Modules for Materialwissenschaft App. Polymer ScienceMA120

Date 24/06/26

Pflichtmodule

CHE.03150.02 - Master Thesis (M.Sc.)

CHE.03150.02			30 CP
Module label	Master Thesis (M.Sc.)		
Module code	CHE.03150.02		
Semester of first implementation			
Module used in courses of study / semesters	• Applied Polymer Science (MA120 LP) (Master) > Materialwissenschaft App. Polymer ScienceMA120, Version of accreditation valid from WS 2007/08 > Pflichtmodule		
Responsible person for this module			
Further responsible persons	professors or lecturers of the university		
Prerequisites	all modules of APS		
Skills to be acquired in this module	• carrying out of independent research • literature studies and experimental work • writing of the thesis • defense of the thesis		
Module contents	• thesis related to polymer chemistry, physics, engineering, or biopolymers • carrying out literature research • collecting experimental data and doing of data evaluation • oral presentation of the final thesis including defense		
Form of instruction	Independent supervised work (30 SWS)		
Languages of instruction	German, English		
Duration (semesters)	1 Semester Semester		
Module frequency	jedes Semester		
Module capacity	unrestricted		
Time of examination			
Credit points	30 CP		
Share on module final degree	Course 1: %.		
Share of module grade on the course of study's final grade	1		
Examination	Exam prerequisites		Type of examination
Course 1			
Final exam of module			written Master Thesis, oral defence
Exam repetition information			
Form of instruction	Independent supervised work		
Course name	Master Thesis		
SWS	30		
Workload of compulsory attendance			
Workload of preparation / homework etc			
Workload of independent learning			
Workload (examination and preparation)			
Workload total	0		
Workload self-arranged work (module-oriented	900		

Total module workload	900
Type of examination	
Frequency	Summer or winter semester
Capacity	unrestricted

PHY.03142.02 - Polymer Physics

PHY.03142.02	15 CP
Module label	Polymer Physics
Module code	PHY.03142.02
Semester of first implementation	
Module used in courses of study / semesters	• Applied Polymer Science (MA120 LP) (Master) > Materialwissenschaft App. Polymer ScienceMA120, Version of accreditation valid from WS 2007/08 > Pflichtmodule • Polymer Materials Science (MA120 LP) (Master) > Materialwissenschaft PolymerMaterialScMA120, Version of accreditation (WS 2009/10 - SS 2014) > Pflichtmodule
Responsible person for this module	
Further responsible persons	Prof. Dr. Thomas Thurn-Albrecht
Prerequisites	
Skills to be acquired in this module	• acquintance with the fundamental concepts of experimental polymer physics • learning and applying the theoretical fundamentals and the experimental physical methods used to characterize and investigate polymer materials • gaining practical experience with basic methods in experimental polymer physics • understanding the properties of polymer surfaces • knowledge of methods and technologies to modify and analyse polymer surfaces
Module contents	Lectures: 1. Introduction to Polymer Physics • chain molecules in solutions and melts (description of chain molecules, chain models, excluded volume interaction, semidilute solutions, screening, structure factor) • mechanical properties of polymer melts (viscoelasticity, Debye-relaxation, relaxation processes in polymer melts, flow behavior, dynamic and thermic glass transition, nonlinear effects) • microscopic models for polymer dynamics (diffusion, Rouse model, reptation) • solid polymers (rubber elasticity, semicrystalline polymers and crystallization) • blends and block copolymers (Flory-Huggins theory, spinodal decomposition, block copolymers and self assembly) • outlook: polymers in nature 2. Experimental Methods of Polymer Physics • scattering techniques (X-ray, light and neutron scattering) • relaxation spectroscopy (dynamic mechanical and dielectric spectroscopy) • calorimetry (DSC, TMDSC) • spectroscopy (IR, Raman, NMR) • microscopy (light-, electron- and scanning force microscopy) 3. Surface Science • surface vs. Bulk • surface composition and ordering • dynamic surface processes (adsorption, desorption, diffusion) • surface tension • surface analysis (XPS, SIMS, SEM, AFM) • surface modification by deposition (wet processes, dry processes, CVD, PE-CVD, PVD), polymer film growth • surface modification by ablation (wet and dry etching) • surface funtionalization (Grafting, plasma treatments) • polymer in lithography • technical applications for surface modification

	4. Lab Course: Experimental Polymer Physics Lab (6 experiments, each consisting of 2x4 contact hours) • rheology/mechanical spectroscopy • dielectric spectroscopy • DSC • polarization microscopy/strain birefringence • infrared spectroscopy • low-field NMR • wide-angle X-ray scattering
Forms of instruction	Practical training (4 SWS) Lecture (3 SWS) Lecture (2 SWS) Lecture (2 SWS) Seminar (2 SWS) Course
Languages of instruction	German, English
Duration (semesters)	1 Semester Semester
Module frequency	jedes Sommersemester
Module capacity	unrestricted
Time of examination	
Credit points	15 CP
Share on module final degree	Course 1: %; Course 2: %; Course 3: %; Course 4: %; Course 5: %; Course 6: %.
Share of module grade on the course of study's final grade	1

Examination	Exam prerequisites	Type of examination
Course 1		
Course 2		
Course 3		
Course 4		
Course 5		
Course 6		
Final exam of module	completion of lab course protocols; seminar problem set solutions; 3 final written examinations	oral examination
Exam repetition information		

Module course label	Course type	Course title	SWS	Workload of compulsory attendance	Workload of preparation / homework etc	Workload of independent learning	Workload (examination and preparation)	Sum workload
Course 1	Practical training	Lab Course Experimental Polymer Physics	4					0
Course 2	Lecture	Lecture Introduction to Polymer Physics	3					0
Course 3	Lecture	Lecture Experimental Methods of Polymer Physics	2					0
Course 4	Lecture	Lecture Surface Science	2					0
Course 5	Seminar	Seminars on Introduction to Polymer Physics and Experimental	2					0

Module course label	Course type	Course title	SWS	Workload of compulsory attendance	Workload of preparation / homework etc	Workload of independent learning	Workload (examination and preparation)	Sum workload
		Methods of Polymer Physics						
Course 6	Course	Private Study						0
Workload by module						450		450
Total module workload								450

ZIW.03143.01 - Polymer Processing

ZIW.03143.01		5 CP
Module label	Polymer Processing	
Module code	ZIW.03143.01	
Semester of first implementation		
Module used in courses of study / semesters	• Applied Polymer Science (MA120 LP) (Master) > Materialwissenschaft App. Polymer ScienceMA120, Version of accreditation valid from WS 2007/08 > Pflichtmodule • Polymer Materials Science (MA120 LP) (Master) > Materialwissenschaft PolymerMaterialScMA120, Version of accreditation (WS 2009/10 - SS 2014) > Pflichtmodule	
Responsible person for this module		
Further responsible persons	Prof. Dr. Hans-Joachim Radusch	
Prerequisites		
Skills to be acquired in this module	learning the most important methods and technological equipment for the production of both semi- and final products based on polymer materials understanding the working principles of polymer processing machines performing lab experiments to get acquainted with modern polymer processing techniques	
Module contents	Lecture: Polymer Processing • fundamentals of polymer processing • extrusion • injection molding • rubber processing • blow molding • rapid prototyping technologies • composite manufacturing Lab Course: Polymer Processing Lab extrusion: operating diagram / residence time determination / melt mixing cast film extrusion / coextrusion: incompatibility and interface disturbance blown film extrusion: influence of blow-up ratio, take-off ratio and cooling rate on mechanical properties injection molding: parameter influence / filling behavior / multi component injection molding rubber processing: curemetry / rubber mixing (kneader) / compression molding / testing	
Forms of instruction	Lecture (2 SWS) Practical training (2 SWS) Course	
Languages of instruction	German, English	
Duration (semesters)	1 Semester Semester	
Module frequency	jedes Wintersemester	
Module capacity	unrestricted	
Time of examination		
Credit points	5 CP	
Share on module final degree	Course 1: %; Course 2: %; Course 3: %.	
Share of module grade on the course of study's final grade	1	

Examination	Exam prerequisites	Type of examination
Course 1		
Course 2		
Course 3		
Final exam of module	attestations to the individual experiments	written examination
Exam repetition information		

Module course label	Course type	Course title	SWS	Workload of compulsory attendance	Workload of preparation / homework etc	Workload of independent learning	Workload (examination and preparation)	Sum workload
Course 1	Lecture	Lecture Polymer Processing	2					0
Course 2	Practical training	Lab Course Polymer Processing	2					0
Course 3	Course	Private Study						0
Workload by module						150		150
Total module workload								150

Vertiefung

ZIW.03148.02 - Advanced Polymer Engineering

ZIW.03148.02	10 CP
Module label	Advanced Polymer Engineering
Module code	ZIW.03148.02
Semester of first implementation	
Module used in courses of study / semesters	• Applied Polymer Science (MA120 LP) (Master) > Materialwissenschaft App. Polymer ScienceMA120, Version of accreditation valid from WS 2007/08 > Vertiefung • Polymer Materials Science (MA120 LP) (Master) > Materialwissenschaft PolymerMaterialScMA120, Version of accreditation (WS 2009/10 - SS 2014) > Vertiefung
Responsible person for this module	
Further responsible persons	Dr. Rene Androsch
Prerequisites	
Skills to be acquired in this module	• acquiring perspectives for the work as a polymer engineer • gain familiarity with the most important concepts and experimental techniques for mechanical testing of polymers • acquiring a basic knowledge about inorganic materials used to process or to be combined with polymers
Module contents	Lectures: 1. Testing of Polymers • elastic, viscoelastic and plastic deformation behaviour of polymers and phenomenological models • quasistatic test methods of polymers (tensile, compression, bending) • hardness measurement and test methods • charpy impact test and instrumented impact test methods for thoughness characterization 2. Polymeric Materials • chemical and physical structure • mechanical, thermal, optical, and electrical properties • structure-property relations • polymeric materials: structure, properties, applications a. thermoplastics (commodity polymers, polyesters, polyamides, high-performance polymers) b. elastomers c. thermosets Lab Course: Polymer Testing Lab • characterization of elastic properties • tensile test on plastics • bend test • compression test • charpy impact test • hardness measurement • drop weight test • tensile impact test
Forms of instruction	Lecture (2 SWS) Lecture (2 SWS) Practical training (2 SWS) Seminar (1 SWS) Course Study trip

ZIW.03148.02 10 CP

Languages of instruction	German, English
Duration (semesters)	1 Semester Semester
Module frequency	jedes Wintersemester
Module capacity	unrestricted
Time of examination	
Credit points	10 CP
Share on module final degree	Course 1: %; Course 2: %; Course 3: %; Course 4: %; Course 5: %; Course 6: %.
Share of module grade on the course of study's final grade	1

Examination	Exam prerequisites	Type of examination
Course 1		
Course 2		
Course 3		
Course 4		
Course 5		
Course 6		
Final exam of module	completion of lab course protocols; seminar problem set solutions	oral or written examination
Exam repetition information		

Module course label	Course type	Course title	SWS	Workload of compulsory attendance	Workload of preparation / homework etc	Workload of independent learning	Workload (examination and preparation)	Sum workload
Course 1	Lecture	Lecture Testing of Polymers	2					0
Course 2	Lecture	Lecture Polymeric Materials	2					0
Course 3	Practical training	Lab Course Polymer Testing	2					0
Course 4	Seminar	Seminar Polymeric Materials	1					0
Course 5	Course	Private Study						0
Course 6	Study trip	Excursion Polymer Industry						0
Workload by module						300		300
Total module workload								300