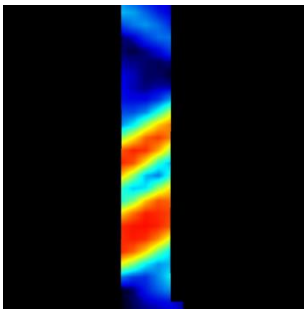
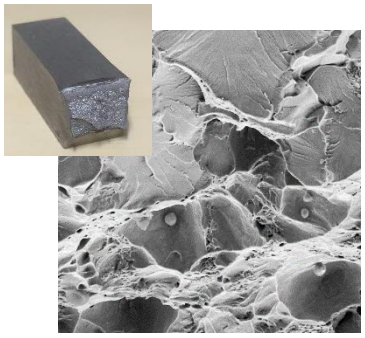
Engineering Materials

Materials are "the stuff that stuff is made of". Advances in the science and technology of the materials we can use are key enablers of technological progress. Mechanical engineers specialised in the materials science of the most important engineering materials keep these advances coming, and understand which advances to focus on from users' as well as producers' perspective.

This specialisation can be complemented for example with application-specific courses for a particular industry, or with design and modelling skills, or with materials-related courses from other programmes and schools. Some examples of study paths in mechanical engineering with a specialisation in engineering materials include:



- **Materials Engineer for Manufacturing**
- **Materials Specialist**
- **Mechanics of Materials**



Graduates with an Engineering Materials focus are employed at large and small companies, start-ups, research institutes and universities, and government agencies, for example, in roles like product development and manufacturing, research, and management.

Study path: Materials Engineer for Manufacturing

Profile

A materials engineer working in a manufacturing environment needs to thoroughly understand the role of materials properties on the product, its design, and how those are affected by the manufacturing process, as well as be conversant about manufacturing technology.

Studies

List of suitable courses for this study path is shown below. All courses are 5 ECTS.

Materials Engineer for Manufacturing

First Year

Autumn		Spring			Summer
I	II	III	IV	V	
MEC-E1001 Mechanical Engineering in Society					
MEC-E1003 Machine Design Project		**MEC-E7002** Manufacturing Methods I			
MEC-E1070 Selection of Engineering Materials	**MEC-E1090** Quality Management and Metrology	**MEC-E6001** Engineering Metals and Alloys	**MEC-E7003** Manufacturing Methods II		
MEC-E1060 Machine Design	**MEC-E1080** Production Engineering	**MEC-E5001** Mechatronic Machine Design	**MEC-E7005** Advanced Casting Technology	**MEC-E6002** Welding Technology and Design	
			MEC-E7006 Advanced Manufacturing		

Second year

Autumn		Spring			
I	II	III	IV	V	
MEC-E3001 Product Development Project (*10 cr.*)					
MEC-E3002 Methods in Early Product Development	**MEC-E6004** Non-Destructive Testing	Master's Thesis (30 cr.)			
MEC-E6003 Materials Safety					

Study Path: Materials Specialist

Profile

A materials specialist is able to understand and predict all the important aspects of the behaviour of materials in a given application. The role of accurate models for failure mechanisms in ensuring safe operation of critical systems makes this job especially important.

Studies

List of suitable courses for this study path is shown below. All courses are 5 ECTS.

Materials Specialist

First Year

Autumn		Spring			Summer
I	II	III	IV	V	
MEC-E1001 Mechanical Engineering in Society					
MEC-E1003 Machine Design Project		**PHYS-E0422** Soft Condensed Matter Physics			
MEC-E1070 Selection of Engineering Materials	**MEC-E1050** Finite Element Method in Solids	**MEC-E6001** Engineering Metals and Alloys	elective	**MEC-E6002** Welding Technology and Design	
MEC-E1060 Machine Design	**MEC-E1080** Production Engineering	**MEC-E8001** Finite Element Analysis	**MEC-E7005** Advanced Casting Technology	**MEC-E8007** Fracture Mechanics	

Second year

Autumn		Spring			
I	II	III	IV	V	
MEC-E6006 Engineering Materials Laboratory		Master's Thesis (30 cr.)			
MEC-E6003 Materials Safety	**MEC-E6004** Non-Destructive Testing				
elective	**MEC-E8006** Fatigue of Structures				

Study path: Mechanics of Materials

Profile

An expert in mechanics of materials knows the physical mechanisms underlying mechanical behaviour, and is able to use that knowledge in performing and interpreting simulations and experiments.

Studies

List of suitable courses for this study path is shown below. All courses are 5 ECTS.

Mechanics of Materials

First Year

Autumn		Spring			Summer
I	II	III	IV	V	
MEC-E1001 Mechanical Engineering in Society					
		PHYS-E0422 Soft Condensed Matter Physics		**MEC-E1005** Modelling in Applied Mechanics	
MEC-E1070 Selection of Engineering Materials	**MEC-E1050** Finite Element Method in Solids	**MEC-E6001** Engineering Metals and Alloys	**MEC-E8003** Beam, Plate, and Shell Models	**MEC-E6005** Engineering Materials Seminar	
MEC-E1030 Random Loads and Processes	**MEC-E1040** Dynamics of Structures	**MEC-E8001** Finite Element Analysis	elective	**MEC-E8007** Fracture Mechanics	

Second year

Autumn		Spring			Summer
I	II	III	IV	V	
MEC-E6006 Engineering Materials Laboratory		Master's Thesis (30 cr.)			
MEC-E6003 Materials Safety	**MEC-E6004** Non-Destructive Testing				
MEC-E8005 Thin-Walled Structures	**MEC-E8006** Fatigue of Structures				