

**Module Plan for  
M.Sc. "Geosciences"  
Ruhr-Universität Bochum  
Prüfungsordnung 2019 with Addendum 2025  
Version February 2026**

Module name and courses within the module	Person responsible for the Module	CP	SWS (weekly hours)	Semester	Language of instruction	Comment (please also consult the handbook for further pre-requisites and information)
<b>Analytical methods in Earth Sciences</b>						
<b>Electron beam microanalysis</b>	Hoffmann / Jöns	6		2		
Electron beam microanalysis (Lecture)			2	SS	English	
Electron beam microanalysis (Practical exercises)			2	SS	English	Block course in September; passed exam is pre-requisite
<b>Geochemical analyses by laser ablation-ICP-mass spectrometry</b>	Schuth	5		3		
Methods of LA-ICPMS (lecture)			2	WS	English	Lecture can be accredited for Complementary module (3 CP); Practical course registration only with passed exam
Practical course in LA-ICPMS			2	WS	English	
<b>Engineering Geology and Rock Mechanics</b>						
<b>Grundlagen des Geoingenieurwesens</b>	Backers	6				
Grundlagen der Ingenieurgeologie			2	WS	German	
Darstellen und Analysieren geotechnischer Informationen			2	WS	German	
<b>Rock mass stress fields</b>	Backers / Bücken			1		
Stress field and rock mass behaviour			2	WS	English	
Stress field modelling and simulation			1	WS	English	
<b>Rock mass mechanics and rock engineering</b>	Duda	5		2		
Rock mass mechanics			2	SS	English	
Rock engineering			2	SS	English	
<b>Rock mass characterisation (Baugrundcharakterisierung Fels)</b>	Backers	5		2, 3		
Rock mass mapping			5 days	SS	Englisch/ German	
Rock mass lab			2	WS	Englisch/ German	
<b>Baugrundcharakterisierung Boden</b>	Backers, Eickhoff	5		2, 3		
Bodenmechanisches und hydraulisches Laborpraktikum			2	WS	German	
Lockergesteinskartierung und hydrogeologisches Feldpraktikum			5 Tage	SS	German	
<b>Geomechanik</b>	Backers	10		3		
Geomechanik und Geotechnik komplexer Systeme			2	WS	German	
geomechanische numerische Simulation			1	WS	German	
Geotechnisches Projekt			1	WS	German	
<b>Engineering geological digital mapping strategies</b>	Duda	5		1		
UAV License				WS	Englisch/ German	
Digitally supported engineering geological mapping				WS	Englisch/ German	
<b>Digital mapping research project</b>	Duda	5		2		
Digital mapping research project				SS	Englisch/ German	
Engineering geology colloquium				SS	Englisch/ German	
<b>Geological engineering for subsurface energy systems</b>	Backers	10		3		
Reservoir geomechanics			2		English	
Simulation of geological systems			1		English	
Subsurface energy utilisation project			1		English	

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<b>Grundbau- und Bodenmechanik</b>	<b>Backers***</b>	<b>9</b>				
Grundbau			2	WS	German	
Bodenmechanik			3	WS	German	
Geotechnische Herausforderungen des Anthropozäns			0,5	SS	German	
<b>Baubetrieb und Management</b>	<b>Backers**</b>	<b>9</b>				
Bauwirtschaft und Bauverträge				WS	German	
Projektmanagement				WS	German	
Betriebswirtschaft im Bauwesen				WS	German	
<b>Umweltgeotechnik</b>	<b>Backers**</b>	<b>6</b>				
Umweltgeotechnik - Deponietechnik				SS	German	
Umgang mit Altlasten				SS	German	
Altbergbau				SS	German	
Seminar Altbergbau				SS	German	
<b>Arbeitssicherheit I / Baustellenorganisation</b>	<b>Backers**</b>	<b>2</b>				
Arbeitssicherheit I / Baustellenorganisation				SS	German	
<b>BWL für Ingenieure</b>	<b>Backers***</b>	<b>4</b>				
BWL für Ingenieure				SS	German	
<b>Boden- und Vegetationsökologie</b>	<b>Backers****</b>	<b>6</b>				
Boden- und Vegetationsökologie I: Bodenschutz				WS	German	
Boden- und Vegetationsökologie II: Vegetation				WS	German	
<b>Crystallography</b>						
<b>Crystal chemistry</b>	<b>Schreuer/ Münchhalfen</b>	<b>10</b>		<b>2, 3</b>		
Crystal chemistry			2	WS	English	
Realstrukturbau und Phasenumwandlung			2	SS	English	
Gemology			2	SS	English	
<b>Crystallisation</b>	<b>Schreuer/ Münchhalfen</b>	<b>10</b>		<b>2, 3</b>		
Mineralization in geothermal systems			4	WS	English	
Synthetic crystals			2	SS	English	
<b>Crystal physics</b>	<b>Schreuer/ Münchhalfen</b>	<b>10</b>		<b>1, 2</b>		
Crystal physics			2	WS	English	
Physical characterization			4	SS	English	
<b>Festkörperspektroskopie</b>	<b>Fechtelkord</b>	<b>10</b>		<b>2, 3</b>		
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	
<b>Crystal structure analysis</b>	<b>Yusenko</b>	<b>10</b>		<b>2, 3</b>		
Crystal structure analysis (Lectures)			2	SS	English	
Single crystal X-ray diffraction: (Practical)			3	WS	English	
Powder X-ray diffraction: (Practical)			3	WS	English	

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<b>Geomorphology and Geohazards</b>						
<b>Geomorphology and geohazards</b>	Kranz	10		2,3		
Earth surface processes and environmental change			2	SS	English	
Geohazards: types, causes and strategies			2	WS	English	Pre-requisite: SS course attended
Field course on geomorphology and geohazards			2 days+2 block course	ab WS 26/27	English	Passed exam from SS is pre-requisite
<b>Quaternary geochronology</b>	Kranz	5		2		
Quaternary geochronology			2	SS	English	
Quaternary geochronology (exercises)				SS	English	
<b>Computational analyses in tectonic geomorphology</b>	Prince	5		2		
Lecture			1		English	
Exercise			1		English	
<b>Geophysics</b>						
<b>Applied geophysics</b>	Renner	10		2		
Reservoir geophysics			3	SS	English	
Rock physics			3	SS	English	
<b>Geophysical field practical</b>	Bedford/Harrington	5		1		
Field exercise			6 days	SS	English	
Data analyses			4 days	SS	English	
<b>Geophysical practical</b>	Bedford, Harrington, Renner	5		2, 3		
Geophysical practical				WS, SS	English	
<b>Physics of the solid Earth</b>	Renner	10		1, 3		
Continuum mechanics			3	WS	English	
Physic of Earth materials			3	WS	English	
<b>Earthquake processes</b>	Harrington	6				
Earthquake seismology and the seismic cycle			4	SS	English	
<b>Geophysical seminar (ab WS25/26)</b>	Bedford, Harrington, Renner	6		1,2		
Deformation mechanisms and tectonics of subduction zones			2	WS	English	
Induced and triggered seismicity seminar			2	SS	English	
<b>Geology and Geohazards in an active Subduction zone</b>	Harrington/Bocchini	5		1		Includes a 7-day field exercise in Crete. Please refer to the handbook for estimated costs and further pre-requisites
Geology and Geohazards in an active Subduction zone			3	SS	English	
<b>Module name and courses within the module</b>	<b>Person responsible for the Module</b>	<b>CP</b>	<b>SWS (weekly hours)</b>	<b>Semester</b>	<b>Language of instruction</b>	<b>Comment (please also consult the handbook for further pre-requisites and information)</b>
<b>Seismotectonics and Seismic Hazard</b>	Harrington/Essing	6		1		
Seismotectonic and Seismic Hazard			4	WS	English	
<b>Python programming for Geosciences</b>	Roth, Essing	10		1, 2		
Introduction to programming in Python		5	3	WS	English	
Advanced Programming in Python		5	3	SS	English	
<b>Introduction to Programming in Matlab</b>	Harrington	6		2		
Lecture and exercise			4	SS	English	
<b>Measuring Earth surface motions with InSAR and GNSS</b>	Bedford + Q-Stelle	6		1		
Lecture, exercise and seminar			4	WS	English	

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<b>Optimization methods for geophysics</b>	<b>Bedford + Q-Stelle</b>	<b>6</b>		<b>2</b>		
Optimization methods for geophysics			4	SS	English	
<b>Gravity and Magnetism/Potential fields</b>	<b>Fischer</b>	<b>5</b>		<b>2</b>		
Gravity and Magnetism/Potential fields			3	SS	English	
<b>Geothermal energy</b>						
<b>Geothermal Drilling Engineering and Subsurface Technologies</b>	<b>Reinsch (IEG)*</b>	<b>5</b>		<b>3, 4</b>		
Geothermal Drilling Engineering and Subsurface Technologies			5	WS	English	
<b>Geothermal energy systems</b>	<b>Reinsch (IEG)*</b>	<b>5</b>				
Geothermal energy systems			5	SS	Englisch	
<b>Applied geothermal energy</b>	<b>Reinsch / Renner</b>	<b>8</b>		<b>1, 2</b>		
Shallow geothermal energy			2	WS	English	Block course at the end of the WS
Deep geothermal energy			3	SS	English	
<b>Hydrogeology and Environmental Geology</b>						
<b>Groundwater hydraulics</b>	<b>Heinze</b>	<b>12</b>		<b>1</b>		
Introduction to groundwater hydraulics			4	WS	English	
Hydraulic groundwater modelling			4	WS	English	
<b>Field course in applied geology</b>	<b>Schreuer</b>	<b>6</b>		<b>annual</b>		
Field course in applied geology (Europe, South America)			14 days		English	
<b>Hydrogeological field methods</b>	<b>Heinze</b>	<b>6</b>		<b>2</b>		
Hydrogeological field exercises			4 days			Pre-requisite: passed modules "Hydrochemistry" and "Groundwater hydraulics"
Analysis of measurement results (Seminar)			2			
<b>Hydrogeochemical methods I</b>	<b>Hachenberg</b>	<b>6</b>		<b>1</b>		
Isotope hydrogeochemistry (lecture)			2	WS	English	
Isotope hydrogeochemistry (exercise)			2	WS	English	
<b>Hydrogeochemical methods II</b>	<b>Hachenberg/Licha</b>	<b>9</b>		<b>3</b>		
Environmental forensics and tracer development			2	WS	English	
Hydrogeochemical modelling			4	WS	English	
<b>Environmental sciences</b>	<b>Hachenberg</b>	<b>6</b>		<b>3</b>		
Climate change and water resources			2		English	Block course in February
Toxic trace elements in groundwater			2		English	
<b>Hydrochemistry</b>	<b>Licha</b>	<b>12</b>		<b>1</b>		
Inorganic hydrochemistry			4	WS	English	
Organic hydrochemistry			4	WS	English	
<b>Siedlungswasserwirtschaft</b>	<b>Licha/Import Civil Engineering</b>	<b>5</b>		<b>2</b>		
Siedlungswasserwirtschaft			3	SS	German	
<b>Petrology and Geochemistry</b>						
<b>Basics in Petrology</b>	<b>Fonseca</b>	<b>6</b>		<b>1</b>		
Mineralogy (lecture)			2	WS	English	
Optical mineralogy (Exercise)			2	WS	English	
<b>Igneous petrology</b>	<b>Bissbort</b>	<b>10</b>		<b>1, 3</b>		
Petrology of igneous rocks			2	WS	English	Pre-requisite is passed module "Basics in Petrology" or BSc module "Baumaterial der Erde"
Thin section exercises with igneous rocks			2	WS	English	
Numerical exercises with data from igneous rocks			2	WS	English	

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<b>Metamorphic petrology</b>	<b>Jöns/Dziggel</b>	<b>12</b>		<b>2</b>		
Petrology of metamorphic rocks			2	SS	English	Pre-requisites is passed module "Basics in Petrology" or BSc module "Baumaterial der Erde"
Thin section exercises with metamorphic rocks			2	SS	English	
Numerical exercises with data from metamorphic rocks			2	SS	English	
THERMOCALC course			1	SS	English	
<b>Thermodynamics for earth scientists</b>	<b>Dohmen</b>	<b>6</b>		<b>2</b>		
Thermodynamics for earth scientists			4	SS	English	Takes place every year
<b>High-temperature geochemistry</b>	<b>Fonseca</b>	<b>6</b>		<b>2</b>		
High-temperature geochemistry			2	SS	English	Pre-requisite is passed BSc course "Geochemistry"
Practical			2	SS	English	
<b>Sedimentology/Sedimentary Geochemistry</b>						
<b>Sedimentary geochemistry</b>	<b>Riechelmann</b>	<b>10</b>		<b>1, 3</b>		
Isotope geochemistry Principles and applications			4	WS	English	
Laboratory course: Isotope geochemistry			4	WS	English	Block course in February/March; passed exam from lecture is pre-requisite
<b>Tectonics and Resources</b>						
<b>Field course in tectonics and resources</b>	<b>Dziggel, Hueck</b>	<b>10</b>		<b>2, 3</b>		
Pre-field course seminar			1	SS	English	
Field course			10 days		English	
<b>Economic geology II</b>	<b>Dziggel, Hueck</b>	<b>10</b>		<b>1, 2</b>		
Metallic mineral deposits			2	WS	English	
Non-metallic mineral deposits			1	WS	English	
Research project on ore deposits			3	SS	English	
<b>Economic geology I</b>	<b>Podlaha</b>	<b>10</b>		<b>1, 2</b>		
Petroleum geology I			2	WS	English	
Petroleum geology II			2	SS	English	
Field trip			1 day	SS	English	
<b>Structural geology</b>	<b>Pascal</b>	<b>10</b>		<b>1, 2</b>		
Lectures, seminars, exercises in structural geology			2	WS	English	
Special methods in structural geology			2	WS	English	
Structural geology field camp			8 days	SS	English	
<b>Courses for the Complementary module (max. 15 CP)</b>						
Advanced Programming in Python	<b>Roth, Essing</b>	<b>5</b>	<b>3</b>	<b>SS</b>	<b>English</b>	
Anwendung der NMR-Spektroskopie in der mineralogischen und geowissenschaftlichen Forschung	<b>Fechtelkord</b>	<b>3</b>	<b>3</b>	<b>SS</b>	<b>German</b>	
Anwendungen der NMR-Spektroskopie in der mineralogischen und geowissenschaftlichen Forschung (short course)	<b>Fechtelkord</b>	<b>3</b>	<b>3</b>	<b>SS</b>	<b>German</b>	
Climate change and water resources	<b>Hachenberg</b>	<b>3</b>	<b>2</b>	<b>WS</b>	<b>English</b>	
Computational wave propagation	<b>Saenger (Hochschule Bo)</b>	<b>6</b>	<b>4</b>	<b>SS</b>	<b>English</b>	
Continuum mechanics	<b>Renner</b>	<b>5</b>	<b>3</b>	<b>WS</b>	<b>English</b>	
Crystal chemistry	<b>Schreuer/Münchhaffen</b>	<b>3</b>	<b>2</b>	<b>WS</b>	<b>English</b>	
Crystal physics	<b>Schreuer</b>	<b>4</b>	<b>2</b>	<b>WS</b>	<b>English</b>	
Crystal structure analysis	<b>Yusenko</b>	<b>2</b>	<b>2</b>	<b>SS</b>	<b>English</b>	

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Deep geothermal energy	Renner	5	3	SS	English	
Diffusion chronometry	Dohmen	3	2	SS	English	Block course
Earth surface processes and environmental change	Kranz	3	2	SS	English	
Environmental forensics and tracer development	Licha	3	2	WS	English	
Evaporite und deren Nutzung	Gillhaus	2	2	WS	German	
Field course structural geology	Pascal	3	8 days	SS	English	
Gemology	Schreuer/ Münchhalfen	3	2	SS	English	
Geohazards: types, causes and strategies	Kranz	4	2	WS	English	
Hydrogeochemical modelling	Hachenberg	6	4	WS	English	
Hydrogeological / geothermal excursion Argentina	Schreuer	6	14 days	WS	English	
Introduction to groundwater hydraulics	Heinze	6	4	WS	German	
Introduction to Python programming	Roth, Essing	5	3	WS	English	
Isotope geochemistry Principles and applications	Riechelmann	6	4	WS	German/ English	
Lectures, seminar, exercises in structural geology	Pascal	4	2	WS	English	
Main seminar crystallography	Schreuer	2	2	WS	English	
Mathematische Methoden der Physik I	Physik-Fak	5		WS	German	
Mathematische Methoden der Physik II	Physik-Fak	5		SS	German	
Methods of LA-ICPMS (lecture)	Schuth	3	2	WS	English	
Mineralization in geothermal systems	Schreuer	7	4	WS	English	
Physic of Earth materials	Renner	5	3	WS alternating	English	
Praxistage Felsbau	Duda	1	1	WS	German	
Realstrukturbau und Phasenumwandlung	Schreuer/Münchhalfen	4	2	SS	English	
Reservoir geophysics	Renner	5	3	SS	English	
Rock physics	Renner	5	3	WS	English	
Shallow geothermal energy	Reinsch	3	2	WS	English	
Special methods in structural geology	Pascal	3	2	WS	English	
Synthetic crystals	Schreuer/Münchhalfen	3	2	SS	German	
Underground storage	Gillhaus	2	2	SS	English	
Well logging rudiments	Reinsch	4	2	SS	English	Block course end of SS (September)

<p>* Sign in in E-Campus Institut GMG Moduledescription: <a href="https://www.fbi.ruhr-uni-bochum.de/fbi/mam/content/downloads/20231030modulhandbuch_msc_sse.pdf">https://www.fbi.ruhr-uni-bochum.de/fbi/mam/content/downloads/20231030modulhandbuch_msc_sse.pdf</a></p>
<p>** Sign in at the Institute of Civil Engineering Moduledescription: <a href="https://www.fbi.ruhr-uni-bochum.de/fbi/mam/content/downloads/mh_msc_bauingenieurwesen_wise_2324.pdf">https://www.fbi.ruhr-uni-bochum.de/fbi/mam/content/downloads/mh_msc_bauingenieurwesen_wise_2324.pdf</a></p>
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