

Adaptation Phase – Semester 1

(Technical courses – at least 25 CP)

Description:

Module I – at least 12 CP: Microstructure, nanostructure, materials physics, crystal structures, structural, mechanical and functional, properties

Module II – at least 5 CP: Diffraction, microscopy, spectroscopy, materials testing, micro/nano/atomic scale

Module III – at least 5 CP: Materials selection, deposition techniques, materials for special applications, chemical engineering, processing technologies

Module	Saarland University - Uds				
	Course	Responsible	Code	E / M	CP
I. Structure & Properties	Microstructure Development	Busch		E	3
	Continuum Mechanics	Diebels	KonM	E	4
	Intermetallic Compounds	Busch	IPhas	E	3
	Experimental Mechanics	Diebels	ExMech	E	4
	Computer Simulation in Material Physics	Müser		E	8
	Fracture Mechanics	Marx	Burch	E	4
	Polymer Materials 3	Lienkamp		E	3
II. Materials Characterization	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	E	3
	Methodology 2: Basics of Microscopy and Spectroscopy	Motz	TeG	E	5
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	E	3
	Diffraction Methods	Mücklich	BEUG	E	5
III. Materials Engineering & Processing Technologies	Machining Technologies	Bähre	Spanf	E	3
	Surface Engineering	Busch	Otech	E	3
	Nonferrous Metals I	Busch	NEM1	E	3
	Lightweight Systems 1	Herrmann		E	3

Module	Polytechnical University of Catalonia - UPC				
	Course	Responsible	Code	E / M	CP
I. Structure & Properties	Physical Metallurgy	Prado	CEM01	M	5
	Physical Properties of Materials	Jiménez	CEM04	M	5
	Mechanical Behaviour of Materials	Alcala	24798	M	5
II. Materials Characterization	Microstructural Characterisation of Materials	Manero	CEM05	M	5
III. Materials Engineering & Processing Technologies	Structure and Properties of Polymers		295em112	E	6

Module	Luleå University of Technology - LTU				
	Course	Responsible	Code	E / M	CP
I. Structure & Properties	Deformation and Fracture	Akthar	T7001T	M	7.5
	Material Science & Engineering I	Akerfeldt	T0004T	M	7.5
II. Materials Characterization	Advanced Materials Characterisation Techniques (Course given during the second semester at LTU)	Akthar	T7003T	M	7.5
III. Materials Engineering & Processing Technologies	Materials Technology and Materials Selection	Fernberg	T0003T	M	7.5

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The following study plan is tentative: changes may apply each semester (last update: 28/10/2020)

Module	University of Lorraine - UL				
	Course	Responsible	Code	E / M	CP
I. Structure & Properties	Properties and Selection of Materials (Mechanics of Materials I, Physical Properties of Materials, Materials Selection)	Ayadi, Czerwiec, Bruyère		M	9
	Physics of Polymers (Physics of Polymers, Polymers Lab)	Royaud		M	6
II. Materials Characterization	Crystal Structures and Defects	Redjaïmia		M	5
III. Materials Engineering & Processing Technologies	Chemical Engineering (Chemical Reaction Engineering, Fluid and Transport Mechanic)	Simmonot, Acem		M	6

Module	Montanuniversität Leoben - MUL				
	Course	Responsible	Code	E / M	CP
I. Structure & Properties	Materials physics II	Eckert, Spieckermann	VO 430.046	E	3
	Atomistic Materials Modelling	Holec	VO 420.020	E	2
	Exercises to Materials modelling at atomic scale	Holec, Hartmann	VO 420.120	E	2
	Structural and Functional Ceramics I	Bermejo	VO 410.002	E	3.75
	Exercises to Structural and Functional Ceramics	Bermejo	UE 410.013	E	2
	Introduction to surface and interface physics	Spieckermann	VO 430.039	E	2
	Cellular solids and composite materials	Pippan	VO 430.038	E	2
	Fundamentals of building materials and ceramics	Harmuth	VO 320.071	E	3
	Polymer Nanotechnology	Gonzalez-G., Gooneie, Holzer	VO 350.100	E	3
	Theory of mechanical properties of solids	Pippan	VO 430.026	E	2
	Fundamentals and application of multiphase simulation	Kharicha	SE 310.024	E	2
	Design principles of biological materials	Paris	VO 430.047	E	2.25
	Mechanics in small Dimensions	Kiener, Eckert	VO 430.002	E	2
	Physical metallurgy and application of steels	Schnitzer	VO 440.002	E	3
	Modelling and simulation of microstructural processes	Stockinger	VO 420.047	E	1.5
II. Materials Characterization	Structure and Scattering Methods	Keckes	VO 430.020	E	2
	Advanced transmission electron microscopy for materials research	Zhang	VO 430.051	E	1
	Testing methods and application of building materials	Gruber, Jin, Marschall	SE 320.070	E	2
	In-situ and in-operando characterization techniques in material science	Kiener, Maier-Kiener	VO 430.013	E	2
	Exercises to In-situ and in-operando characterization techniques in material science	Kiener, Maier-Kiener	UE 430.014	E	2
III. Materials Engineering & Processing Technologies	Materials selection	Tkadletz	SE 425.136	E	2.5
	Nanostructured Materials	Rostislav	VO 425.031	E	1
	Material Selection, Qualification and Failure Analysis in Polymer Engineering	Pilz, Pinter	SE 210.023	E	4.5
	Additive manufacturing	Eckert	VO 430.001	E	2
	Additive manufacturing with polymers	Godec, Holzer, Gonzalez-G.	VO 350.650	E	3
	Metal Forming	Stockinger	VO 560.015	E	4.5

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Module	University of Padova - UNIPD				
	Course	Responsible	Code	E / M	CP
I. Structure & Properties	Technology of metals	Zambon	INP9086801	M	9
	Solid state physics	Gasparotto	INM0018236	M	9
II. Materials Characterization	Nanostructured Materials	Martucci	INP7080521	E	6
III. Materials Engineering & Processing Technologies	Composite Materials	Simone	INP9086686	M	9

Track 1: Advanced Metallic Materials

(Technical Courses – at Least 25 CP in each Semester)

Module	Saarland University - Uds				
	Course	Responsible	Code	E / M	CP
Semester 2	Steel II	Busch	Stahl	E	3
	Kinetics of amorphous systems	Busch	Kin	E	3
	Powder Metallurgy	Busch	PuMet	E	3
	Amorphous Metals	Busch	AmoMet	E	3
	Precision Machining Technologies	Bähre	FBTec	E	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	E	3
	Methodology 7: Nano- and micromechanical testing methods	Motz	NMMMM	E	3
	Material Modelling	Diebels	MaMo	E	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	E	4
	Methodology 9: Applications of atomic force microscopy	Motz		E	3
	Laser Treatment of Materials - Applications	Mücklich	Las2	E	3
	Physical Acoustics 1	Rabe		E	4
	Functional Materials II	Mücklich	FuWV	E	4
	Materials Physics - Interfacial and Microstructure Physics	Motz		E	5
	Methodology 6: Microstructure mechanics and damage mechanisms	Motz		E	3
	Internship (Industry)	Motz, Marx	FPI	E	6
Seminar Material Engineering	All Professors	SMWS	E	2	
Semester 3	Nonferrous Metals I	Busch	NEM1	E	3
	Nonferrous Metals II	Busch	NEM2	E	3
	Intermetallic Compounds	Busch	IPhas	E	3
	Lightweight Systems 1	Herrmann		E	3
	Machining Technologies	Bähre	Spanf	E	3
	Surface Engineering	Busch	OTech	E	3
	Heavy Plate Production and Processing	Kalla		E	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	E	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	E	3
	Corrosion and High Temperature Behavior	Busch	KorHT	E	3
	Laboratory Materials Science	Motz, Marx	PrMW	E	4
	Fracture Mechanics	Marx	Bruch	E	4
	Physical Acoustics 2	Rabe		E	4
	Diffraction Methods	Mücklich	BEUG	E	5
	Methodology 2: Basics of Microscopy and Spectroscopy	Motz	TeG	E	5
	Laser Treatment of Materials - Interaction with Matter	Mücklich	Las1	E	3
Computer Simulation in Material Physics	Müser		E	8	
Internship (Industry)	Motz, Marx	FPI	E	6	
Seminar Material Science	All Professors	SMWW	E	2	

Module	Polytechnical University of Catalonia - UPC				
	Course	Responsible	Code	E / M	CP
Semester 2	Modern Manufacture of Metallic Materials		295EM021	M	6
	Structural Integrity and Failure Analysis		295EM022	M	6
	Materials Joining Technologies		295EM126	E	6
	Biomedical Materials		295EM122	E	6
	Materials for Energy and Transport Applications		295EM125	E	6
	Design of equipment coating technologies		295EQ242	E	6
Semester 3	Experimentation in Materials Science and Engineering		295EM031	M	6
	Advanced Characterization of Materials		295EM011	E	6
	Nanostructured Materials		295EM114	E	6
	Advanced Surface Engineering		295EM115	E	6
	Functional Materials		295EM123	E	6
	Sustainable Materials		295II133	E	6

Module	Luleå University of Technology - LTU				
	Course	Responsible	Code	E / M	CP
Semester 2	Phase Transformations (offered in semester 1)	Akthar	T7008T	M	7.5
	Select 2 of the following courses:				
	Materials Modelling	Joffe	T7002T	E	7.5
	Surface Engineering	Vuorinen	T7004T	E	7.5
	Nanomaterials	NN	T7006T	E	7.5
	Materials Selection and Ecodesign	Vuorinen	T0007T	E	7.5
Semester 3	Metal working	Åkerfeldt	T7028T	E	7.5
	Advanced Metallic Materials - Project Work	All Professors	T0009T	M	30

Module	University of Lorraine - UL				
	Course	Responsible	Code	E / M	CP
Semester 2	Materials Mechanics II: Plasticity	Ayadi		M	5
	Materials Characterization	Zollinger		M	4
	Conferences and Industrial Visits	Zollinger		M	1
	Bibliographic Project	Horwat		M	6
	Solidification and phase transformation	Horwat, Zollinger		M	10
Semester 3	Ferrous and Non-Ferrous Alloys	Denis		M	6
	Stress-Phase Transformations	Denis		M	4
	Microstructural control	Mathieu		M	6
	Development processes (Extractive Metallurgy, Processing Routes)	Patisson		M	3
	Bibliographic Project	Horwat		M	7

Module	Montanuniversität Leoben - MUL				
	Course	Responsible	Code	E / M	CP
Semester 2	Introduction to Solid State Physics	Holec	VO 420.003	E	3
	Elasticity and Dislocations in Materials Science	Holec, Romaner	VO 420.069	E	1
	Non-semiconductor Materials for Microelectronics	Daniel	VO 425.060	E	1.5
	Transmission Electron Microscopy of Solids	Zhang	VO 430.041	E	1
	Atom probe tomography in materials science	Mendez	IV 420.170	E	2
	Phase transformations and precipitates in metals and their characterization	Rashkova	VO 420.034	E	2
	Fracture Toughness of Materials	Kolednik	VO 430.042	E	2

	Non-Linear Fracture Mechanics – Theory and Application	Kolednik	VO 430.044	E	2	
	Materials Physics III	Kiener, Bachmaier	VO 430.047	E	2	
	Metastable materials	Eckert, Spieckmann	VO 430.053	E	2	
	Solidification processes and phase transformations	Eckert	VO 430.027	E	2	
	Design of modern high-performance steels	Schnitzer	VO 440.005	E	3	
	Introduction into Synchrotron Radiation	Paris	VO 460.461	E	1	
	Synchrotron Radiation in Materials Science	Lechner, Paris	VO 460.462	E	2	
	Theoretical and practical aspects of nanoindentation	Daniel	VO 425.067	E	1	
	Scientific work in the field of X-ray structure research	Keckes	SE 430.000	E	4	
	Modern optical methods for materials characterization	Deluca	VO 410.007	E	2	
	Magnetic Properties of Nanomaterials	Lechner	VO 460.105	E	2	
	Semester 3	Nanostructured Materials	Daniel	VO 425.031	E	1
		Functional materials	Mitterer	VO 425.000	E	3
Atomistic Materials Modelling		Holec	VO420.020	E	2	
Exercises to Materials modelling at atomic scale		Holec, Hartmann	UE 420.120	E	2	
Introduction to vacuum technology		Mitterer	VO 425.050	E	1	
Metal forming		Stockinger	VO 560.015	E	4.5	
Physical metallurgy and application of steels		Schnitzer	VO 440.002	E	3	
Mechanics in small Dimensions		Kiener, Eckert	VO 430.002	E	2	
In-situ and in-operando characterization techniques in material science		Kiener, Maier- Kiener	VO 430.013	E	2	
Exercises to In-situ and in-operando characterization techniques in material science		Kiener, Maier- Kiener	UE 430.014	E	2	
Materials selection		Tkadletz	SE 425.136	E	2.5	
Materials physics II		Eckert, Spieckermann	VO 430.046	E	3	
Advanced transmission electron microscopy for materials research		Zhang	VO 430.051	E	1	

Module	University of Padova - UNIPD				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Not Available				

Track 2: Polymers and Composites

(Technical Courses – at Least 25 CP in each Semester)

Module	Saarland University - Uds				
	Course	Responsible	Code	E / M	CP
Semester 2	Lightweight Systems 2	Herrmann		E	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	E	3
	Physical Acoustics 1	Rabe		E	4
	Material Modelling	Diebels	MaMo	E	4
	Empirical and Statistical Modelling	Bähre	EsMod	E	4
	Finite Elements in Continuum Mechanics	Diebels	FEMM	E	4
	Polymerwerkstoffe 4	Lienkamp		E	3
	Smart Materials and Polymers	Gallei	MC06	E	1.5
	Internship (Industry)	Motz, Marx	FPI	E	6
	Seminar Material Engineering	All Professors	SMWS	E	2
Semester 3	Synthesis of Polymers	Gallei	MC01	E	2
	Polymer Materials 3	Lienkamp		E	3
	Functional Coatings	Kraus	GuKBe	E	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	E	3
	Lightweight Systems 1	Herrmann		E	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	E	3
	NanoBioMaterials 1	Arzt	NBM-1	E	3
	Corrosion and High Temperature Behavior	Busch	KorHT	E	3
	Experimental Mechanics	Diebels	ExMech	E	4
	Continuum Mechanics	Diebels	KonM	E	4
	Physical Acoustics 2	Rabe		E	4
	Computer Simulation in Material Physics	Müser		E	8
	Laboratory Materials Science	Motz, Marx	PrMW	E	4
	Internship (Industry)	Motz, Marx	FPI	E	6
Seminar Material Science	All Professors	SMWW	E	2	

Module	Polytechnical University of Catalonia - UPC				
	Course	Responsible	Code	E / M	CP
Semester 2	Composite Technology		295EM121	M	6
	New Challenges in Additivation and Degradation of Plastic Materials		295EM125	M	6
	Structural Integrity and Failure Analysis		295EM022	E	6
	Materials for Energy and Transport Applications		295EM125	E	6
	Materials Joining Technologies		295EM126	E	6
	Experimentation and Instrumentation		295EQ221	E	6
	Polymer Transformation Processes		295EQ222	E	6
	Polymer Physics		295EQ022	E	6
	Design of equipment coating technologies		295EQ242	E	6
	Semester 3	Advances in the processing of polymeric materials		295EM032	M
Experimentation in Materials Science and Engineering			295EM031	E	6
Sustainable Materials			295II133	E	6
Chemistry of polymerizations			295EQ231	E	6
Biopolymers and bioplastics			295EQ232	E	6
Biotech processes and polymer Industry			295EQ011	E	6

Module	Luleå University of Technology - LTU					
	Course	Responsible	Code	E / M	CP	
Semester 2	Composite Materials	Joffe	T7012T	M	7.5	
	Select 1 of the following courses:					
	Phase Transformations (offered in semester 1)	Akthar	T7008T	E	7.5	
	Laser Material Processing (offered in semester 1)	Kaplan	T0018T	E	7.5	
	Materials Mechanics (offered in semester 1)	Edberg	T7016T	E	7.5	
	Select 1 of the following courses:					
Semester 3	Aerospace Materials	Fernberg	T7005T	E	7.5	
	Composites Manufacturing and Lightweight design	Fernberg	T7029T	E	7.5	
	Polymers and composites - Project Work	All Professors	T0009T	M	30	

Module	University of Lorraine - UL				
	Course	Responsible	Code	E / M	CP
Semester 2	Materials Mechanics II: Plasticity	Ayadi		M	5
	Materials Characterization	Zollinger		M	4
	Conferences and Industrial Visits	Zollinger		M	1
	Bibliographic Project	Horwat		M	6
	Chemistry of Organic Materials (Macromolecular Chemistry, Polymers Lab II)	Six		M	10
Semester 3	Manufacturing of Polymeric Materials	Hu, Jonquières		M	6
	Functional Polymeric Materials	Six		M	4
	Natural and Biodegradable Materials	Jonquières		M	4
	Polymeric Matrix Composites	Ayadi		M	5
	Bibliographic Project	Horwat		M	7

Module	University of Leoben - MUL				
	Course	Responsible	Code	E / M	CP
Semester 2	Testing of composites	Pinter, Wolfahrt	SE 210.035	E	2.5
	Fracture Toughness of Materials	Kolednik	VO 430.042	E	2
	Non-Linear Fracture Mechanics – Theory and Application	Kolednik	VO 430.044	E	2
	Ageing and lifetime modelling of polymers	Oreski	SE 210.036	E	2
	Thermoplastic Composite Materials FRPC	Schledjewski	VO 270.008	E	2.5
	Technical Biopolymers	Resch-Fauster	SE 210.026	E	3
	Polymer Photochemistry	Kern	VO 231.002	E	2
	Polymers in electronic and optical applications	Kern	VO 231.003	E	2
	Material Modeling of Polymer and Composite Materials	Frankl, Pletz, Tauscher	IV 250.017	E	3
	Case study in processing of composites	Fauster, Schledjewski	UE 270.010	E	7.5
	FEM Project	Pletz, Schuecker, Tauscher	UE 250.052	E	6
	Powder Injection Molding (PIM)	Kukla	VO 290.001	E	1
	Topology-Optimization	Schuecker	IV 250.018	E	2
	Recycling Technology of Polymers	Feuchter, Holzer	VO 350.080	E	3
	Exercises to Recycling Technology of Polymers	Feuchter, Holzer	UE 350.081	E	2
	Special Techniques in Polymer Processing	Holzer	VO 350.300	E	3
	Scanning Probe Techniques for the Characterization of Solid Surfaces	Teichert	VO 460.103	E	2

	Machines and Tools for Processing of Composites	Schledjewski	VO 270.012	E	2.5
Semester 3	Laboratory course in fracture mechanics of polymers and composites	Arbeiter / Pinter	UE 210.025	E	2
	Material Selection, Qualification and Failure Analysis in Polymer Engineering	Pilz, Pinter	SE 210.023	E	4.5
	Chemistry of functional polymers with switchable material properties	Schlögl	VO 231.069	E	3
	Thermoset based composite materials	Schledjewski	SE 270.017	E	2.5
	Advanced Tooling and Troubleshooting for Injection Molding	Berger-Weber, Friesenbichler, Kurzbauer	VO 290.018	E	3
	Polymer Nanotechnology	Gonzalez-Gutierrez, Gooneie, Holzer	VO 350.100	E	3
	Case study in processing of composites	Fauster, Schledjewski	UE 270.010	E	7.5
	Injection Molding Simulation	Lucyshyn	SE 350.200	E	3
	Modeling and Simulation of Polymer Processing with OpenFOAM	Gooneie, Holzer	VO 350.401	E	3
	Additive Manufacturing with Polymers	Godec, Gonzalez-G. Holzer	VO 350.650	E	3
Ceramic Matrix Composites and ceramic laminates	Lube	VO 410.006	E	2	

Module	University of Padova - UNIPD				
	<i>Course</i>	<i>Responsible</i>	<i>Code</i>	<i>E / M</i>	<i>CP</i>
Semester 2	Not Available				
Semester 3	Not Available				

Track 3: Smart Surfaces and Functional Materials

(Technical Courses – at Least 25 CP in each Semester)

Module	Saarland University - Uds				
	Course	Responsible	Code	E / M	CP
	High-Performance Ceramics	Falk	HLKer	E	3
	Precision Machining Technologies	Bähre	FBTec	E	3
	NanoBioMaterials 2	Arzt	NBM-2	E	3
	Finite Elements in Continuum Mechanics	Diebels	FEMM	E	4
	Functional Materials II	Mücklich	FuWV	E	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	E	4
	Methodology 9: Applications of atomic force microscopy	Motz		E	3
	Laser Treatment of Materials - Applications	Mücklich	Las2	E	3
	Material Modelling	Diebels	MaMo	E	4
	Tribology in the manufacturing technology	Bähre, Fang		E	3
	Internship (Industry)	Motz, Marx	FPI	E	6
	Seminar Material Engineering	All Professors	SMWS	E	2
	Intermetallic Compounds	Busch	IPhas	E	3
	Surface Engineering	Busch	OTech	E	3
	Microstructure Development	Busch		E	3
	Laser Treatment of Materials - Interaction with Matter	Mücklich	Las1	E	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	E	3
	Functional Coatings	Kraus	GuKBe	E	3
	NanoBioMaterials 1	Arzt	NBM-1	E	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	E	3
Computer Simulation in Material Physics	Müser		E	8	
Corrosion and High Temperature Behavior	Busch	KorHT	E	3	
Laboratory Materials Science	Motz, Marx	PrMW	E	4	
Internship (Industry)	Motz, Marx	FPI	E	6	
Seminar Material Science	All Professors	SMWW	E	2	

Module	Polytechnical University of Catalonia - UPC				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Not Available				

Module	Luleå University of Technology - LTU				
	Course	Responsible	Code	E / M	CP
Semester 2	Surface Engineering	Vuorinen	T7004T	M	7.5
	Select 1 of the following courses:				
	Phase Transformations (offered in semester 1)	Akthar	T7008T	E	7.5
	Materials Mechanics (offered in semester 1)	Edberg	T7016T	E	7.5
	Select 1 of the following courses:				
	Nanostructured Materials and Nanotechnology	NN	T7006T	E	7.5
	Materials Modeling	Joffe	T7002T	E	7.5
Metal Working	Åkerfeldt	T7028T	E	7.5	

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	Material Selection and Ecodesign	Vuorinen	T0007T	E	7.5
Semester 3	Smart Surfaces and Functional Materials - Project Work	All Professors	T0009T	M	30

Module	University of Lorraine - UL				
	<i>Course</i>	<i>Responsible</i>	<i>Code</i>	<i>E / M</i>	<i>CP</i>
Semester 2	Materials Mechanics II: Plasticity	Ayadi		M	5
	Materials Characterization	Zollinger		M	4
	Conferences and Industrial Visits	Zollinger		M	1
	Bibliographic Project	Horwat		M	6
	Solidification and phase transformation	Horwat, Zollinger		M	10
Semester 3	Surface Treatments	Horwat, Capon		M	6
	Materials and Surface Characterization	Horwat		M	5
	Formation of Microstructures	Denis		M	3
	Corrosion protection	Mathieu		M	5
	Bibliographic Project	Horwat		M	7

Module	Montanuniversität Leoben - MUL				
	<i>Course</i>	<i>Responsible</i>	<i>Code</i>	<i>E / M</i>	<i>CP</i>
Semester 2	Scientific work in the field of X-ray structure research	Keckes	SE 430.000	E	4
	Introduction to Solid State Physics	Holec	VO 420.003	E	3
	Elasticity and Dislocations in Materials Science	Holec, Romaner	VO 420.069	E	1
	Transmission Electron Microscopy of Solids	Zhang	VO 430.041	E	1
	Materials Physics III	Kiener, Bachmaier	VO 430.047	E	2
	Metastable materials	Eckert, Spieckmann	VO 430.053	E	2
	Introduction into Synchrotron Radiation	Paris	VO 460.461	E	1
	Theoretical and practical aspects of nanoindentation	Daniel	VO 425.067	E	1
	Synchrotron Radiation in Materials Science	Lechner / Paris	VO 460.462	E	2
	Materials testing of ceramics	Lube	VO 410.027	E	3
	Exercises to materials testing of ceramics	Lube	UE 410.028	E	1
	Fracture Toughness of Materials	Kolednik	VO 430.042	E	2
	Non-Linear Fracture Mechanics – Theory and Application	Kolednik	VO 430.044	E	2
	Electroceramics for functional components	Supancic	VO 410.025	E	2
	Exercises to electroceramics for functional components	Kreith	UE 410.026	E	1
	Non-semiconductor Materials for Microelectronics	Daniel	VO 425.060	E	1.5
	Structural and Functional Ceramics II	Bermejo	VO 410.012	E	3.75
	Modern optical methods for materials characterization	Deluca	VO 410.007	E	2
	FE modelling of ceramic systems	Supancic	VO 410.005	E	2
	Scanning Probe Techniques for the Characterization of Solid Surfaces	Teichert	VO 460.103	E	2
Physic of fullerenes, graphene and carbon nanotubes	Teichert	VO 460.113	E	2	

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	Magnetic Properties of Nanomaterials	Lechner	VO 460.105	E	2
	Electronic and mechanical properties of heterostructure devices	Kasper	VO 460.102	E	2
	Atom probe tomography in materials science	Mendez	IV 420.170	E	2
	Mechanical behavior of multilayer ceramic components and microelectronic parts	Bermejo	VO 410.009	E	2
Semester 3	Nanostructured Materials	Rostislav	VO 425.031	E	1
	Functional materials	Mitterer	VO 425.000	E	3
	Atomistic Materials Modelling	Holec	VO 420.020	E	2
	Exercises to Materials modelling at atomic scale	Holec, Hartmann	UE 420.120	E	2
	Introduction to surface and interface physics	Spieckmann	VO 430.039	E	2
	Growth and characterization of epitaxial layers	Kratzer	VO 460.104	E	2
	Physics of micro- and nanoelectronic devices	Meissels	VO 460.072	E	2
	Mechanics in small Dimensions	Kiener / Eckert	VO 430.002	E	2
	In-situ and in-operando characterization techniques in material science	Kiener / Maier-Kiener	VO 430.013	E	2
	Exercises to In-situ and in-operando characterization techniques in material science	Kiener / Maier-Kiener	UE 430.014	E	2
	Materials selection	Tkadletz	SE 425.136	E	2.5
	Materials physics II	Eckert, Spieckermann	VO 430.046	E	3
	Ceramic Matrix Composites and ceramic laminates	Lube	VO 410.006	E	2
	Modelling of behaviour of ceramics materials	Supancic	VO 410.023	E	2
	Structural and Functional Ceramics I	Bermejo	VO 410.002	E	3.75
Exercises to structural and functional ceramics	Bermejo, Lube, Harrer, Kraleva	UE 410.013	E	2	
Advanced transmission electron microscopy for materials research	Zhang	VO 430.051	E	1	

Module	University of Padova - UNIPD				
	<i>Course</i>	<i>Responsible</i>	<i>Code</i>	<i>E / M</i>	<i>CP</i>
Semester 2	Not Available				
Semester 3	Not Available				

Track 4: Advanced Processing Technologies

(Technical Courses – at Least 25 CP in each Semester)

Module	Saarland University - Uds				
	Course	Responsible	Code	E / M	CP
Semester 2	Powder Metallurgy	Busch	PuMet	E	3
	Lightweight Systems 2	Herrmann	?	E	3
	Production Engineering	Bähre	ProdSys	E	3
	Amorphous Metals	Busch	AmoMet	E	3
	Precision Machining Technologies	Bähre	FBTec	E	3
	Steel II	Busch	Stahl	E	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	E	3
	Physical Acoustics 1	Rabe		E	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	E	4
	Fluid Mechanics	Roland	Ström	E	4
	Laser Treatment of Materials - Applications	Mücklich	Las2	E	3
	Finite Elements in Continuum Mechanics	Diebels	FEMM	E	4
	Tribology in the manufacturing technology	Bähre, Fang		E	3
	Non-Destructive Testing in the destructive Testing	Starke		E	3
	Internship (Industry)	Motz, Marx	FPI	E	6
Seminar Material Engineering	All Professors	SMWS	E	2	
Semester 3	Functional Coatings	Kraus	GuKBe	E	3
	Joining Technology	Kalla	?	E	3
	Surface Engineering	Busch	OTech	E	3
	Machining Technologies	Bähre	Spanf	E	3
	Shaping Processes	Bähre	URUmV	E	3
	Heavy Plate Production and Processing	Kalla		E	3
	Lightweight Systems 1	Herrmann		E	3
	Laser Treatment of Materials - Interaction with Matter	Mücklich	Las1	E	3
	Corrosion and High Temperature Behavior	Busch	KorHT	E	3
	Computer Simulation in Material Physics	Müser		E	8
	Nonferrous Metals II	Busch	NEM2	E	3
	Laboratory Materials Science	Motz, Marx	PrMW	E	4
	Internship (Industry)	Motz, Marx	FPI	E	6
	Seminar Material Science	All Professors	SMWW	E	2

Module	Polytechnical University of Catalonia - UPC				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Not Available				

Module	Luleå University of Technology - LTU					
	Course	Responsible	Code	E / M	CP	
Semester 2	Laser Material Processing (semester 1)	Volpp	T0018T	M	7.5	
	Advanced Processing and Cyberlab	Volpp	T7015T			
	Select 1 of the following courses:					
	Surface Engineering	Vuorinen	T7004T	E	7.5	
	Nanostructured Materials and Nanotechnology	NN	T7006T	E	7.5	
	Materials Modeling	Joffe	T7002T	E	7.5	
	Metal working	Åkerfeldt	T7028T	E	7.5	
	Composite materials	Joffe	T7012T			
	Composites Manufacturing and Lightweight design	Fernberg	T7029T	E	7.5	
Biocomposites	Oksman	T7017T	E	7.5		
Semester 3	Advanced Processing Technologies - Project Work	All Professors	T0009T	M	30	

Module	University of Lorraine - UL				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Not Available				

Module	Montanuniversität Leoben - MUL				
	Course	Responsible	Code	E / M	CP
Semester 2	Recycling Technology of Polymers	Feuchter, Holzer	VO 350.080	E	3
	Exercises to Recycling Technology of Polymers	Feuchter, Holzer	UE 350.081	E	2
	Technical Biopolymers	Resch-Fauster	SE 210.026	E	3
	Polymer Photochemistry	Kern	VO 231.002	E	2
	Special Techniques in Polymer Processing	Holzer	VO 350.300	E	3
	Powder Injection Molding (PIM)	Kukla	VO 290.001	E	1
	Machines and Tools for Processing of Composites	Schledjewski	VO 270.012	E	2.5
	Material Modeling of Polymer and Composite Materials	Frankl, Pletz, Tauscher	IV 250.017	E	3
	Design of modern high-performance steels	Schnitzer	VO 440.005	E	3
	Special metallurgical process technology	Bernhard, Michelic, Schenk	VO 220.045	E	3
	Scanning Probe Techniques for the Characterization of Solid Surfaces	Teichert	VO 460.103	E	2
	Solidification processes and phase transformations	Eckert	VO 430.027	E	2
	Semester 3	Not Available			

Module	University of Padova - UPD				
	Course	Responsible	Code	E / M	CP
Semester 2	Iron making steel making	Dabala	INP9086838	M	9
	Glass science and technology	Colombo	INP3050685	M	6
	Ceramic science and technology	Guglielmi	INP6075477	M	9
	Corrosion and materials protection	Brunelli	INP8083383	E	6
	Computational materials science	Simone	INP8083385	E	6
	Computational mechanics of materials	Nicola	NP7080417	E	6
Semester 3	Manufacturing technology	Bruschi	INP7080518	M	6
	Materials selection and design	Bernardo	INP6075497	M	6
	Electromagnetic processing of materials	Dughiero	INP3051531	M	6
	Design with polymeric materials	Lorenzetti	INP6075499	M	6
	Quality manufacturing and engineering	Savio	INP7080521	E	6
	Biopolymer Engineering	Brusatin	INP7080519	E	6
	Nanostructured materials	Martucci	INP7080521	E	6

Track 5: Bio/Nanomaterials

(Technical Courses – at Least 25 CP in each Semester)

Module	Saarland University - Uds				
	Course	Responsible	Code	E / M	CP
Semester 2	Methodology 6: Microstructural Mechanics and Damage Mechanisms	Motz, Marx	MSMSM	E	3
	Nanostructural Physics 2	Hartmann		E	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	E	3
	NanoBioMaterials 2	Arzt	NBM-2	E	3
	Methodology 7: Nano- and micromechanical testing methods	Motz	NMMMM	E	3
	High-Performance Ceramics	Falk	HLKer	E	3
	Material Modelling	Diebels	MaMo	E	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	E	4
	Methodology 9: Applications of atomic force microscopy	Motz		E	3
	Laser Treatment of Materials - Applications	Mücklich	Las2	E	3
	Functional Materials II	Mücklich	FuWV	E	4
	Internship (Industry)	Motz, Marx	FPI	E	6
	Seminar Material Engineering	All Professors	SMWS	E	2
	Semester 3	Functional Coatings	Kraus	GuKBe	E
3D Analysis of Micro and Nanostructures - Basics		Mücklich	3DMN1	E	3
NanoBioMaterials 1		Arzt	NBM-1	E	3
Laser Treatment of Materials - Interaction with Matter		Mücklich	Las1	E	3
Methodology 4: High Resolution Microscopy II (TEM, SPM)		Motz	HMV2	E	3
Surface Engineering		Busch	OTech	E	3
Laboratory NanoBioMaterials		Arzt	NBM-P	E	4
Continuum Mechanics		Diebels	KonM	E	4
Methodology 2: Basics of Microscopy and Spectroscopy		Motz	TeG	E	5
Computer Simulation in Material Physics		Müser		E	8
Laboratory Materials Science		Motz, Marx	PrMW	E	4
Internship (Industry)		Motz, Marx	FPI	E	6
Seminar Material Science	All Professors	SMWW	E	2	

Module	Polytechnical University of Catalonia - UPC				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Biofunctional Materials		295II332	M	6
	Advanced Ceramics		295EM033	M	6
	Advanced Surface Engineering		295EM115	E	6
	Experimentation in Materials Science and Engineering		295EM031	E	6
	Nanostructured Materials		295EM114	E	6
	Bioinformatics		240EM031	E	6
	Advanced Characterization of Materials		295EM011	E	6
Biomechanics and Sport Technology		295II335	E	6	

*E / M: Elective / Mandatory / CP = Credit Points according to ECTS System of the EU

The following study plan is tentative: changes may apply each semester (last update: 28/10/2020)

Module	Luleå University of Technology - LTU				
	Course	Responsible	Code	E / M	CP
Semester 2	Biocomposites	Oksman	T7017T	M	7.5
	Nanomaterials	NN	T7006T	M	7.5
	Select one of the following:				
	Phase Transformations (semester 1)	Akthar	T7008T	E	7.5
	Material Mechanics (semester 1)	Edberg	T7016T	E	7.5
Semester 3	Laser Material Processing (semester 1)	Volpp	T0018T	E	7.5
	Bio/Nanomaterials - Project Work	All Professors	T0009T	M	30

Module	University of Lorraine - UL				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Not Available				

Module	Montanuniversität Leoben - MUL				
	Course	Responsible	Code	E / M	CP
Semester 2	Not Available				
Semester 3	Not Available				

Module	University of Padova - UNIPD				
	Course	Responsible	Code	E / M	CP
Semester 2	Fundamentals of nanoscience	Mattei	SCP9087651	M	6
	Ceramic science and technology	Guglielmi	INP6075477	M	9
	Iron Making Steel Making	Dabala	INP9086838	M	9
	Sports Engineering			M	6
	Glass science and technology	Colombo	INP3050685	E	6
	Corrosion and materials protection	Brunelli	INP8083383	E	6
	Computational materials science	Simone	INP8083385	E	6
	Computational mechanics of materials	Nicola	NP7080417	E	6
Semester 3	Manufacturing technology	Bruschi	INP7080518	M	6
	Materials selection and design	Bernardo	INP6075497	M	6
	Nanofabrication	Romanato	SCP9087654	E	6
	Biopolymers Engineering	Brusatin	INP7080519	M	6
	Nanostructured materials	Martucci	INP7080521	M	6

For INP code <https://en.didattica.unipd.it/off/2020/LM/IN/IN0523>

For SCP code <https://en.didattica.unipd.it/off/2020/LM/SC/SC1174>

Transversal skills

(at Least 10 CP in first year, at least 5 CP in 3rd Semester)

Description:

Languages – at least 6 CP: Courses on languages of the consortium: English, German, French, Spanish, Swedish, Italian, Catalan

IW and PSS – 2 CP: Participation in Integration Week and Professional Summer School

Additional Transversal skills – at least 3 CP: Courses, Seminars, Projects, Summer Schools related transversal competences

Sem	Module	Saarland University - Uds				
		Course	Responsible	Code	E / M	CP
1	Languages	Language Courses German	ISZ Saar		E	3 – 6
		Language Courses German, English, Spanish, French, Swedish, Italian, Catalan	Sprachenzentrum		E	3 – 6
	IW – PSS	AMASE Integration Week	Mücklich		M	1
	Transversal Skills	Data Science and Artificial Intelligence			E	9
		Literature Seminar Data Science and Artificial Intelligence for MSE	Dahmen - DFKI		E	3
		Crash course Business Start-up	KWT		E	2
Start-up Cup, 3-days seminar		KWT		E	2	
Patent law	Wolf		E	3		
2	Languages	Language Courses German	ISZ Saar		E	3 – 6
		Language Courses German, English, Spanish, French, Swedish, Italian, Catalan	Sprachenzentrum		E	3 – 6
	IW – PSS	Professional Summer School	Mücklich		M	1
	Transversal Skills	Data Science and Artificial Intelligence			E	9
		Literature Seminar Data Science and Artificial Intelligence for MSE	Dahmen - DFKI		E	3
		Crash course Business Start-up	KWT		E	2
Start-up Cup, 3-days seminar		KWT		E	2	
Outreach project "Schülerlabor Advanced Materials"	Mücklich		E	2		
KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH		E	3		
3	Languages	Language Courses German	ISZ Saar		E	3 – 6
		Language Courses German, English, Spanish, French, Swedish, Italian, Catalan	Sprachenzentrum		E	3 – 6
	IW – PSS	Professional Summer School	Mücklich		M	1
	Transversal Skills	Data Science and Artificial Intelligence			E	9
		Literature Seminar Data Science and Artificial Intelligence for MSE	Dahmen - DFKI		E	3
		Crash course Business Start-up	KWT		E	2
Start-up Cup, 3-days seminar		KWT		E	2	
Outreach project "Schülerlabor Advanced Materials"	Mücklich		E	2		
KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH		E	3		
Patent law	Wolf		E	3		

Sem	Module	Polytechnical University of Catalonia - UPC				
		Course	Responsible	Code	E / M	CP
1	Languages	Language Courses German I, French I, English I, Spanish I			M	4
	IW – PSS	AMASE Integration Week	Mücklich - UdS		M	1
	Transversal Skills	Data Analysis and Pattern recognition		295II012	E	6
2	Languages	Language Courses German II, French II, English II, Spanish II			M	4
	IW – PSS	Professional Summer School	Mücklich - UdS		M	1
	Transversal Skills	Sustainability and circular economy			E	6
		Recircula Challenge Competition	Recircula Hub UPC-AMB		E	2
3	Languages	Language Courses German II, French II, English II, Spanish II			M	4
	IW – PSS	Professional Summer School	Mücklich - UdS		M	1
	Transversal Skills	Recircula Challenge Competition	Recircula Hub UPC-AMB		E	2
		Data Analysis and Pattern recognition		295II012	E	6
		KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH		E	3

Sem	Module	Luleå University of Technology - LTU				
		Course	Responsible	Code	E / M	CP
1	Languages	Swedish, German, French, Spanish	LTU		M	3, 7.5
	IW – PSS	--				
	Transversal Skills	Gender Diversity				
2	Languages	Language Courses German, French, Spanish			M	7.5
	IW – PSS	--				
	Transversal Skills	Career Planning Lecture Series				
3	Languages	Swedish for International Students 1			M	3
	Languages	Swedish for International Students 2			M	4.5
	IW – PSS	--				
3	Transversal Skills	Gender Diversity				
		Career Planning Lecture Series				

Sem	Module	University of Lorraine - UL				
		Course	Responsible	Code	E / M	CP
1	Languages	Language Course French, German, Spanish, English			M	2 – 6
	IW – PSS	AMASE Integration Week	Mücklich - UdS		M	1
	Transversal Skills	Gender Diversity				?
2	Languages	Language Courses French, German, Spanish, English			M	2 – 6

*E / M: Elective / Mandatory / CP = Credit Points according to ECTS System of the EU

The following study plan is tentative: changes may apply each semester (last update: 28/10/2020)

	IW – PSS	Professional Summer School	Mücklich - UdS	M	1
	Transversal Skills	Outreach project (Students at school / pupils at University)		E	2
		KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH	E	3
3	Languages	Language Courses French, German, Spanish, English		M	2 – 6
	IW – PSS	Professional Summer School	Mücklich - UdS	M	1
	Transversal Skills	Gender Diversity KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH	E	3

Sem	Module	Montanuniversität Leoben - MUL				
		Course	Responsible	Code	E / M	CP
1	Languages	Language Course French, German, Spanish, English				
	IW – PSS	AMASE Integration Week	Mücklich - UdS		M	1
	Transversal Skills	Sustainable Business Management				
Computational data analysis in materials science		Saringer	IV 425.140			2
2	Languages	Language Courses French, German, Spanish, English				4
		Intensive Incoming English Course	Fink, Fuchsbichler			4
	IW – PSS	Professional Summer School	Mücklich - UdS		M	1
	Transversal Skills	The art of scientific writing	Mitterer	IV 425.003	E	2
KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)		KOREATECH		E	3	
3	Languages	Language Courses French, German, Spanish, English				
		Intensive Incoming English Course	Fink, Fuchsbichler			4
	IW – PSS	Professional Summer School	Mücklich - UdS		M	1
	Transversal Skills	Computational data analysis in materials science	Saringer	IV 425.140		
KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)		KOREATECH		E	3	

Sem	Module	University of Padua - UNIPD				
		Course	Responsible	Code	E / M	CP
1	Languages	Language Course French, German, Spanish, English				
	IW – PSS	AMASE Integration Week	Mücklich - UdS		M	1
	Transversal Skills	Innovation and entrepreneurship				6
2	Languages	Language Courses French, German, Spanish, English				
	IW – PSS	Professional Summer School	Mücklich - UdS		M	1
		Industry Community Work at UNIPD and University of Sidney				3
		KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH		E	3
3	Languages	Language Courses French, German, Spanish, English				
	IW – PSS	Professional Summer School	Mücklich - UdS		M	1
	Transversal Skills	Innovation and entrepreneurship				6
		Industry Community Work at UNIPD and University of Sidney				3
		KOREATECH Summer Programme for Capstone Design Project (4 weeks – Limited places)	KOREATECH		E	3