Study Plan of the Master of Science Programme

Digitalization & Sustainability in Materials Science & Engineering

at the Engineering Science Faculty

As of 17.09.2026

The objective of this study plan is to facilitate the students' ability to plan their academic programme.
The plan is intended to serve as an informative reference tool.
Although every effort has been made to ensure the accuracy of the information presented, no guarantee of its veracity can be provided.
The official examination and study regulations for the Master's programme "Digitalization & Sustainability in Materials Science & Engineering", as currently in force, are the authoritative reference.

The semester specifications refer to a study start in the summer semester.

The following abbreviations apply:

LP:	Creditpoints
SWS:	Semester hours per week
*	Module is in German
**	Portions of the course will be delivered via the edX.org online platform.
***	Offered in both SS and WS - Preferentially take course in the semester WITHOUT stars

V:	Lecture	nV:	Lecture with *n* SWS
Ü:	Exercise lesson	nÜ:	Exercise lesson with *n* SWS
S:	Seminar	nS:	Seminar with *n* SWS
P:	Practical Course	nP:	Practical Course with *n* SWS

Module	Name of the Module or Course	1. Semester (SS) SWS	LP	2. Semester SWS	LP	3. Semester SWS	LP	4. Semester SWS	LP	LP.
Compulsory Module Connected Knowledge in Materials Science										**7**
CKM	Connected Knowledge in Materials Science (Ringvorlesung)	4V	7	4V***	7***					7
Compulsory Elective Area Materials Science[1)]										**15**
	Compulsory Elective Modules									

1) At least 3 Modules from the list "Compulsory Elective Area Materials Science" with a total of at least 15 LP have to be taken.

Compulsory Area Informatics										**10**
PML	**Python and Machine Learning for Non-Programmers**									**5**
PML1	Python and data tools for Non-Programmers	1V+3Ü	3	1V+3Ü***	3***					3
PML2	Machine Learning for Beginnners: Theory & Application	1V***	2***	1V	2					2
NAS	**Numerical Methods and Applied Statistics**									**5**
NAS1	Numerical Methods	2V	2							2
NAS2	Applied Statistics			1V+1Ü	3					3
Compulsory Area Sustainability										**10**
ERT	**Environmental and Resource Technology**									**5**
ERT	Environmental and Resource Technology			4V	5					5
CLM	**Carbon & Life Cycle Management**									**5**
CLM1	Carbon Management			2V	3					3
CLM2	Life Cycle Management			1V+1Ü	2					2

Focus area: Connection between Materials Science with Sustainability and Digitalization[2)]										**25**
	Focus areas									
	Sustainable Applications & Processes for Materials									
	Circular Economy & Sustainable Raw Materials									
	Digitalization in Materials Science									

2) At least 5 Modules with a total of at least 25 LP must be taken. At least one Module must be taken from each of the three Focus Areas.

	Compulsory Elective Area Social, Economical and Legal Aspects of Sustainability[3)]									**6**
	Compulsory Elective Modules									6

3) At least 1 Module from the list "Social, Economical and Legal Aspects of Sustainability" with a total of at least 6 LP must be taken.

Research Module Area										**12**
RM1	Research Module I					x	6			6
RM2	Research Module II					x	6			6
Compulsory Elective Area Individual Knowledge Development[4)]										**5**
IKD	Individual Knowledge Development						5			5

4) At least 1 Module with at least 5 credits from the Master programs of the Faculty of Engineering, the Faculty of Biology, Chemistry and Geosciences or the Faculty of Mathematics, Physics and Computer Science has to be taken.

MA	**Module Master Thesis**[5)]									**30**
MA	Masterarbeit / Master Thesis							x	30	30

5) The duration of the Master Thesis is 6 months.

Total number of LPs per semester		**30**		**30**		**30**		**30**	**120**

Module overview: Compulsory Elective Area Materials Science

Module	Name of the Module or Course	1. Semester		2. Semester		3. Semester		4. Semester		LP.
		SWS	LP	SWS	LP	SWS	LP	SWS	LP	
BMB	**Biomaterials and Biocomponents**									**5**
BMB1	Biomaterials	2V	3							3
BMB2	Biocomponents & Natural Composite Materials	1V	2							2
PM	**Polymer Materials and Technology**									**5**
PM	Polymer Materials and Technology			2V+2P	5					5
FSET	**Functional Materials and Systems Aspects for Energy and Environmental Technology**									**5**
FSET1	Functional Materials and Systems Aspects for Energy and Environmental Technology	3V	4							4
FSET2	Functional Materials and Systems Aspects for Energy and Environmental Technology	1P	1							1
CMC	**Ceramic Matrix Composites**									**5**
CMC1	Ceramic Matrix Composites			2V	3					3
CMC2	Technical Fibers			1V+1P	2					2
BMM	**Basics of Metallic Materials**									**5**
BMM1	Metals and Alloys: Liquid, Solid, Interfaces			1V	2					2
BMM2	Metals and Alloys: Material Selection			1V+1P	3					3

Module overview: Focus area Sustainable Applications and Processes for Materials

Module	Name of the Module or Course	1. Semester		2. Semester		3. Semester		4. Semester		LP.
		SWS	LP	SWS	LP	SWS	LP	SWS	LP	
PS	**Polymer Systems for Sustainable Applications**									**5**
PS1	MOOC: Cellular Polymers**			3V***	3***	3V	3			3
PS2	Renewable Energies					1V+1Ü	2			2
BFM	**Biomaterials and Biofabrication MOOC**									**5**
BFM	MOOC: Biomaterials and Biofabrication**			3V	5	3V***	5***			5
EM	**Energy Materials***									**5**
EM1	Solid State Materials Characterization*					2V	2			2
EM2	Electrocatalysis and Electrochemical process engineering*			2V+1S	3					3
HE	**Hydrogen Embrittlement: Phenomenon and mechanism**									**5**
HE1	Hydrogen Embrittlement: Phenomenon and Mechanism			2V+1P	4					4
HE2	Seminar: Hydrogen Embrittlement: Phenomenon and Mechanism			1S	1					1
PIB	**Polymer Interfaces and Biosensors**									**5**
PIB1	Polymer Interfaces and Biosensors					2V	3			3
PIB2	Praktikum: Polymer Interfaces and Biosensors					2P	2			2
BM	**Battery Materials 1**									**5**
BM	Battery Materials			3V+1Ü***	5***	3V+1Ü	5			5
LF	**Laboratory to Fabrication**									**5**
LF1	Laboratory to Fabrication			2V	3					3
LF2	Pratical Course: Laboratory to Fabrication			2P	2					2
BIM	**Biomimetics**									**5**

BIM1	Biomimetics & Bio-inspired Materials 1			1V+2P	3					3
BIM2	Biomimetics & Bio-inspired Materials 2			1V***	2***	1V	2			2

Module overview: Focus area Circular Economy & Sustainable Raw Materials

Module	Name of the Module or Course	1. Semester SWS	LP	2. Semester SWS	LP	3. Semester SWS	LP	4. Semester SWS	LP	LP.
SPM	**Sustainable Polymer Chemistry and Polymer Materials (DSMSE)**									**5**
SPM	Sustainable Polymer Chemistry and Polymer Materials					2V+3P	5			5
MS	**Materials Selection across Materials Classes**									**5**
MS1	Materials Selection across Materials Classes			2V	3					3
MS2	Materials Selection and Sustainable Development			1S	2					2
SBI	**Sustainable Business Innovation**									**5**
SBI	Sustainable Business Innovation			2V+2Ü	5					5
CRM	**Critical Raw Materials**									**5**
CRM1	Critical Raw Materials					2V	2			2
CRM2	Seminar Critical Raw Materials					2S	3			3

Module overview: Focus area Digitalization in Materials Science

Module	Name of the Module or Course	1. Semester SWS	LP	2. Semester SWS	LP	3. Semester SWS	LP	4. Semester SWS	LP	LP.
SPD	**Simulation, Programming and Data Analysis**									**5**
SPD1	Numerical simulation of coupled physical processes (COMSOL)			1V+1Ü***	2***	1V+1Ü	2			2
SPD2	Programming for scientific and engineering applications (Matlab)			1V+1Ü***	2***	1V+1Ü	2			2
SPD3	Data analysis of scientific and engineering data (Origin)			1Ü***	1***	1Ü	1			1
MI	**Materials Informatics**									**5**
MI1	Machine Learning in Materials Science			2V+2Ü	3	2V+2Ü***	3***			3
MI2	Emerging Trends in Materials Informatics			1S	2					2
CMM	**Computational Materials Modeling**									**5**
CMM	Computational Materials Modeling					2V+2Ü	5			5
DSP	**Data Science for Polymers**									**5**
DSP	Data Science for Polymers					1V+1Ü+3P	5			5

Module overview: Compulsory Elective Area Social, Economical and Legal Aspects of Sustainability

Module	Name of the Module or Course	1. Semester SWS	LP	2. Semester SWS	LP	3. Semester SWS	LP	4. Semester SWS	LP	LP.
PoE	**Principles of Entrepreneurship**									**6**
PoE	Principles of Entrepreneurship	2V+2Ü	6	2V+2Ü***	6***					3
IE	**Impact Entrepreneurship - Developing Social and Ecological Innovations**									**6**
IE	Impact Entrepreneurship - Developing Social and Ecological Innovations	2V+2Ü	6	2V+2Ü***	6***					6
TPI	**Technopreneurship for Engineers**									**6**
TPI1	Technopreneurship for Engineers	2V	2	2V***	2***					2
TPI2	Exercise: Technopreneurship for Engineers	2Ü	4	2Ü***	4***					4
IM	**Innovation Management**									**6**
IM1	Innovation Management 1	2V	3	2V***	3***					3

IM2	Innovation Management 2	2V	3	2V***	3***					3
SEC	**Social Entrepreneuship Cases: Analyzing Social Businesses**									**6**
SEC	Social Entrepreneuship Cases: Analyzing Social Businesses			2V+2Ü	6					6