

003366The following study plan is tentative: changes can happen each semester (last update: 2018.10.09)

### Semester 1: Adaptation Phase

Modules		UdS		
	Course	Responsible	Code	ECTS
<b>I. Structure &amp; Properties</b>	Microstructure Development	Busch		3
	Continuum Mechanics	Diebels	KonM	4
	Thermodynamics of Heterogeneous Materials	Possart	ThS	5
	Intermetallic Compounds	Busch	IPhas	3
	Theoretical Material Physics	Müser	TMP	5
	Computer Simulation in Material Physics	Müser	?	8
<b>II. Materials Characterization</b>	Experimental Mechanics	Diebels	ExMech	4
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	3
	Methodology 2: Basics of Microscopy and Spectroscopy	Motz	TeG	5
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	3
<b>III. Materials Engineering &amp; Processing Technologies</b>	Diffraction Methods	Mücklich	BEUG	5
	Machining Technologies	Bähre	Spanf	3
	Surface Engineering	Busch	Otech	3
	Nonferrous Metals I	Busch	NEM1	3

Modules		UPC		
	Course	Responsible	Code	ECTS
<b>I. Structure &amp; Properties</b>	Physical Metallurgy	Prado		5
	Physical Properties of Materials	Jiménez		5
	Mechanical Behaviour of Materials	Alcala		5
<b>II. Materials Characterization</b>	Microstructural Materials Characterisation	Manero		5
<b>III. Materials Engineering &amp; Processing Technologies</b>	Micro-Mechanical Design of Materials, Nanomechanics and Coatings	Llanes		5

Modules		LTU		
	Course	Responsible	Code	ECTS
<b>I. Structure &amp; Properties</b>	Deformation and Fracture	Akthar	T7001T	7,5
	Material Science & Engineering I	Wallström	T0004T	7,5
<b>II. Materials Characterization</b>	<i>Advanced Materials Characterisation Techniques (Course given during the second semester at LTU)</i>	<i>Akthar</i>	<i>T7003T</i>	<i>7,5</i>
<b>III. Materials Engineering &amp; Processing Technologies</b>	Materials Technology and Materials Selection	Wallström	T0003T	7,5

*Comment: courses in italic might be chosen depending on the student backgrounds.*

Modules		UL		
	Course	Responsible	Code	ECTS
<b>I. Structure and Properties</b>	Crystal Structures and Defects	Redjaimia		5
	Physical Properties of Materials	Bauer		5
	Materials Mechanics I: Viscoelasticity	Ayadi		4
	Macromolecular Chemistry	Six		4
<b>II. Materials Characterization</b>	Materials Characterisation	Bauer		5
<b>III. Materials Engineering &amp; Processing Technologies</b>	Chemical Reaction Engineering	SIMONNOT		3

#### Description:

Module I: Microstructure, nanostructure, materials physics, crystal structures, structural, mechanical and functional, properties

Module II: Diffraction, microscopy, spectroscopy, materials testing, micro/nano/atomic scale

Module III: Materials selection, deposition techniques, materials for special applications, chemical eng., processing technologies

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**Track 1: Advanced Metallic Materials - Design, characterization and processing**

<b>UdS</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Steel II	Busch	Stahl	3
	Kinetics of Phase Transformation	Busch	Kin	3
	Powder Metallurgy	Busch	PuMet	3
	Nonferrous Metals II	Busch	NEM2	3
	Amorphous Metals	Busch	AmoMet	3
	Machining Technologies	Bähre	Spanf	3
	Precision Machining Technologies	Bähre	FBTec	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	3
	Methodology 7: Nano- and micromechanical testing methods	Motz	NMMMM	3
	Material Modelling	Diebels	MaMo	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	4
	Laser Treatment of Materials - Applications	Mücklich	Las2	4
	Physical Acoustics 1	Rabe	?	4
	Computer Simulation in Materials Physics	Müser	?	4
	Functional Materials II	Mücklich	FuWV	4
	Internship (Industry)	Motz, Marx	FPI	6
Seminar Material Engineering	All Professors	SMWS	<b>2 - 4</b>	
Semester 3	Nonferrous Metals I	Busch	NEM1	3
	Intermetallic Compounds	Busch	IPhas	3
	Lightweight Systems 1	Herrmann	?	3
	Surface Engineering	Busch	OTech	3
	Heavy Plate Production and Processing	Kalla	?	3
	Non-Destructive Testing of Materials II	Boller	Zfp2	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	3
	Structural Durability	Boller		3
	Corrosion and High Temperature Behavior	Busch	KorHT	3
	Laboratory Materials Science	Motz, Marx	PrMW	4
	Fracture Mechanics	Motz	Bruch	4
	Physical Acoustics 2	Rabe	?	4
	Diffraction Methods	Mücklich	BEUG	5
	Methodology 2: Basics of Microscopy and Spectroscopy	Motz	TeG	5
	Theoretical Material Physics	Müser	TMP	5
Computer Simulation in Material Physics	Müser	?	8	
Internship (Industry)	Motz, Marx	FPI	6	
Seminar Material Science	All Professors	SMWW	<b>2 - 4</b>	
<b>UPC</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Metals and Alloys	Calvo		5
	Corrosion and Degradation of Materials	Iribarren & Fernandez		5
	Fracture and Fatigue	Anglada		5
	New perspectives in Materials Science	Llanes		5
	Development of Competences for the Search and Publication of Information in Materials Science	Library staff		2
	Materials Selection in Mechanical Design	Cabrera		5
	Internship (Industry)	All Professors		5
	Metals Technology	Prado		5
Semester 3	Light Alloys	Calvo		5
	Failure Analysis and Quality Control in Materials Technology	Mateo		5
	Materials Joining Technologies	Mateo		5
	Surface Technology			5
	Nanotechnology	Cabreera		5
	Modelling of Plastic Deformation of Metals	Riera		5
	Internship (Industry)	All Professors		5
Tutorised Research Work	All Professors		5	

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LTU				
	Course	Responsible	Code	ECTS
Semester 2	Phase Transformations (semester 1)	Akthar	T7008T	7,5
	Advanced Materials Characterization Techniques	Akthar	T7003T	7,5
	<b>Select 2 of the following (italic):</b>			
	<i>Materials Modelling</i>	Joffe	T7002T	7,5
	<i>Surface Engineering</i>	Vuorinen	T7004T	7,5
	<i>Nanomaterials</i>	Soldatov	T7006T	7,5
	<i>Materials Selection and Ecodesign</i>	Vuorinen	T0007T	7,5
Semester 3	Advanced Metallic Materials - Project Work	All Professors	T0009T	27
UL				
	Course	Responsible	Code	ECTS
Semester 2	Inorganic Materials Phase Transformation	Redjaimia		5
	Solid State Diffusion	Redjaimia		4
	Materials Mechanics II: Plasticity	Ayadi		4
	Materials Degradation	Jonquières/Mat hieu		3
	Bibliographic Project	Horwat		3
	Materials Characterization	Redjaimia		1,5
	Granular Solids and Porous Media	Barth		3
	Measurements and Data Interpretation	Besson		2
	Materials Selection	Redjaimia		1
Semester 3	Plastic Deformation and Microstructures	Jacques		3
	Microstructure Formation	Gautier/Bauer Grosse		3
	Elaboration Processes	Patisson		3
	Characterisation Methods	Dehmas		3
	Stress Microstructure Relationship	Denis		3
	Advanced Metallic Materials - Project Work	Horwat		15

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**Track 2: Polymers and Composites - Modelling, processing & tailored properties**

<b>UdS</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Experimental Characterization of Polymer Materials	Possart	ECPol	3
	Adhesives and Adhesive Bonding Technology	Possart	Kleb	3
	Organic Layers - Preparation and Characterization	Possart	OSHC	3
	Polymeric Composit Materials	Katrakova	PolVer	3
	Refractory Materials	Falk	FeWe	3
	Lightweight Systems 2	Herrmann	?	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	3
	Numerical Mechanics	Diebels	NuMech	4
	Physical Acoustics 1	Rabe	?	4
	Material Modelling	Diebels	MaMo	4
	Empirical and Statistical Modelling	Bähre	EsMod	4
	Finite Elements in Continuum Mechanics	Diebels	FEMM	4
	Internship (Industry)	Motz, Marx	FPI	6
	Seminar Material Engineering	All Professors	SMWS	<b>2 - 4</b>
Semester 3	Synthesis of Polymers	Wenz	MC01	2
	Non-Destructive Testing of Materials II	Boller	ZFP2	3
	Functional Coatings	Kraus	GuKBe	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	3
	High-Performance Ceramics	Falk	HLKer	3
	Rubber Technologies	Katrakova	Kautech	3
	Lightweight Systems 1	Herrmann	?	3
	Ceramic Composites	Falk	KeKo	3
	Polymer - Solid Interphases	Possart	PFInt	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	3
	NanoBioMaterials 1	Arzt	NBM-1	3
	Corrosion and High Temperature Behavior	Busch	KorHT	3
	Experimental Mechanics	Diebels	ExMech	4
	Continuum Mechanics	Diebels	KonM	4
	Physical Acoustics 2	Rabe	?	4
	Thermodynamics of Heterogeneous Materials	Possart	ThS	5
	Theoretical Material Physics	Müser	TMP	5
	Computer Simulation in Material Physics	Müser	?	8
Laboratory Materials Science	Motz, Marx	PrMW	4	
Internship (Industry)	Motz, Marx	FPI	6	
Seminar Material Science	All Professors	SMWW	<b>2 - 4</b>	
<b>UPC</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Natural Materials and Biomaterials	Ginebra		5
	New perspectives in Materials Science	Llanes		5
	Plastics Materials: Characterization and Applications	Santana		5
	Technological Biopolymers	Munoz		5
	Technology of Plastic	Martinez		5
	Internship (Industry)	All Professors		5
	Development of Competences for the Search and Publication of Information in Materials Science	Library staff		2
Semester 3	Advanced Ceramics and Inorganic Composite Materials	Anglada		5
	Composite Materials	Pagés		5
	Design, Ecodesign and Polymers Recycling	Maspoch		5
	Life Tissues, Substitutive Materials and Biointerfaces	Engel		5
	Polymers and Composites	Martinez		5
	Internship (Industry)	All Professors		5
	Tutorised Research Work	All Professors		5
<b>LTU</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Composites	Varna	T7012T	7,5
	Aerospace Materials	Varna	T7005T	7,5
	Advanced Materials Characterization Techniques	Akthar	T7003T	7,5
	<b>Select 1 of the following (italic):</b>			
	<i>Phase Transformations (semester 1)</i>	Akthar	T7008T	7,5
	<i>Laser Material Processing (semester 1)</i>	Kaplan	T0018T	7,5
<i>Materials Mechanics (semester 1)</i>	Lindgren	T7016T	7,5	
Semester 3	Polymers and composites - Project Work	All Professors	T7009T	27

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UL				
	Course	Responsible	Code	ECTS
Semester 2	Polymer Physics	Etienne		5
	Composite Materials with Polymeric Matrix	Etienne		1,5
	Mechanical Behaviour of Composite Materials	Meshaka		3
	Process Engineering	Simmonot		3
	Laboratory: Polymers	Etienne		2
	Separation Engineering	Barth		2
	Materials Mechanics II: Plasticity	Ayadi		4
	Bibliographic Project	Horwat		3
	Formulation of Polymer Blends	Six		0,5
	Medical Applications of Polymers	Six		0,5
	Functional Polymers	Etienne		1
	Biopolymers and Degradable Polymers	Jonquieres		0,5
	Semester 3	<b>Not Available</b>		

*Comment: only one internship can be done during semester 2 or semester 3.*

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**Track 3: High Performing Surfaces - Coating, structuring & functionalization**

<b>UdS</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Nonferrous Metals II	Busch	NEM2	3
	Precision Machining Technologies	Bähre	FBTec	3
	Organic Layers - Preparation and Characterization	Possart	OSHC	3
	Adhesives and Adhesive Bonding Technology	Possart	Kleb	3
	NanoBioMaterials 2	Arzt	NBM-2	3
	Finite Elements in Continuum Mechanics	Diebels	FEMM	4
	Functional Materials II	Mücklich	FuWV	4
	Computer Simulation in Materials Physics	Müser	?	4
	Numerical Mechanics	Diebels	NuMech	4
	Laser Treatment of Materials - Applications	Mücklich	Las2	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	4
	Material Modelling	Diebels	MaMo	4
	Internship (Industry)	Motz, Marx	FPI	6
	Seminar Material	All Professors	SMWS	<b>2 - 4</b>
Semester 3	Non-Destructive Testing of Materials II	Boller	ZFP2	3
	High-Performance Ceramics	Falk	HLKer	3
	Intermetallic Compounds	Busch	IPhas	3
	Surface Engineering	Busch	OTech	3
	Laser Treatment of Materials - Interaction with Matter	Mücklich	Las1	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	3
	Functional Coatings	Kraus	GuKBe	3
	Polymer - Solid Interphases	Possart	PFInt	3
	NanoBioMaterials 1	Arzt	NBM-1	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	3
	Theoretical Material Physics	Müser	TMP	5
	Computer Simulation in Material Physics	Müser	?	8
	Laboratory Materials Science	Motz, Marx	PrMW	4
	Internship (Industry)	Motz, Marx	FPI	6
Seminar Material Science Seminar	All Professors	SMWW	<b>2 - 4</b>	
<b>UPC</b>				
Semester 2	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
	<b>Not Available</b>			
Semester 3	<b>Not Available</b>			
<b>LTU</b>				
Semester 2	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
	Surface Engineering	Vuorinen	T7004T	7,5
	Advanced Materials Characterization Techniques	Akthar	T7003T	7,5
	<b>Select 1 of the following (italic):</b>			
	<i>Phase Transformations (semester 1)</i>	Akthar	T7008T	7,5
	<i>Materials Mechanics (semester 1)</i>	Lindgren	T7016T	7,5
	<b>Select 1 of the following (italic):</b>			
	<i>Nanomaterials</i>	Soldatov	T7006T	7,5
<i>Materials Modeling</i>	Joffe	T7002T	7,5	
<i>Material Selection and Ecodesign</i>	Vuorinen	T0007T	7,5	
Semester 3	High performing Surfaces - Project Work	All Professors	T7009T	27
<b>UL</b>				
Semester 2	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
	<b>Not Available</b>			
Semester 3	Plastic Deformation and Microstructures	Jacques		3
	Microstructure Formation	Gautier/Bauer-Grosse		3
	Elaboration Processes	Patisson		3
	Surface Treatment I: Introduction	Capon		3
	Surface Treatment II	Horwat		3
High Performing Surfaces - Project Work	Horwat		15	

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**Track 4: Materials Engineering and Manufacturing Technologies**

<b>UdS</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Powder Metallurgy	Busch	PuMet	3
	Lightweight Systems 2	Herrmann	?	3
	Production Engineering	Bähre	ProdSys	3
	Amorphous Metals	Busch	AmoMet	3
	Precision Machining Technologies	Bähre	FBTec	3
	Structural Health Monitoring	Boller	?	3
	Nonferrous Metals II	Busch	NEM2	3
	Steel II	Busch	Stahl	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	3
	Computer Simulation in Materials Physics	Müser	?	4
	Physical Acoustics 1	Rabe	?	4
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	4
	Machine Dynamics	Diebels	?	4
	Fluid Mechanics	Roland	Ström	4
	Laser Treatment of Materials - Applications	Mücklich	Las2	4
	Finite Elements in Continuum Mechanics	Diebels	FEMM	4
	Internship (Industry)	Motz, Marx	FPI	6
Seminar Material Engineering	All Professors	SMWS	<b>2 - 4</b>	
Semester 3	Functional Coatings	Kraus	GuKBe	3
	Joining Technology	Kalla	?	3
	Powder Technology	Falk	PuVerf	3
	Non-Destructive Testing of Materials II	Boller	ZfP2	3
	Surface Engineering	Busch	OTech	3
	Machining Technologies	Bähre	Spanf	3
	Shaping Processes	Bähre	URUmV	3
	Heavy Plate Production and Processing	Kalla	?	3
	Lightweight Systems 1	Herrmann	?	3
	Laser Treatment of Materials - Interaction with Matter	Mücklich	Las1	3
	Structural Durability	Boller		3
	Corrosion and High Temperature Behavior	Busch	KorHT	3
	Theoretical Material Physics	Müser	TMP	5
	Computer Simulation in Material Physics	Müser	?	8
	Laboratory Materials Science	Motz, Marx	PrMW	4
	Internship (Industry)	Motz, Marx	FPI	6
	Seminar Material Science	All Professors	SMWW	<b>2 - 4</b>
<b>UPC</b>				
Semester 2	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
	<b>Not Available</b>			
Semester 3	<b>Not Available</b>			
<b>LTU</b>				
Semester 2	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
	Laser Material Processing (semester 1)	Kaplan	T0018T	7,5
	Advanced Materials Characterization Techniques	Antti	T7003T	7,5
	Advanced Processing and Cyberlab	Kaplan	T7015T	7,5
	<b>Select 1 of the following (italic):</b>			
	<i>Surface Engineering</i>	Vuorinen	T7004T	7,5
	<i>Nanomaterials</i>	Soldatov	T7006T	7,5
<i>Materials Modeling</i>	Joffe	T7002T	7,5	
<i>Biocomposites</i>	Aitomäki	T7017T	7,5	
Semester 3	Materials Engineering and Manufacturing Technologies - Project Work	All Professors	T7009T	27

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UL				
	Course	Responsible	Code	ECTS
Semester 2	Inorganic Materials Phase Transformation	Redjaimia		5
	Surface Treatment II	Horwat		3
	Ecodesign	Simmonot		2
	Materials Mechanics II: Plasticity	Ayadi		4
	Process Engineering	Simmonot		3
	Separation Engineering	Barth		2
	Materials Mechanics III: Processing and Forming	Ayadi		2
	Granular Solids and Porous Media	Barth		3
	Waste and Effluent Recycling	Pineau/Simmonot		2
Semester 3	<b>Not Available</b>			

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**Track 5: Bio/Nanomaterials (including special applications)**

<b>UdS</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
Semester 2	Organic Layers - Preparation and Characterization	Possart	OSHC	3
	Methodology 6: Microstructural Mechanics and DamageMechanisms	Motz, Marx	MSMSM	3
	Nanostructural Physics 2	Hartmann		3
	Kinetics of Phase Transformation	Busch	Kin	3
	3D Analysis of Micro and Nanostructures - Advanced Methods	Mücklich	3DMN2	3
	NanoBioMaterials 2	Arzt	NBM-2	3
	Methodology 7: Nano- and micromechanical testing methods	Motz	NMMMM	3
	Material Modelling	Diebels	MaMo	4
	Computer Simulation in Materials Physics	Müser	?	8
	Methodology 3: High Resolution Microscopy I (SEM, EDS)	Motz	HMV1	4
	Laser Treatment of Materials - Applications	Mücklich	Las2	4
	Functional Materials II	Mücklich	FuWV	4
	Internship (Industry)	Motz, Marx	FPI	6
	Seminar Material Engineering	All Professors	SMWS	<b>2 - 4</b>
Semester 3	Functional Coatings	Kraus	GuKBe	3
	3D Analysis of Micro and Nanostructures - Basics	Mücklich	3DMN1	3
	NanoBioMaterials 1	Arzt	NBM-1	3
	Powder Technology	Falk	PuVerf	3
	High-Performance Ceramics	Falk	HLKer	3
	Non-Destructive Testing of Materials II	Boller	ZfP2	3
	Laser Treatment of Materials - Interaction with Matter	Mücklich	Las1	3
	Methodology 4: High Resolution Microscopy II (TEM, SPM)	Motz	HMV2	3
	Surface Engineering	Busch	OTech	3
	Laboratory NanoBioMaterials	Arzt	NBM-P	4
	Continuum Mechanics	Diebels	KonM	4
	Material Modelling	Diebels	MaMo	4
	Thermodynamics of Heterogeneous Materials	Possart	ThS	5
	Methodology 2: Basics of Microscopy and Spectroscopy	Motz	TeG	5
	Theoretical Material Physics	Müser	TMP	5
	Computer Simulation in Material Physics	Müser	?	8
	Laboratory Materials Science	Motz, Marx	PrMW	4
Internship (Industry)	Motz, Marx	FPI	6	
Seminar Material Science	All Professors	SMWW	<b>2 - 4</b>	
<b>UPC</b>				
Semester 2	<b>Not Available</b>			
Semester 3	Biomedical Materials			4,5
	Surface Engineering			3
	Design, Ecodesign and Recycling	Maspoch		4,5
	Life Tissues,Substitutive Materials and Biointerfaces	Engel		5
	Nanotechnology	Cabrera		5
	Bioceramics	Ginebra		5
	Advanced Ceramics and Inorganic Composite Materials	Anglada		5
	Internship (Industry)	All Professors		5
Tutorised Research Work	All Professors		5	
<b>LTU</b>				
	<b>Course</b>	<b>Responsible</b>	<b>Code</b>	<b>ECTS</b>
	Biocomposites	Aitomäki	T7017T	7,5
	Nanomaterials	Soldatov	T7006T	7,5
	Advanced Materials Characterization Techniques	Akthar	T7003T	7,5
	<b>Select 1 of the following (italic):</b>			
	<i>Phase Transformations (semester 1)</i>	<i>Akthar</i>	<i>T7008T</i>	<i>7,5</i>
	<i>Laser Material Processing (semester 1)</i>	<i>Kaplan</i>	<i>T0018T</i>	<i>7,5</i>
	<i>Materials Mechanics (semester 1)</i>	<i>Lindgren</i>	<i>T7016T</i>	<i>7,5</i>
Semester 3	Bio/Nanomaterials (including Special Applications) - Project Work	All Professors	T7009T	27
<b>UL</b>				
Semester 2	<b>Not Available</b>			
Semester 3	<b>Not Available</b>			

*Comment: only one internship can be done during semester 2 or semester 3.*