

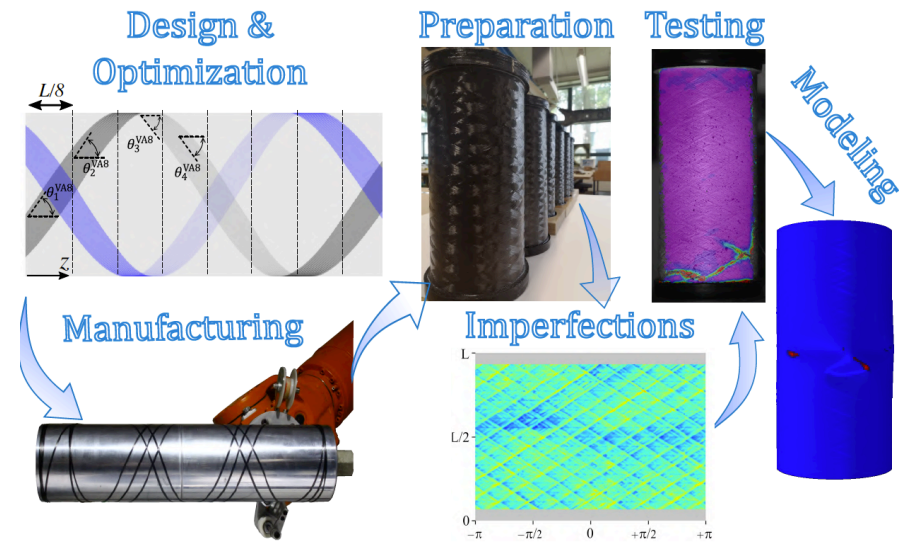
Solid Mechanics

Experts in solid mechanics are needed to ensure the safety and durability of new products, machines and structures. Studies in solid mechanics combine theoretical, numerical, and practical notions that are necessary to tackle engineering problems related to the deformation of materials and structures. Knowledge of material science, machine design, manufacturing and product development may also be useful in your future career. Here, three different study paths related to solid mechanics are proposed:

- **Structural Engineer**
- **Computational Engineer**
- **Project Engineer**

Each study path offers a different balance between solid mechanics, material science, machine design, and manufacturing. These study paths are detailed below, but they are suggestions that can be modified based on your personal interests and background. Students can select other courses from the MSc in Mechanical Engineering, or other programs, such as Mathematics or Civil Engineering.

An expertise in solid mechanics will allow you to work in wide range of engineering disciplines. For example, recent graduates are now working in companies designing wind turbines, medical devices, elevators, marine propellers, wooden structures and large-scale steel constructions. Others are conducting research either in governmental institutes or universities.



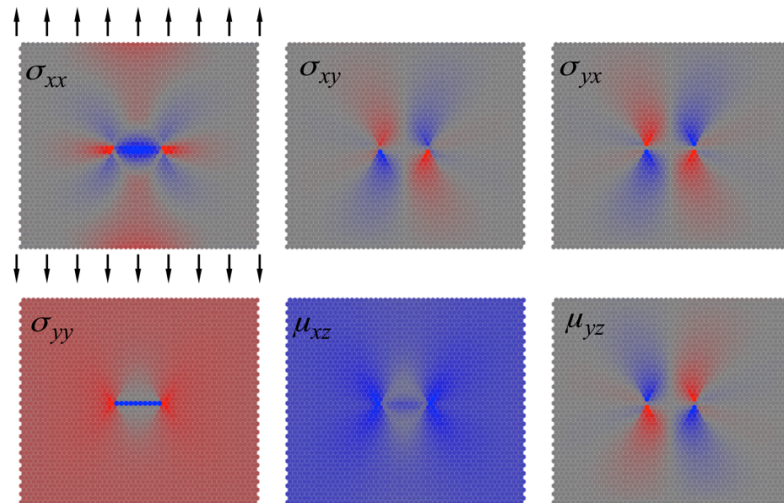
$$\left[\begin{aligned}
 \delta W^{\text{ext}} &= \delta \int_V (\vec{f} \cdot \vec{u}) dV \\
 \delta W^{\text{int}} &= -\delta \frac{1}{2} \int_V (\vec{\sigma} : \vec{\varepsilon}_c) dV \\
 \delta W^{\text{coh}} &= -\delta \frac{1}{2} \int_A \vec{t}^c \cdot \llbracket \vec{u} \rrbracket dA \\
 \delta W^{\text{jmp}} &= \delta \int_A \sum_e \vec{t}^e \cdot (\vec{u}^e - \vec{u}^*) dA \\
 \delta W^{\text{lsq}} &= -\delta \frac{1}{2} \int_A \sum_e |\vec{t} \cdot (\vec{u}^e - \vec{u}^*)|^2 dA
 \end{aligned} \right.$$

Study Path: Structural Engineer

Profile: A structural engineer has a strong expertise in mechanics of materials and structures. This specialist combines theoretical and practical knowledge in material science, numerical methods and continuum mechanics.

Studies: Recommended courses for this study path are provided on the right. This list can be modified depending on your background and personal preferences. All courses are 5 ECTS, and the MSc thesis should be completed in the 2nd spring.

Work environment: A structural engineer can work as an expert in a product development team of a large company, a consultancy company, a research centre, or university. This specialist may be interested in continuing their studies to the doctorate level.



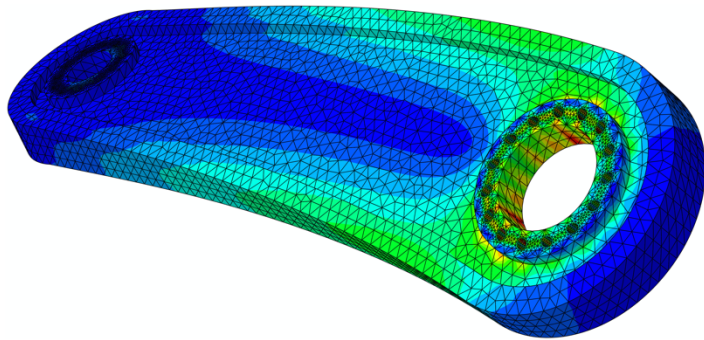
Code	Course	Period	Year
Common Studies			
MEC-E1001	Mechanical Engineering in Society	I-V	1
MEC-E1005	Modelling in Applied Mechanics	V	1
MEC-E1010	Dynamics of Rigid Body	I	1
MEC-E1040	Dynamics of Structures	II	1
MEC-E1050	Finite Element Method in Solids	II	1
MEC-E1070	Selection of Engineering Materials	I	1
Engineering materials			
MEC-E6003	Materials Safety	I	2
MEC-E6007	Mechanical Testing of Materials	IV-V	1
Solid Mechanics			
MEC-E8001	Finite Element Analysis	III	1
MEC-E8002	Continuum Mechanics and Material Modelling	III	1
MEC-E8003	Beam, Plate and Shell Models	IV	1
MEC-E8005	Thin-walled Structures	I	2
MEC-E8006	Fatigue of Structures	II	2
MEC-E8007	Fracture Mechanics	V	1
Add four electives, suggestions:			
MEC-E1030	Random Loads and Processes	I	
MEC-E6001	Engineering Metals and Alloys	V	
MEC-E6005	Engineering Materials Seminar	V	
MEC-E6006	Engineering Materials Laboratory	I-II	
CIV-E4060	Steel Structures	IV	
CHEM-E2105	Wood and Wood Products	III-IV	

Study Path: Computational Engineer

Profile: A computational engineer knows the fundamental laws of solid and fluid mechanics, and understands how these principles are implemented in numerical methods. This expert is able to use numerical tools to solve engineering problems related to mechanics of structures and/or fluid flows.

Studies: Recommended courses for this study path are provided on the right. This list can be modified depending on your background and personal preferences. All courses are 5 ECTS, and the MSc thesis should be completed in the 2nd spring.

Work environment: A computational engineer can work in a research or product development team of a large company, as a consultant in company specialized in numerical simulations, at a research centre, or university. This specialist may be interested in continuing their studies to the doctorate level.



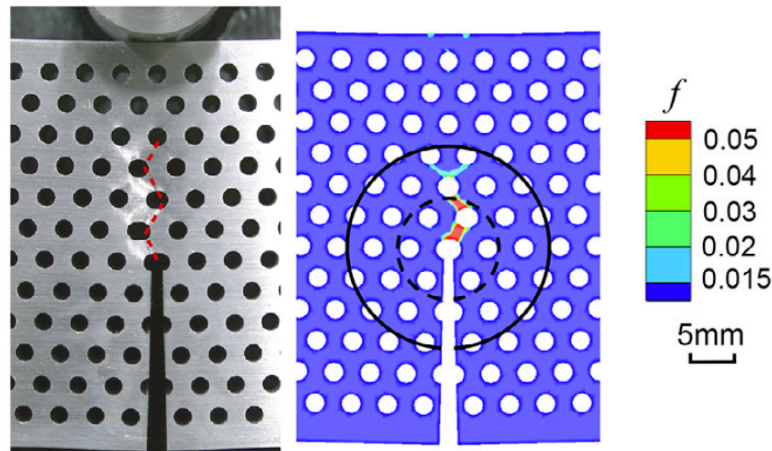
Code	Course	Period	Year
Common Studies			
MEC-E1001	Mechanical Engineering in Society	I-V	1
MEC-E1005	Modelling in Applied Mechanics	V	1
MEC-E1010	Dynamics of Rigid Body	I	1
MEC-E1020	Fluid Dynamics	I	1
MEC-E1040	Dynamics of Structures	II	1
MEC-E1050	Finite Element Method in Solids	II	1
Marine Technology			
MEC-E2010	Computational Fluid Modelling	I-II	2
Engineering Materials			
MEC-E6001	Engineering Metals and Alloys	V	1
MEC-E6003	Materials Safety	I	2
Solid Mechanics			
MEC-E8001	Finite Element Analysis	III	1
MEC-E8002	Continuum Mechanics and Material Modelling	III	1
MEC-E8003	Beam, Plate and Shell Models	IV	1
MEC-E8006	Fatigue of Structures	II	2
MEC-E8007	Fracture Mechanics	V	1
Add four electives, suggestions:			
MEC-E1030	Random Loads and Processes	I	
MEC-E1070	Selection of Engineering Materials	I	
MEC-E6005	Engineering Materials Seminar	V	
MEC-E8005	Thin-walled Structures	I	
EEN-E2001	Computational Fluid Dynamics	III-IV	
CIV-E4080	Material Modelling in Civil Engineering	V	

Study Path: Project Engineer

Profile: A project engineer has a broad knowledge of mechanical engineering, combining notions of solid and fluid mechanics, materials science, manufacturing and product development. Communications skills, creativity and teamwork are also essential to excel as a project engineer.

Studies: Recommended courses for this study path are provided on the right. This list can be modified depending on your background and personal preferences. All courses are 5 ECTS, and the MSc thesis should be completed in the 2nd spring.

Work environment: A young project engineer is likely to work in a product development team in a small, medium or large company. Later, an experienced professional is likely to lead a team of engineers and manage large projects.



Code	Course	Period	Year
Common Studies			
MEC-E1001	Mechanical Engineering in Society	I-V	1
MEC-E1005	Modelling in Applied Mechanics	V	1
MEC-E1010	Dynamics of Rigid Body	I	1
MEC-E1020	Fluid Dynamics	I	2
MEC-E1040	Dynamics of Structures	II	1
MEC-E1050	Finite Element Method in Solids	II	1
MEC-E1060	Machine Design	I	1
MEC-E1070	Selection of Engineering Materials	I	2
MEC-E1080	Production Engineering	I-II	1
Production Engineering			
MEC-E7002	Manufacturing Methods I	III-IV	1
MEC-E7003	Manufacturing Methods II	IV-V	1
Solid Mechanics			
MEC-E8001	Finite Element Analysis	III	1
MEC-E8006	Fatigue of Structures	II	2
MEC-E8007	Fracture Mechanics	V	1
Add four electives, suggestions:			
MEC-E3002	Methods in Early Product Development	I	
MEC-E6001	Engineering Metals and Alloys	V	
MEC-E6002	Welding Technology and Design	V	
MEC-E6003	Materials Safety	I	
MEC-E6004	Non-destructive Testing	II	
MEC-E6005	Engineering Materials Seminar	V	
MEC-E8003	Beam, Plate and Shell Models	IV	