

**SYLLABUS**

**STUDY YEAR 2024/2025**

# **Master Programme in Materials Engineering**

## **Enrollment semester Autumn 2024**

DATE

**2023-10-25**

REFERENCE NO.

**LTU-4449-2023**

DECISION MAKER

**Ordförande teknisk fakultetsnämnd**

## Programme content and structure

Education for the degree of Master of Science is given in conjunction with the University of Saarland (Germany), Nancy (France), Barcelona (Spain) and from 2021 also Leoben (Austria) and Pauda (Italy). During the programme students spend at least one term during their second year at one of these universities.

Within the field of Materials Technology, during the first year the structure and properties of materials are covered, together with experimental methods within materials science. It is possible to choose different areas of specialisation in the form of five different electives: Advanced Metallic Materials, Polymers and Composites, High Performance Surfaces, Materials Engineering and Manufacturing Technologies, Bio/Nanomaterials. During the second year a project is completed within materials technology and material development connected to development work in cooperation with industry or within a field of current research. The last year of the programme comprises the Masters thesis. This is carried out at the university in which the student has been accepted or at the university where the student has spent the third term.

For a Masters thesis in the field of Materials Technology (120 credits) at least 90 credits comprise courses at an advanced level. Students can not combine courses Laser Material Processing (T0018T) with Material Selection & Eco Design (T0007T). The degree requires that the student spends at least one term at one cooperating university in Saarland (Germany), Nancy (France), Barcelona (Spain), Leoben (Austria) or Pauda (Italy) and have completed courses at an advanced level (specially specified).

For admission to the degree project course, entry requirements specified in the course syllabus must be completed. Information regarding the application- and admission process is given and ensured by the responsible department.

Degree project can also be performed in Saarbrücken, Nancy, Barcelona, Leoben or Padu.

Swedish for beginners is offered for overseas students. The course is not included in the degree, and is read in addition to the obligatory courses.

## Credits

120 credits

## Degree

- Degree of Master of Science (120 credits) - Major; Materials Science and Engineering

## Specialisations

### Profile

- Track 1 Advanced Metallic Materials
- Track 2 Polymers and Composites
- Track 3 Smart Surfaces and Functional Materials
- Track 4 Advanced Processing Technologies
- Track 5 Bio/Nano materials

## Entry requirements

Bachelors degree of minimum 180 ECTS with at least 60 ECTS in the area of mechanical engineering, material science, physics or chemistry. At least 22,5 credits in Mathematics at university level is required.

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Good knowledge in English, equivalent to English 6

## Selection

The selection procedure is based on academic qualifications, quality and quantity aspects

### Selection group

Academic: 100%

## Compulsory courses

### Compulsory courses 60 credits

Course code	Course	Cr	Level	Comment
E7009T	Degree project in Materials Technology, Master	30	Master's level	
T0028T	Materials Science and Engineering: an introduction	7.5	Bachelor's level	
T0029T	Materials processing	7.5	Bachelor's level	
T7001T	Deformation and Fracture	7.5	Master's level	
T7003T	Advanced Materials Characterisation Techniques	7.5	Master's level	

#### Profile:

Choose courses within one of five areas of specialisation

### Language course/s, 7.5 credits, the choice will depend on the choice of country and prior knowledge 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
L0005S	French for Beginners 1	7.5	Bachelor's level	Selectable
L0006S	Spanish for Beginners 1	7.5	Bachelor's level	Selectable
L0007S	German for Beginners 1	7.5	Bachelor's level	Selectable
L0008S	Spanish for Beginners 2	7.5	Bachelor's level	Selectable
L0009S	German for Beginners 2	7.5	Bachelor's level	Selectable
L0028S	French for Beginners 2	7.5	Bachelor's level	Selectable
S0046P	Swedish for International Students 1	3	Bachelor's level	Selectable
S0047P	Swedish for International Students 2	4.5	Bachelor's level	Selectable

#### S0046P Swedish for International Students 1, 3 credits

Non-Scandinavian students are offered the course in addition to the requirements for graduation

### Course in Luleå 30 credits

Selective space is 30 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7009T	Material Science & Engineering, project course	30	Master's level	Selectable

**Or**

### **Course at one of this places 30 credits**

Selective space is 30 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
	Courses in Saarbrücken	30		Selectable
	Courses in Barcelona	30		Selectable
	Courses in Nancy	30		Selectable

## **Profile: Track 1 Advanced Metallic Materials**

### **Advanced Metallic Materials: Compulsory course 7.5 credits**

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7008T	Phase Transformations	7.5	Master's level	Selectable

### **Advanced Metallic Materials: Two of the following are compulsory 15 credits**

Selective space is 15 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T0007T	Material Selection & Eco Design	7.5	Bachelor's level	Selectable
T7002T	Materials Modeling	7.5	Master's level	Selectable
T7004T	Surface Engineering	7.5	Master's level	Selectable
T7006T	Nanostructured Materials and Nanotechnology	7.5	Master's level	Selectable
T7028T	Metal Working	7.5	Master's level	Selectable

## Profile: Track 2 Polymers and Composites

### Polymers and Composites: Compulsory courses 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7012T	Composite Materials	7.5	Master's level	Selectable

### Polymers and Composites: One of the following are compulsory 15 credits

Selective space is 15 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T0018T	Laser Material Processing	7.5	Bachelor's level	Selectable
T7005T	Aerospace Materials	7.5	Master's level	Selectable
T7008T	Phase Transformations	7.5	Master's level	Selectable
T7016T	Material mechanics	7.5	Master's level	Selectable
T7029T	Composites Manufacturing and Lightweight Design	7.5	Master's level	Selectable

## Profile: Track 3 Smart Surfaces and Functional Materials

### Smart Surfaces and Functional Materials: Compulsory course 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7004T	Surface Engineering	7.5	Master's level	Selectable

### Smart Surfaces and Functional Materials: One of the following are compulsory 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7008T	Phase Transformations	7.5	Master's level	Selectable
T7016T	Material mechanics	7.5	Master's level	Selectable

## Smart Surfaces and Functional Materials: One of the following are compulsory 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T0007T	Material Selection & Eco Design	7.5	Bachelor's level	Selectable
T7002T	Materials Modeling	7.5	Master's level	Selectable
T7006T	Nanostructured Materials and Nanotechnology	7.5	Master's level	Selectable
T7028T	Metal Working	7.5	Master's level	Selectable

## Profile: Track 4 Advanced Processing Technologies

### Advanced Processing Technologies: Compulsory courses 15 credits

Selective space is 15 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T0018T	Laser Material Processing	7.5	Bachelor's level	Selectable
T7015T	Advanced processing and CyberLab	7.5	Master's level	Selectable

### Advanced Processing Technologies: One of the following is compulsory 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7002T	Materials Modeling	7.5	Master's level	Selectable
T7004T	Surface Engineering	7.5	Master's level	Selectable
T7006T	Nanostructured Materials and Nanotechnology	7.5	Master's level	Selectable

Course code	Course	Cr	Level	Comment
T7012T	Composite Materials	7.5	Master's level	Selectable
T7017T	Biocomposites	7.5	Master's level	Selectable
T7028T	Metal Working	7.5	Master's level	Selectable
T7029T	Composites Manufacturing and Lightweight Design	7.5	Master's level	Selectable

## Profile: Track 5 Bio/Nano materials

### Bio/Nanomaterials: Compulsory courses 15 credits

Selective space is 15 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T7006T	Nanostructured Materials and Nanotechnology	7.5	Master's level	Selectable
T7017T	Biocomposites	7.5	Master's level	Selectable

### Bio/Nanomaterials: One of the following are compulsory 7.5 credits

Selective space is 7.5 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
T0018T	Laser Material Processing	7.5	Bachelor's level	Selectable
T7008T	Phase Transformations	7.5	Master's level	Selectable
T7016T	Material mechanics	7.5	Master's level	Selectable

## Study schedule

### Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025

Study-period	Course code	Course	Cr	Comment
1	S0046P	Swedish for International Students 1	3	Selectable
1	S0047P	Swedish for International Students 2	4.5	Selectable
1	T0028T	Materials Science and Engineering: an introduction	7.5	
1	T7001T	Deformation and Fracture	7.5	
1-2	L0005S	French for Beginners 1	7.5	Selectable
1-2	L0006S	Spanish for Beginners 1	7.5	Selectable
1-2	L0007S	German for Beginners 1	7.5	Selectable
2	T0029T	Materials processing	7.5	
3-4	L0008S	Spanish for Beginners 2	7.5	Selectable
3-4	L0009S	German for Beginners 2	7.5	Selectable
3-4	L0028S	French for Beginners 2	7.5	Selectable
4	T7003T	Advanced Materials Characterisation Techniques	7.5	

### Year of study 2 Enrollment semester Autumn 2024, Is offered in 2025/2026, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	S0046P	Swedish for International Students 1	3	Selectable
1-2		Courses in Saarbrücken	30	Selectable
1-2		Courses in Barcelona	30	Selectable
1-2		Courses in Nancy	30	Selectable
1-2	T7009T	Material Science & Engineering, project course	30	Selectable
3-4	E7009T	Degree project in Materials Technology, Master	30	Entry requirements

## Profile: Track 1 Advanced Metallic Materials

**Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025**

Study-period	Course code	Course	Cr	Comment
2	T7008T	Phase Transformations	7.5	Selectable
3	T7002T	Materials Modeling	7.5	Selectable
3	T7004T	Surface Engineering	7.5	Selectable
3	T7028T	Metal Working	7.5	Selectable
4	T0007T	Material Selection & Eco Design	7.5	Selectable
4	T7006T	Nanostructured Materials and Nanotechnology	7.5	Selectable

## Profile: Track 2 Polymers and Composites

**Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025**

Study-period	Course code	Course	Cr	Comment
2	T0018T	Laser Material Processing	7.5	Selectable
2	T7008T	Phase Transformations	7.5	Selectable
2	T7016T	Material mechanics	7.5	Selectable
3	T7012T	Composite Materials	7.5	Selectable
4	T7005T	Aerospace Materials	7.5	Selectable
4	T7029T	Composites Manufacturing and Lightweight Design	7.5	Selectable

## Profile: Track 3 Smart Surfaces and Functional Materials

**Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025**

Study-period	Course code	Course	Cr	Comment
2	T7008T	Phase Transformations	7.5	Selectable
2	T7016T	Material mechanics	7.5	Selectable
3	T7002T	Materials Modeling	7.5	Selectable
3	T7004T	Surface Engineering	7.5	Selectable
3	T7028T	Metal Working	7.5	Selectable
4	T0007T	Material Selection & Eco Design	7.5	Selectable
4	T7006T	Nanostructured Materials and Nanotechnology	7.5	Selectable

## Profile: Track 4 Advanced Processing Technologies

**Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025**

Study-period	Course code	Course	Cr	Comment
2	T0018T	Laser Material Processing	7.5	Selectable
3	T7002T	Materials Modeling	7.5	Selectable
3	T7004T	Surface Engineering	7.5	Selectable
3	T7012T	Composite Materials	7.5	Selectable
3	T7015T	Advanced processing and CyberLab	7.5	Selectable
3	T7017T	Biocomposites	7.5	Selectable
3	T7028T	Metal Working	7.5	Selectable
4	T7006T	Nanostructured Materials and Nanotechnology	7.5	Selectable
4	T7029T	Composites Manufacturing and Lightweight Design	7.5	Selectable

## Profile: Track 5 Bio/Nano materials

**Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025**

Study-period	Course code	Course	Cr	Comment
2	T0018T	Laser Material Processing	7.5	Selectable
2	T7008T	Phase Transformations	7.5	Selectable
2	T7016T	Material mechanics	7.5	Selectable
3	T7017T	Biocomposites	7.5	Selectable
4	T7006T	Nanostructured Materials and Nanotechnology	7.5	Selectable