung der Bestimmungen dieser Studien- und Prüfungsordnung und fällt die Entscheidungen in Prüfungsangelegenheiten. [2]Er entscheidet über die Anerkennung von Studienzeiten sowie Studien- und Prüfungsleistungen und trifft die Feststellung gemäß § 18 Absatz 1 Satz 1. [3]Er berichtet der KIT-Fakultät regelmäßig über die Entwicklung der Prüfungs- und Studienzeiten, einschließlich der Bearbeitungszeiten für die Masterarbeiten und die Verteilung der Modul- und Gesamtnoten. [4]Er ist zuständig für Anregungen zur Reform der Studien- und Prüfungsordnung und zu Modulbeschreibungen. [5]Der Prüfungsaus-

schuss entscheidet mit der Mehrheit seiner Stimmen. [6]Bei Stimmengleichheit entscheidet die/der Vorsitzende des Prüfungsausschusses.

(4) [1]Der Prüfungsausschuss kann die Erledigung seiner Aufgaben für alle Regelfälle auf die/den Vorsitzende/n des Prüfungsausschusses übertragen. [2]In dringenden Angelegenheiten, deren Erledigung nicht bis zu der nächsten Sitzung des Prüfungsausschusses warten kann, entscheidet die/der Vorsitzende des Prüfungsausschusses.

(5) [1]Die Mitglieder des Prüfungsausschusses haben das Recht, der Abnahme von Prüfungen beizuwohnen. [2]Die Mitglieder des Prüfungsausschusses, die Prüfenden und die Beisitzenden unterliegen der Verschwiegenheit. [3]Sofern sie nicht im öffentlichen Dienst stehen, sind sie durch die/den Vorsitzende/n zur Verschwiegenheit zu verpflichten.

(6) [1]In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen KIT-Fakultät zu absolvierende Prüfungsleistung betreffen, ist auf Antrag eines Mitgliedes des Prüfungsausschusses eine fachlich zuständige und von der betroffenen KIT-Fakultät zu nennende prüfungsberechtigte Person hinzuzuziehen.

(7) [1]Belastende Entscheidungen des Prüfungsausschusses sind schriftlich mitzuteilen. [2]Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. [3]Vor einer Entscheidung ist Gelegenheit zur Äußerung zu geben. [4]Widersprüche gegen Entscheidungen des Prüfungsausschusses sind innerhalb eines Monats nach Zugang der Entscheidung bei diesem einzulegen. [5]Über Widersprüche entscheidet das für Lehre zuständige Mitglied des Präsidiums.

§ 17 Prüfende und Beisitzende

(1) [1]Der Prüfungsausschuss bestellt die Prüfenden. [2]Er kann die Bestellung der/dem Vorsitzenden übertragen.

(2) [1]Prüfende sind Hochschullehrer/innen sowie leitende Wissenschaftler/innen gemäß § 14 Abs. 3 Ziff. 1 KITG, habilitierte Mitglieder und akademische Mitarbeiter/innen gemäß § 52 LHG, welche der KIT-Fakultät angehören und denen die Prüfungsbefugnis übertragen wurde; desgleichen kann wissenschaftlichen Mitarbeitern/Mitarbeiterinnen gemäß § 14 Abs. 3 Ziff. 2 KITG die Prüfungsbefugnis übertragen werden. [2]Bestellt werden darf nur, wer mindestens die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat.

(3) [1]Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zu Prüfenden bestellt werden, sofern sie die gemäß Absatz 2 Satz 2 vorausgesetzte Qualifikation nachweisen können.

(4) [1]Zu Prüfenden einer Masterarbeit können auch Externe bestellt werden, sofern sie die gemäß Absatz 2 Satz 2 vorausgesetzte Qualifikation nachweisen können.

(5) [1]Die Beisitzenden werden durch die Prüfenden benannt. [2]Zu Beisitzenden darf nur bestellt werden, wer einen akademischen Abschluss in einem Masterstudiengang der Angewandten Geowissenschaften oder einen gleichwertigen akademischen Abschluss erworben hat.

§ 18 Anerkennung von Studien- und Prüfungsleistungen, Studienzeiten

(1) [1]Studien- und Prüfungsleistungen sowie Studienzeiten, die in Studiengängen an staatlichen oder staatlich anerkannten Hochschulen und Berufsakademien der Bundesrepublik Deutschland oder an ausländischen staatlichen oder staatlich anerkannten Hochschulen erbracht wurden, werden auf Antrag der Studierenden anerkannt, sofern hinsichtlich der erworbenen Kompetenzen kein wesentlicher Unterschied zu den Leistungen oder Abschlüssen besteht, die ersetzt werden sollen. [2]Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. [3]Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studien- und Prüfungsleistung (Anrechnung) werden die Grundsätze des ECTS herangezogen.

(2) [1]Die Studierenden haben die für die Anerkennung erforderlichen Unterlagen vorzulegen. [2]Studierende, die neu in den Masterstudiengang Angewandte Geowissenschaften immatrikuliert

wurden, haben den Antrag mit den für die Anerkennung erforderlichen Unterlagen innerhalb eines Semesters nach Immatrikulation zu stellen. [3]Bei Unterlagen, die nicht in deutscher oder englischer Sprache vorliegen, kann eine amtlich beglaubigte Übersetzung verlangt werden. [4]Die Beweislast dafür, dass der Antrag die Voraussetzungen für die Anerkennung nicht erfüllt, liegt beim Prüfungsausschuss.

(3) [1]Werden Leistungen angerechnet, die nicht am KIT erbracht wurden, werden sie im Zeugnis als „anerkannt“ ausgewiesen. [2]Liegen Noten vor, werden die Noten, soweit die Notensysteme vergleichbar sind, übernommen und in die Berechnung der Modulnoten und der Gesamtnote einbezogen. [3]Sind die Notensysteme nicht vergleichbar, können die Noten umgerechnet werden. [4]Liegen keine Noten vor, wird der Vermerk „bestanden“ aufgenommen.

(4) [1]Bei der Anerkennung von Studien- und Prüfungsleistungen, die außerhalb der Bundesrepublik Deutschland erbracht wurden, sind die von der Kultusministerkonferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen der Hochschulpartnerschaften zu beachten.

(5) [1]Außerhalb des Hochschulsystems erworbene Kenntnisse und Fähigkeiten werden angerechnet, wenn sie nach Inhalt und Niveau den Studien- und Prüfungsleistungen gleichwertig sind, die ersetzt werden sollen und die Institution, in der die Kenntnisse und Fähigkeiten erworben wurden, ein genormtes Qualitätssicherungssystem hat. [2]Die Anrechnung kann in Teilen versagt werden, wenn mehr als 50 Prozent des Hochschulstudiums ersetzt werden soll.

(6) [1]Zuständig für Anerkennung und Anrechnung ist der Prüfungsausschuss. [2]Im Rahmen der Feststellung, ob ein wesentlicher Unterschied im Sinne des Absatz 1 vorliegt, sind die zuständigen Fachvertreter/innen zu hören. [3]Der Prüfungsausschuss entscheidet in Abhängigkeit von Art und Umfang der anzurechnenden Studien- und Prüfungsleistungen über die Einstufung in ein höheres Fachsemester.

II. Masterprüfung

§ 19 Umfang und Art der Masterprüfung

(1) [1]Die Masterprüfung besteht aus den Modulprüfungen nach Absatz 2 sowie dem Modul Masterarbeit (§ 14).

(2) [1]Es sind Modulprüfungen in folgenden Fächern abzulegen:

1. Fach „Geowissenschaftliche Spezialisierung“: Modul(e) im Umfang von 70 LP.

[2]Im Fach „Geowissenschaftliche Spezialisierung“ ist eines der folgenden Profile zu wählen:

a) Sustainable Energy-Resources-Storage

b) Mineralogie und Geochemie

c) Ingenieur- und Hydrogeologie.

2. Fach „Fachbezogene Ergänzung“: Modul(e) im Umfang von 20 LP.

[3]Die Festlegung der zur Auswahl stehenden Module und deren Fach- und Profilzuordnung werden im Modulhandbuch getroffen.

§ 20 Bestehen der Masterprüfung, Bildung der Gesamtnote

(1) [1]Die Masterprüfung ist bestanden, wenn alle in § 19 genannten Modulprüfungen bestanden wurden.

(2) [1]Die Gesamtnote der Masterprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt der Fachnoten und dem Modul Masterarbeit.

(3) [1]Haben Studierende die Masterarbeit mit der Note 1,0 und die Masterprüfung mit einem Durchschnitt von 1,2 oder besser abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen.

§ 21 Masterzeugnis, Masterurkunde, Diploma Supplement und Transcript of Records

(1) [1]Über die Masterprüfung werden nach Bewertung der letzten Prüfungsleistung eine Masterurkunde und ein Zeugnis erstellt. [2]Die Ausfertigung von Masterurkunde und Zeugnis soll nicht später als drei Monate nach Ablegen der letzten Prüfungsleistung erfolgen. [3]Masterurkunde und Masterzeugnis werden in deutscher und englischer Sprache ausgestellt. Masterurkunde und Zeugnis tragen das Datum der erfolgreichen Erbringung der letzten Prüfungsleistung. [4]Diese Dokumente werden den Studierenden zusammen ausgehändigt. [5]In der Masterurkunde wird die Verleihung des akademischen Mastergrades beurkundet. [6]Die Masterurkunde wird von dem Präsidenten und der KIT-Dekanin/ dem KIT-Dekan der KIT-Fakultät unterzeichnet und mit dem Siegel des KIT versehen.

(2) [1]Das Zeugnis enthält die Fach- und Modulnoten sowie die den Modulen und Fächern zugeordneten Leistungspunkte und die Gesamtnote. [2]Sofern gemäß § 7 Abs. 2 Satz 2 eine differenzierte Bewertung einzelner Prüfungsleistungen vorgenommen wurde, wird auf dem Zeugnis auch die entsprechende Dezimalnote ausgewiesen; § 7 Abs. 4 bleibt unberührt. [3]Das Zeugnis ist von der KIT-Dekanin/ dem KIT-Dekan der KIT-Fakultät und von der/dem Vorsitzenden des Prüfungsausschusses zu unterzeichnen.

(3) [1]Mit dem Zeugnis erhalten die Studierenden ein Diploma Supplement in deutscher und englischer Sprache, das den Vorgaben des jeweils gültigen ECTS Users‘ Guide entspricht, sowie ein Transcript of Records in deutscher und englischer Sprache.

(4) [1]Das Transcript of Records enthält in strukturierter Form alle erbrachten Studien- und Prüfungsleistungen. [2]Dies beinhaltet alle Fächer und Fachnoten samt den zugeordneten Leistungspunkten, die dem jeweiligen Fach zugeordneten Module mit den Modulnoten und zugeordneten Leistungspunkten sowie die den Modulen zugeordneten Erfolgskontrollen samt Noten und zugeordneten Leistungspunkten. [3]Absatz 2 Satz 2 gilt entsprechend. [4]Aus dem Transcript of Records soll die Zugehörigkeit von Erfolgskontrollen zu den einzelnen Modulen deutlich erkennbar sein. [5]Angerechnete Studien- und Prüfungsleistungen sind im Transcript of Records aufzunehmen. [6]Alle Zusatzleistungen werden im Transcript of Records aufgeführt.

(5) [1]Die Masterurkunde, das Masterzeugnis und das Diploma Supplement einschließlich des Transcript of Records werden vom Studierendenservice des KIT ausgestellt.

III. Schlussbestimmungen

§ 22 Bescheinigung von Prüfungsleistungen

[1]Haben Studierende die Masterprüfung endgültig nicht bestanden, wird ihnen auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Studien- und Prüfungsleistungen und deren Noten enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. [2]Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

§ 23 Aberkennung des Mastergrades

(1) [1]Haben Studierende bei einer Prüfungsleistung getäuscht und wird diese Tatsache nach der Aushändigung des Zeugnisses bekannt, so können die Noten der Modulprüfungen, bei denen getäuscht wurde, berichtigt werden. [2]Gegebenenfalls kann die Modulprüfung für „nicht ausreichend“ (5,0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

210

(2) [1]Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass die/der Studierende darüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. [2]Hat die/der Studierende die Zulassung vorsätzlich zu Unrecht erwirkt, so kann die Modulprüfung für „nicht ausreichend“ (5,0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

(3) [1]Vor einer Entscheidung des Prüfungsausschusses ist Gelegenheit zur Äußerung zu geben.

(4) [1]Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. [2]Mit dem unrichtigen Zeugnis ist auch die Masterurkunde einzuziehen, wenn die Masterprüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.

(5) [1]Eine Entscheidung nach Absatz 1 und Absatz 2 Satz 2 ist nach einer Frist von fünf Jahren ab dem Datum des Zeugnisses ausgeschlossen.

(6) [1]Die Aberkennung des akademischen Grades richtet sich nach § 36 Abs. 7 LHG.

§ 24 Einsicht in die Prüfungsakten

(1) [1]Nach Abschluss der Masterprüfung wird den Studierenden auf Antrag innerhalb eines Jahres Einsicht in das Prüfungsexemplar ihrer Masterarbeit, die darauf bezogenen Gutachten und in die Prüfungsprotokolle gewährt.

(2) [1]Für die Einsichtnahme in die schriftlichen Modulprüfungen, schriftlichen Modulteilprüfungen bzw. Prüfungsprotokolle gilt eine Frist von einem Monat nach Bekanntgabe des Prüfungsergebnisses.

(3) [1]Der/die Prüfende bestimmt Ort und Zeit der Einsichtnahme.

(4) [1]Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 25 Inkrafttreten, Übergangsvorschriften

(1) [1]Diese Studien- und Prüfungsordnung tritt am 01. Oktober 2021 in Kraft und gilt für

1. Studierende, die ihr Studium im Masterstudiengang Angewandte Geowissenschaften am KIT im ersten Fachsemester aufnehmen, sowie für

2. Studierende, die ihr Studium im Masterstudiengang Angewandte Geowissenschaften am KIT in einem höheren Fachsemester aufnehmen, sofern dieses Fachsemester nicht über dem Fachsemester liegt, das der erste Jahrgang nach Ziff. 1 erreicht.

(2) [1]Die Studien- und Prüfungsordnung des KIT für den Masterstudiengang Angewandte Geowissenschaften vom 03. März 2016 (Amtliche Bekanntmachung des KIT Nr. 10 vom 07. März 2016) behält Gültigkeit für

1. Studierende, die ihr Studium im Masterstudiengang Angewandte Geowissenschaften am KIT zuletzt im Sommersemester 2021 aufgenommen haben, sowie für

2. Studierende, die ihr Studium im Masterstudiengang Angewandte Geowissenschaften am KIT ab dem Wintersemester 2021/2022 in einem höheren Fachsemester aufnehmen, sofern das Fachsemester über dem liegt, das der erste Jahrgang nach Absatz 1 Ziff. 1 erreicht hat.

[2]Im Übrigen tritt sie außer Kraft.

(3) [1]Studierende, die auf Grundlage der Studien- und Prüfungsordnung für den Masterstudiengang Angewandte Geowissenschaften vom 03. März 2016 (Amtliche Bekanntmachung des KIT Nr. 10 vom 07. März 2016) ihr Studium am KIT aufgenommen haben, können Prüfungen auf Grundlage dieser Studien- und Prüfungsordnung letztmalig bis zum des Prüfungszeitraums des Sommersemesters 2026 ablegen.

(4) [1]Studierende, die auf Grundlage der Studien- und Prüfungsordnung für den Masterstudiengang Angewandte Geowissenschaften vom 03. März 2016 (Amtliche Bekanntmachung des KIT Nr. 10 vom 07. März 2016) ihr Studium am KIT aufgenommen haben, können auf Antrag ihr Studium nach der vorliegenden Studien- und Prüfungsordnung fortsetzen.

Karlsruhe, den 10. August 2021

gez. Prof. Dr.-Ing. Holger Hanselka
(Präsident)

Die Forschungsuniversität in der Helmholtz-Gemeinschaft

Karlsruher Institut für Technologie

Amtliche Bekanntmachung

2022 **Ausgegeben Karlsruhe, den 30. November 2022** **Nr. 64**

I n h a l t **Seite**

480

Satzung für den Zugang zu dem Masterstudiengang Angewandte Geowissenschaften am Karlsruher Institut für Technologie (KIT)

vom 30. November 2022

Aufgrund von § 10 Abs. 2 Ziff. 5 und § 20 Abs. 2 KIT-Gesetz (KITG) in der Fassung vom 14. Juli 2009 (GBl. S. 317 ff), zuletzt geändert durch Artikel 2 des Gesetzes zur Änderung des Landeshochschulgesetzes und anderer Gesetze vom 26. Oktober 2021 (GBl. S. 941), §§ 59 Abs. 1, 63 Abs. 2 Landeshochschulgesetz (LHG) in der Fassung vom 1. Januar 2005 (GBl. S. 1 ff), zuletzt geändert durch Artikel 7 der Zehnten Verordnung des Innenministeriums zur Anpassung des Landesrechts an die geänderten Geschäftsbereiche und Bezeichnungen der Ministerien (10. Anpassungsverordnung) vom 21. Dezember 2021 (GBl. 2022, S. 1, 2), hat der KIT-Senat am 21. November 2022 die nachstehende Satzung beschlossen:

§ 1

Anwendungsbereich

Die Satzung regelt den Zugang zu dem Masterstudiengang Angewandte Geowissenschaften am Karlsruher Institut für Technologie (im Folgenden: KIT).

§ 2

Fristen

(1) Eine Zulassung erfolgt sowohl zum Winter- als auch zum Sommersemester.

(2) Der Antrag auf Zulassung einschließlich aller erforderlichen Unterlagen muss

- für das **Wintersemester** bis zum **30. September eines Jahres**
- für das **Sommersemester** bis zum **31. März eines Jahres**

für ausländische Bewerber/innen, die Deutschen gemäß § 1 Abs. 2 HZVO nicht gleichgestellt sind,

1. für das **Wintersemester** bis zum **15. Juli eines Jahres**
2. für das **Sommersemester** bis zum **15. Januar eines Jahres**

beim KIT eingegangen sein.

§ 3

Form des Antrages

(1) [1]Die Form des Antrags richtet sich nach den allgemeinen für das Zulassungs- und Immatrikulationsverfahren geltenden Bestimmungen in der jeweils gültigen Zulassungs- und Immatrikulationsordnung des KIT.

(2) [1]Dem Antrag sind folgende Unterlagen beizufügen:

1. eine Kopie des Nachweises über den Bachelorabschluss oder gleichwertigen Abschluss gemäß § 5 Abs. 1 Nr. 1 samt Diploma Supplement und Transcript of Records (unter Angabe der erbrachten Leistungspunkte nach European Credit Transfer System - ECTS).

2. Nachweise der in § 5 Abs. 1 Nr. 2 genannten Mindestleistungen, aus denen die Studieninhalte hervorgehen,

3. eine Erklärung der Bewerberin/des Bewerbers darüber, ob sie/er in dem Masterstudiengang Angewandte Geowissenschaften oder einem verwandten Studiengang mit im wesentlichen gleichem Inhalt eine nach der Prüfungsordnung erforderliche Prüfung endgültig nicht bestanden hat oder der Prüfungsanspruch aus sonstigen Gründen nicht mehr besteht,

4. ein Nachweis über erforderliche Sprachkenntnisse gemäß § 5 Abs. 1 Nr. 4,

5. die in der jeweils gültigen Zulassungs- und Immatrikulationsordnung genannten weiteren Unterlagen.

[2]Das KIT kann verlangen, dass diese der Zugangsentscheidung zugrundeliegenden Dokumente bei der Einschreibung im Original vorzulegen sind.

(3) [1]Die Immatrikulation in den Masterstudiengang Angewandte Geowissenschaften kann auch beantragt werden, wenn bis zum Ablauf der Bewerbungsfrist im Sinne des § 2 der Bachelorabschluss noch nicht vorliegt und aufgrund des bisherigen Studienverlaufs, insbesondere der bisherigen Prüfungsleistungen zu erwarten ist, dass die/der Bewerber/in das Bachelorstudium rechtzeitig vor Beginn des Masterstudiengangs Angewandte Geowissenschaften abschließt.

[2]In diesem Fall sind die bis zu diesem Zeitpunkt erbrachten Studien- und Prüfungsleistungen im Rahmen der Zugangsentscheidung zu berücksichtigen. [3]Das spätere Ergebnis des Bachelorabschlusses bleibt unbeachtet. [4]Der Bewerbung ist eine Bescheinigung über die bis zum Ende der Bewerbungsfrist erbrachten Prüfungsleistungen (z.B. Notenauszug) beizulegen.

482

§ 4

Zugangskommission

(1) [1]Zur Vorbereitung der Zugangsentscheidung setzt die KIT-Fakultät für Bauingenieur-, Geo- und Umweltwissenschaften eine Zugangskommission ein, die aus mindestens zwei Personen des hauptberuflich tätigen wissenschaftlichen Personals besteht. [2]Ein/e studentische/r Vertreter/in kann mit beratender Stimme an den Zugangskommissionssitzungen teilnehmen. [3]Eines der Mitglieder der Zugangskommission führt den Vorsitz.

(2) [1]Die Zugangskommission berichtet dem KIT-Fakultätsrat nach Abschluss des Zugangsverfahrens über die gesammelten Erfahrungen und macht Vorschläge zur Verbesserung und Weiterentwicklung des Zugangsverfahrens.

§ 5

Zugangsvoraussetzungen

(1) [1]Voraussetzungen für den Zugang zum Masterstudiengang Angewandte Geowissenschaften sind:

1. ein überdurchschnittlicher Bachelorabschluss oder mindestens gleichwertiger Abschluss in dem Studiengang Angewandte Geowissenschaften oder einem Studiengang mit im Wesentlichen gleichem Inhalt an einer Universität, Fachhochschule oder Berufsakademie bzw. Dualen Hochschule oder an einer ausländischen Hochschule. Die Überdurchschnittlichkeit bemisst sich an der durchschnittlichen Abschlussnote von Bachelorstudierenden der Angewandten Geowissenschaften am KIT der jeweilig letzten drei Jahre. Das Studium muss im Rahmen einer mindestens dreijährigen Regelstudienzeit und mit einer Mindestanzahl von 180 ECTS-Punkten absolviert worden sein,

2. notwendige Mindestkenntnisse und Mindestleistungen in folgenden Bereichen:

   - Geologie: Leistungen im Umfang von mindestens 20 Leistungspunkten,
   - Physik und/oder Chemie: Leistungen im Umfang von mindestens 10 Leistungspunkten,
   - Mathematik: Leistungen im Umfang von mindestens 10 Leistungspunkten,
   - mindestens 30 Leistungspunkte aus weiteren Natur-, Geo- oder Ingenieurwissenschaften.

   Im Zweifelsfall entscheidet die Zugangs- und Auswahlkommission über die Anrechenbarkeit der von der Studienbewerberin oder dem Studienbewerber erbrachten Leistungen.

3. dass im Masterstudiengang Angewandte Geowissenschaften oder einem verwandten Studiengang mit im Wesentlichen gleichem Inhalt kein endgültiges Nichtbestehen einer nach der Prüfungsordnung erforderlichen Prüfung vorliegt und der Prüfungsanspruch auch aus sonstigen Gründen noch besteht.

4. der Nachweis von ausreichenden Kenntnissen
   a) der deutschen Sprache gemäß den Voraussetzungen der geltenden Zulassungs- und Immatrikulationsordnung des KIT oder
   b) der englischen Sprache, die mindestens dem Niveau B2 des Gemeinsamen Europäischen Referenzrahmens für Sprachen (GER) oder gleichwertig entsprechen, nachgewiesen beispielsweise durch einen der folgenden international anerkannten Tests:
      a. Test of English as Foreign Language (TOEFL) mit mindestens 90 Punkten im internet-based Test oder
      b. IELTS mit einem Gesamtergebnis von mindestens 6.5 und keiner Section unter 5.5 oder
      c. University of Cambridge Certificate in Advanced English (CAE) oder University of Cambridge Certificate of Proficiency in English (CPE)
      d. UNIcert mindestens Stufe II.

   Der Nachweis der Englischkenntnisse durch einen der o.g. Tests entfällt für Bewerberinnen und Bewerber mit
   a) einem Hochschulabschluss einer Hochschule mit Englisch als einziger Unterrichts- und Prüfungssprache; Englisch als einzige und offizielle Sprache des absolvierten Studiengangs muss im Diploma Supplement, im Transcript of Records oder in der Abschlussurkunde ausgewiesen sein; andere Bestätigungen über die Unterrichts- und Prüfungssprache werden nicht als Sprachnachweis akzeptiert;
   b) einem Abiturzeugnis, wobei die Fremdsprache über mindestens 5 Lernjahre bis zum Abschluss, der zum Hochschulzugang berechtigt, belegt worden sein muss und die Abschluss- oder Durchschnittsnote der letzten zwei Lernjahre des Sprachunterrichts mindestens der deutschen Note 4 (ausreichend) bzw. mindestens 5 Punkten entsprechen müssen.

   Kann der Sprachnachweis bis zum Bewerbungsschluss nicht vorgelegt werden, kann eine Zulassung unter dem Vorbehalt erteilt werden, dass einer der akzeptierten Nachweise der ausreichenden Englischkenntnisse spätestens bei der Einschreibung vorgelegt wird.

(2) [1]Über die Gleichwertigkeit des Bachelorabschlusses im Sinne von Absatz 1 Nr. 1 sowie die Festlegung der Studiengänge mit im Wesentlichen gleichem Inhalt im Sinne von Absatz 1 Nr. 3 entscheidet die Zugangskommission des Masterstudiengangs Angewandte Geowissenschaften im Benehmen mit dem Prüfungsausschuss des Masterstudiengangs Angewandte Geowissenschaften. [2]Bei der Anerkennung von ausländischen Abschlüssen sind die Empfehlungen der Kultusministerkonferenz sowie die Absprachen im Rahmen von Hochschulpartnerschaften zu beachten.

§ 6

Immatrikulationsentscheidung

(1) [1]Die Entscheidung über das Erfüllen der Zugangsvoraussetzungen und die Immatrikulation trifft die/der Präsident/in auf Vorschlag der Zugangskommission.

(2) [1]Die Immatrikulation ist zu versagen, wenn

a) die Bewerbungsunterlagen nicht fristgemäß im Sinne des § 2 oder nicht vollständig im Sinne des § 3 vorgelegt wurden,

b) die in § 5 geregelten Voraussetzungen nicht erfüllt sind,

c) im Masterstudiengang Angewandte Geowissenschaften oder in einem verwandten Studiengang mit im Wesentlichen gleichem Inhalt eine nach der Prüfungsordnung erforderliche Prüfung endgültig nicht bestanden wurde oder der Prüfungsanspruch aus sonstigen Gründen nicht mehr besteht (§ 60 Abs. 2 Nr. 2 LHG, § 9 Abs. 2 HZG).

[2]Im Fall des § 3 Abs. 3 kann die Immatrikulation unter dem Vorbehalt zugesichert werden, dass der endgültige Nachweis über den Bachelorabschluss *unverzüglich, spätestens bis zwei Monate nach Beginn des Semesters, für das die Immatrikulation* beantragt wurde, nachgereicht wird. [3]Wird der Nachweis nicht fristgerecht erbracht, erlischt die Zusicherung und eine Immatrikulation erfolgt nicht. [4]Hat die/der Bewerber/in die Fristüberschreitung nicht zu vertreten, hat sie/er dies gegenüber der Zugangskommission zu belegen und schriftlich nachzuweisen. [5]Die Zugangskommission kann im begründeten Einzelfall die Frist für das Nachreichen des endgültigen Zeugnisses verlängern.

(3) [1]Erfüllt die/der Bewerber/in die Zugangsvoraussetzungen nicht und/oder kann sie/er nicht immatrikuliert werden, wird ihr/ihm das Ergebnis des Zugangsverfahrens schriftlich mitgeteilt. [2]Der Bescheid ist zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen.

(4) [1]Über den Ablauf des Zugangsverfahrens ist eine Niederschrift anzufertigen.

(5) [1]Im Übrigen bleiben die allgemein für das Zulassungs- und Immatrikulationsverfahren geltenden Bestimmungen in der Zulassungs- und Immatrikulationsordnung des KIT unberührt.

§ 7

Inkrafttreten

[1]Diese Satzung tritt am Tage nach ihrer Bekanntmachung in den Amtlichen Bekanntmachungen des KIT in Kraft. [2]Sie gilt erstmals für das Bewerbungsverfahren zum Sommersemester 2023.

[3]Gleichzeitig tritt die Satzung für den Zugang zum Masterstudiengang Angewandte Geowissenschaften vom 23. November 2020 (Amtliche Bekanntmachungen des KIT Nr. 60 vom 24. November 2020), zuletzt geändert durch Satzung vom 03. März 2022 (Amtliche Bekanntmachung Nr. 12 vom 04. März 2022), außer Kraft.

Karlsruhe, 30. November 2022

gez. Prof. Dr. Holger Hanselka
(Präsident)