

Master of Science "Crystalline Materials"

Modules and Courses

Module #	Module Name	Course #	Course Name	Key Words for Course Content	h/wk	d	Type	ECTS Points WS1	ECTS Points SS2	ECTS Points WS3	ECTS Points Total	Exam Mode	Instructors
CRYS 41	Crystal Growth I	CRYS 411	Crystal Growth Technology	Melt, Solution, and Vapor Phase Growth	2		L	3			3	Written Exam	Cröll
		CRYS 412	Crystal Growth Methods I	Float-Zone, Solution Growth; Vapor phase	2		P	3			3	Marked Report	Cröll, Danilewsky, Fiederle
CRYS 42	Advanced Crystallography	CRYS 421	Crystallographic Methodology	Symmetry; Color Groups; Quasi Crystals	2		L+P	3			3	Written Exam	Cröll, Keller, Danilewsky
		CRYS 422	Space Groups and Crystal Structures	Space Groups 2D and 3D; Crystal Chemistry	2		L+P	3			3	Written Exam	Cröll, Keller
GEOL 42	Computer Methods	GEOL 421	Computer Methods	Computer-Based Data Analysis and Visualization; Methods for Modeling Geological Systems; Case Studies	4		L+P	6		6	6	Marked Report	Henk, Tipper, Ulmer
GEOL 43	Analytical Methods	GEOL 431	Physical Analytical Procedures	X-Ray Fluorescence; X-Ray Diffraction; Scanning Electron Microscopy; Electron Probe Microanalysis	2		L+P	3		3	3	Marked Report	Majzlan, Müller-Sigmund, Danilewsky, Lab Personnel
		GEOL 432	Chemical Analytical Procedures	Atomic Absorption Spectroscopy; Ion Chromatography; Infrared Spectroscopy; Wet Chemistry	2		L+P	3		3	3	Marked Report	Majzlan, NN, Lab Personnel
CRYS 51	Advanced Analytical Methods	CRYS 511	High-Resolution Spectroscopy	XPS; SIMS; AGS; XAS; EXAFS; XANES; Mössbauer	2		L+P		3		3	Written Exam	Keller, Cröll, Danilewsky, Fiederle
		CRYS 512	X-Ray Diffraction by Crystals	Structure Determination	2		L+P		3		3	Written Exam	Keller
CRYS 52	Crystal Growth II	CRYS 521	Growth Kinetics	Facets; Type-II Striations	1		L		1.5		1.5	Written Exam	Danilewsky
		CRYS 522	Crystal Growth Methods II	Bridgman Growth; HT-Solution Growth	1		P		1.5		1.5	Marked Report	Cröll, Fiederle, Danilewsky
		CRYS 523	Crystal Preparation	Orienting; Cutting; Etching; NDIC	1		P		1.5		1.5	Marked Report	Cröll, Fiederle, Danilewsky
		CRYS 524	Epitaxy	Methods of Epitaxial Deposition	1		L		1.5		1.5	Written Exam	Fiederle

CRYS 53	Applied Materials I	CRYS 531	Crystal Physics	Tensors; NL Optics; Piezo-, Pyro-, Ferroelectric Effects	2		L+P		3		3	Written Exam	Cröll, Danilewsky
		CRYS 532	Semiconductors	Band Structures; Impurities and Dopants	2		L+P		3		3	Written Exam	Fiederle
CRYS 54	Defects	CRYS 541	Crystal Defects	Point Defects; Dislocations; Stacking Faults etc.	2		L+P		3		3	Written Exam	Cröll, Danilewsky
		CRYS 542	Electrical and Optical Characterization	Resistivity; Photoluminescence; DLTS; etc.	2		L+P		3		3	Written Exam	Fiederle
CRYS 61	Applied Materials II	CRYS 611	Semiconductor Technology	Ion Implantation; Diffusion; Epitaxy	2		L+P		3		3	Written Exam	Fiederle
		CRYS 612	Electrical Characterization of Crystals and Devices	Resistivity; Piezo-, Ferroelectricity; PL Measurements	2		P		3		3	Marked Report	Fiederle, Cröll
CRYS 62	Analytical X-Ray Methods	CRYS 621	Structure Analysis by X-Ray Diffraction	Structure Solution and Structure Refinement from Single Crystal and Powder Diffraction Data (Rietveld)	3		L+P		4.5		4.5	Written Exam	Keller, Fiederle
		CRYS 622	Defect Analysis by Diffraction	Rocking Curves; X-Ray Topography	1		L+P		1.5		1.5	Written Exam	Danilewsky
CRYS 63	Technical and Applied Mineralogy	CRYS 631	Modern Ceramics, Cements, and Glasses	Ceramics; Cements; Glasses	3		L+P		4.5		4.5	Written Exam	Vogt, Cröll
		CRYS 632	Thermal Analysis	Laboratory Course on Differential Thermal Analysis and Differential Thermal Gravimetric Analysis	1		P		1.5		1.5	Marked Report	Keller
CRYS 64	Field Trips and Seminars	CRYS 641	Seminar: Recent publications	Crystal Growth and Characterization	2		L		3		3	Marked Presentation	Cröll, Fiederle
		CRYS 642	Advanced Seminar on In-House Research		1		L		1.5		1.5	Passed/Failed	Cröll
		CRYS 643	Field Trips to Industrial GEOL 581 Facilities			3		F		1.5		1.5	Marked Report

Special Topics in Geoscience (Elective Courses)

		CRY5 525	Purification and Doping Methods	Vacuum; Clean Room Technology; Rectification; Sublimation; Doping	2		L		3		3	Written Exam	Cröll
		CRY5 533	Semiconductor Devices	Diodes; Transistors; Detectors	2		L		3		3	Written Exam	Fiederle
		CRY5 551	Electron Back Scatter Diffraction	Scanning Electron Microscopy; Electron Back Scatter Diffraction (EBSD); Orientation Analysis; Texture Analysis	1		L+P				1.5	Marked Report	Danilewsky, Stein, Hindle
		CRY5 644	Special Topics in Materials Science	Topics Vary Each Year	2		L			3	3	Written Exam	Various
		GEOL 433	Special Analytical Procedures in Mineralogy	Fluid Inclusions Analysis; Cathodoluminescence; Mineral Separation Techniques; Size Distribution Analysis	2		L+P		3		3	Marked Report	All Staff and Lab Personnel
		GEOL 441	Aqueous Geochemistry	Chemical Composition of Natural Waters; Dissolution and Precipitation; Concept of Saturation; Carbonate System and pH Control; Weathering and Rock Alteration; Al and Fe Reactions; Redox Systems; Phase Diagrams in Aqueous Geochemistry	2		L+P	3		3	3	Written Exam	Bucher
		GEOL 442	Chemical Modeling of Natural Waters	Modeling Concepts; Equations of State; Software; PT-Functions of Solubility; Titration Models; Redox Models; Distribution of Species; Saturation and Reaction Modeling; Transport and Reaction; Data Bases	2		L+P	3		3	3	Written Exam	Bucher
		GEOL 551	Energy, Waste, and the Environment	Nuclear Waste; Coal Combustion Products; CO ₂ Sequestration; Waste Incineration Slags; Landfills and Landfill Gases; Waste as Resource	2		L+P		3		3	Written Exam	Gieré
		GEOL 612	Geomechanical Modeling	Rock Mechanics; Numerical Methods; Stress and Fracture Prediction	2		L+P		3		3	Written Exam	Henk
			Geoscience Courses from B.Sc. Curriculum	BSc Courses to Make up for Deficiencies for External Students or Non-Geoscience Students								According to B.Sc. Curriculum	All Staff

Other Elective Courses

			Special Topics in Microsystems Engineering										Import (11 th Faculty)
			Special Topics in Chemistry										Various
			Special Topics in Physics										Import (Math&Physics)
			Languages										Import