

**Module Plan for
M.Sc. In Geosciences curriculum
at the Ruhr-Universität Bochum
for the *Prüfungsordnung* 2019**

Version September 2023

Name of Module	Person responsible for the Module	CP	SWS	Semester	Language	Ergänzungs module (Complimentary module)
Applied geophysics I	Friederich	10		1, 3		
Geophysical inverse problems			3	WS	English	
Seismic and electromagnetic field methods			3	WS	English	E
Applied geophysics II	Renner	10		2		
Reservoir geophysics			3	SS	English	E
Rock physics			3	SS	English	E
Geophysical methods	Friederich / Renner	14		1, 3		
Field practical			6 days field 4 data analysis	WS	English	
Scientific programming			3	1 WS	English	E
Geophysical seminar			4	3 WS	English	
Geophysical practical	Friederich / Renner	5		1, 2, 3		
Geophysical practical				WS, SS	English	
Physic of the solid Earth I	Friederich	10		2		
Seismologic data analysis			3	SS	English	E
Seismic waves: theory and numerical modelling			3	SS	English	
Physics of the solid Earth II	Renner	10		1, 3		
Continuum mechanics			3	WS	English	E
Physic of earth materials			3	WS	English	E
Applied hydrogeology	Hachenberg	9		2, 3		
Fissured rock hydrogeology			2	SS	English	
Climate change and water resources			2	WS	English	E
Well construction			2	SS	English	
Applied geothermal energy	Wohnlich	8		1, 2		
Shallow geothermal energy			2	WS	English	E
Deep geothermal energy			3	SS	English	E
Groundwater hydraulics	Heinze	12		1		
Introduction to groundwater hydraulics			4	WS	English	E
Hydraulic groundwater modelling			4	WS	English	
Hydrochemistry	Licha	12		1		
Inorganic hydrochemistry			4	WS	English	
Organic hydrochemistry			4	WS	English	

Hydrogeochemical methods I	Hachenberg	6		1		
Isotope hydrogeochemistry (lecture)			2	WS	English	
Isotope hydrogeochemistry (exercise)			2	WS	English	
Hydrogeochemical methods II	Hachenberg	9		3		
Environmental forensics and tracer development			2	WS	English	E
Hydrogeochemical modelling			4	WS	English	
Scientific project in Hydrogeochemistry/Hydrogeology	Warner, Heinze	10		2		
Scientific soft skills			2	SS	English	
Project work			1	SS	English	
Instrumental environmental analysis	Warner	6		3		
Basics in Instrumental Environmental Analysis (Lecture)			2	WS	English	
Environmental Sampling and Analysis (Lab Course)			2	WS	English	
Geothermal Drilling Engineering and Subsurface Technologies	Licha (Lehrtransfer IEG)	5		3, 4		
Geothermal Drilling Engineering and Subsurface Technologies			5	WS	English	
Wasser im Wandel: Eine postindustrielle Gewässergeschichte des Ruhrgebiets	Warner	10		1	Deutsch	
Field course in applied geology	Schreuer	7		annual		
Field course in applied geology (Europe, South America)			14 days annually		English	
Hydrogeological field methods	Wohnlich, Heinze	12		2		
Tracer techniques in hydrogeology			3	SS	English	
Hydrogeological field camp			3	SS	English	E
3x 1 day field trips			2	SS	English	E
Siedlungswasserwirtschaft	Licha (Lehrtransfer Bauing.)	5		2		
Siedlungswasserwirtschaft			3	SS	German	
Earthquake processes	Harrington	6		1		
Earthquake seismology and the seismic cycle			4	WS	English	
Earthquake seminar and data analysis	Harrington	9		1, 2, 3, 4		
Induced seismicity seminar			2	SS	English	E
Fault transition zones			2	WS	English	
Seismic data and time series analyses			2	WS	English	
Seismotectonics and Seismic Hazard	Harrington / Verdecchia	6		1		
Seismotectonic and Seismic Hazard			4	SS	English	
Geology and geohazards in an active subduction zone	Harrington	5		SS		
Geology and geohazards in an active subduction zone			3		English	
Measuring Earth surface motions with InSAR and GNSS	Bedford, Peña	6		SS		
Measuring Earth surface motions with InSAR and GNSS			4		Englisch	

Grundlagen des Geoingenieurwesens	Backers	6				
Grundlagen der Ingenieurgeologie			2	WS	German	
Darstellen und Analysieren geotechnischer Informationen			2	WS	German	
Rock mass and stress field	Backers / Duda	6		1		
Stress field and rock mass behaviour			2	WS	English	E
Stress field modelling and simulation			0,5	WS	English	E
Geological engineering research project			2	WS	English	E
Rock mass mechanics and rock engineering	Duda	6		2		
Rock mass mechanics			2	SS	English	
Rock engineering			2	SS	English	
Baugrunderkundung und -dokumentation	Backers	6		2		
Baugrunderkundung und -modellierung			2	SS	German	
Ingenieurgeologische Kartierung			5 Days	WS	German	
Rock mass characterisation (Baugrundcharakterisierung Fels)	Backers	5		2, 3		
Rock mass mapping			5 Tage	SS	Englisch	
Rock mass lab			2	WS	Englisch	
Baugrundcharakterisierung Boden	Backers, Eickhoff	5		2, 3		
Bodenmechanisches und hydraulisches Laborpraktikum			2	WS	German	
Lockergesteinskartierung und hydrogeologisches Feldpraktikum			5 Tage	SS	German	
Grundbau- und Bodenmechanik	Backers (Lehrtransfer Bauing.)	6				
Grundbau			3	WS	German	
Bodenmechanik			3	WS	German	
Geotechnische Herausforderungen des Anthropozäns			0,5	SS	German	
Geomechanik	Backers	10		3		
Geomechanik und Geotechnik komplexer Systeme			2	WS	German	
geomechanische numerische Simulation			1	WS	German	
Geotechnisches Projekt			1	WS	German	
Geologie des Pleisto-, Holo- und Anthropozäns	Backers	5		1		
Quartärgeologie			2	WS	German	
Quartärgeologie und geogene Risiken			2 Tage	WS	German	
Geological engineering for subsurface energy systems (from 2024)	Backers	10		3		
Reservoir geomechanics			2		German	
Simulation of geological systems			1		German	
Subsurface energy utilisation project			1		German	
Baubetrieb und Management	Backers (Lehrtransfer Bauing.)	9				
Bauwirtschaft und Bauverträge				WS	German	
Projektmanagement				WS	German	
Betriebswirtschaft im Bauwesen				WS	German	

Umweltgeotechnik	Backers (Lehrtransfer Bauing.)	6				
Umweltgeotechnik - Deponietechnik				SS	German	
Umgang mit Altlasten				SS	German	
Altbergbau				SS	German	
Seminar Altbergbau				SS	German	
Arbeitsicherheit I / Baustellenorganisation	Backers (Lehrtransfer Bauing.)	2				
Arbeitsicherheit I / Baustellenorganisation				SS	German	
Boden- und Vegetationsökologie	Backers (Lehrtransfer Geogr. Institut)	6				
Boden- und Vegetationsökologie I: Bodenschutz				WS	German	
Boden- und Vegetationsökologie II: Vegetation				WS	German	
BWL für Ingenieure	Backers (Lehrtransfer Bauing.)	4				
BWL für Ingenieure				SS	German	
Kristallisation	Schreuer/ Münchhallen	10		2, 3		
Mineralization in geothermal systems			4	WS	English	
Synthetische Kristalle			2	SS	German	
Kristallphysik	Schreuer/ Münchhallen	10		1, 2		
Kristallphysik			2	WS	German	E
Physikalische Charakterisierung			4	SS	German	
Kristallchemie	Schreuer/ Münchhallen	10		2, 3		
Kristallchemie			2	WS	German	E
Realstrukturbau und Phasenumwandlung			2	SS	German	
Edelsteinkunde			2	SS	German	E
Festkörperspektroskopie	Fechtelkord	10		2, 3		
Festkörperspektroskopie I: NMR Spek.			2	SS	German	
Festkörperspektroskopie II: Allg. Spek.			2	WS	German	
Laborübung zu FK I			2	SS	German	
Laborübung zu FK II			2	WS	German	
Strukturbestimmung	NN	10		2, 3		
Strukturbestimmung			2	SS	German	
Röntgenbeugung Einkristalldiffraktometrie			3	WS	German	
Röntgenbeugung Pulverdiffraktometrie			3	WS	German	
Analytic methods in rock analysis	Fockenberg	5		2, 3		
Methods of rock analysis			2	SS	English	
Practicals on rock analysis			2	WS	English	
Electron beam microanalysis	Hoffmann / Jöns	6		2		
Electron beam microanalysis (Lecture)			2	SS	English	
Electron beam microanalysis (Practical exercises)			2	SS	English	

Igneous petrology	Chakraborty	10		1		
Petrology of igneous rocks			2	WS	English	
Thin section exercises with igneous rocks			2	WS	English	
Numerical exercises with data from igneous rocks			2	WS	English	
Kinetics	Chakraborty	10		3		
Principles of chemical kinetics			2	WS	English	
Diffusion chronometry			2	WS	English	
Kinetic modelling			2	WS	English	
Metamorphic petrology	Schertl / Jöns / Dziggel	12		2		
Petrology of metamorphic rocks			2	SS	English	
Thin section exercises with metamorphic rocks			2	SS	English	
Numerical exercises with data from metamorphic rocks			2	SS	English	
THERMOCALC course			1	SS	English	
Thermodynamics	Chakraborty	10		2		
Principles of elementary thermodynamics			4	SS	English	
Solution phase thermodynamics			2	SS	English	
Mantle petrology	Beyer	10		3, 4		
Lecture + Paper seminar - Petrology of the deep Earth			3	WS	English	
Lab course + Lecture – Experimental Petrology: The Earth in the laboratory			5	SS	English	
High-temperature geochemistry	Fonseca	10				
High-temperature geochemistry			3	SS	English	
Practical			3	SS	English	
Field course in tectonics and resources	Dziggel	10		2, 3		
Pre-field course seminar			1	SS	English	
Field course			10 days		English	
Economic geology II	Dziggel	10		1, 2		
Metallic mineral deposits			2	WS	English	
Non-metallic mineral deposits			1	WS	English	
Research project on ore deposits			3	SS	English	
Geochemical analyses by laser ablation-ICP-mass spectrometry	Schuth	5		3		
Methods of LA-ICPMS			2	WS	English	
Practical course in LA-ICPMS			2	WS	English	
Economic geology I	Podlaha	10		1, 2		
Petroleum geology I			2	WS	English	
Petroleum geology II			2	SS	English	
Field trip			1 day	SS	English	
Advanced Sedimentology	Immenhauser	10		1, 2		
Sedimentary systems I			3	WS	English	
Sedimentary systems II			4	SS	English	
Biomineralization			3	WS, every 2nd year	English	E

Sedimentary geochemistry	Riechermann	10		1, 3		
Isotope geochemistry Principles and applications			4	WS	German/ English	E
Laboratory course: Isotope geochemistry			4	WS	German/ English	E
Sedimentäre Geologie im Gelände	Immenhauser Schreuer	8				
Geländeübungen in wechselnden Gebieten			10 Tage		German	
Structural geology	Pascal	10		1, 2		
Lectures, seminars, exercises in structural geology			2	WS	English	E
Special methods in structural geology			2	WS	English	E
Structural geology field camp			8 T	SS	English	E
Courses for the Complementary module		15				
3x 1 day field trips	Warner/Heinze	3	2	SS	English	E
Anwendung der NMR-Spektroskopie in der mineralogischen und geowissenschaftlichen Forschung	Fechtelkord	3	3	SS	German	E
Angewandte Karbonatdiagenese	Müller	3	3	WS	German	E
Climate change and water resources	Bender	2	2	WS	English	E
Continuum mechanics	Renner	5	3	WS	English	E
Deep geothermal energy	Renner	5	3	SS	English	E
Digital rock physics	Saenger (Hochschule Bochum)	6	4	SS	English	E
Edelsteinkunde	Schreuer/ Münchhalfen	3	2	SS	German	E
Einführung in den Bau von Schächten	Sniehotta	3	2	WS	German	E
Environmental forensics and tracer development	Licha	3	2	WS	English	E
Evaporite und deren Nutzung	Gilhaus	2	2	WS	German	E
Exkursion Argentinien	Wohnlich/Schreuer	7	12 Tage	WS	English	E
Field course structural geology	Pascal	3	8 days	SS	English	E
Geländeübungen in wechselnden Gebieten	Immenhauser/ Schreuer	8	8 Tage	SS	German	E
Geländeübung Ostwestfalen	Stritzke	2	2	SS	German	E
Introduction to Groundwater hydraulic	Heinze	6	4	WS	German	E
Hauptseminar Kristallographie	Schreuer	2	2	WS	English	E
Hydrogeochemical modelling	Hachenberg	6	4	WS	English	E
Hydrogeological field camp	Wohnlich/Heinze	5	3	SS	English	E
Induced seismicity seminar	Harrington	3	2	SS	English	E
Informatik I	ET/IT-Fak	5		WS	German	E
Informatik II	ET/IT-Fak	5		SS	German	E
Introduction to Matlab	Harrington	6	4	SS	English	E
Lectures, seminar, exercises in structural geology	Pascal	4		WS	English	E
Marine Geophysik	Lehrauftrag	3		WS	German	E
Mathematische Methoden der Physik I	Physik-Fak	4		WS	German	E
Mathematische Methoden der Physik II	Physik-Fak	4		SS	German	E
Physic of earth materials	Renner	5	3	WS alternating	English	E
Praxistage Felsbau	Duda	1	1	WS	German	E
Professional career opportunities in water sciences	Warner	3	3	WS	English	E

Reservoir geophysics	Renner	5	3	SS	English	E
Rock physics	Renner	5	3	WS	English	E
Scientific programming	Friederich	5	3	1 WS	English	E
Sedimentary systems I	Immenhauser	3	3	WS	English	E
Seismic and electromagnetic field methods	Friederich	5	5	WS	English	E
Seismologic data analysis	Fischer	5	3	SS	English	E
Isotope geochemistry Principles and applications	Riechelmann	6	4	WS	German/ English	E
Laboratory course: Isotope geochemistry	Riechelmann	4	4	WS	German/ English	E
Shallow geothermal energy	Wohnlich	3	2	WS	English	E
Special methods in structural geology	Pascal	3		WS	English	E
Spezielle Petrologie der Magmatite und Metamorphite	Schertl	4	2	WS	German	E
Stress field and rock mass behaviour behaviour	Backers		2	WS	English	E
Stress field modelling and simulation			1			
Anwendungen der NMR-Spektroskopie in der mineralogischen und geowissenschaftlichen Forschung (short course)	Fechtelkord	3	3	SS	German	E
Tektonophysik	Renner	3		WS	German	E
Underground storage	Gillhaus	2	2	SS	English	E
Wasser im Wandel	Heimgartner/Warner Fak. Philologie	10	2	WS/SS	German	E
Well logging rudiments I	Renner/Rübel	2	2	WS	English	E
Master Thesis		30		4		