



Occupation and fields of activity

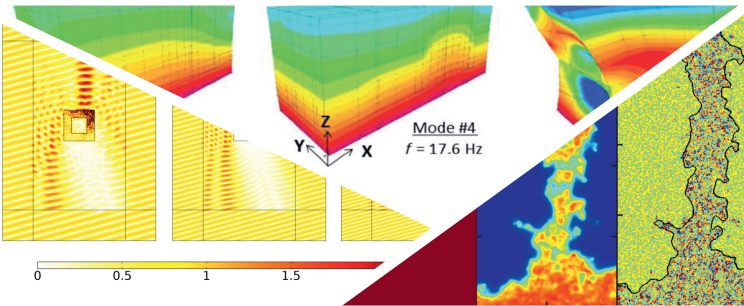
The construction industry has a significant impact on global energy consumption and carbon dioxide emissions. With building operations accounting for 36% of global energy consumption and 39% of carbon dioxide emissions globally, it's no surprise that the United Nations has made sustainable development in the building sector a top priority. However, there is a shortage of civil engineers with the expertise to design and implement sustainable building practices.

To fill this gap, the new Master's program „Mechanics of Sustainable Materials and Structures“ offers students the opportunity to acquire expertise and an open-minded sensitivity towards sustainable solutions. With a high mobility scheme, graduates of the program will be equipped to build their careers in any of the three participating European countries (Germany, Italy, France) and abroad. The program represents a unique opportunity for aspiring civil engineers to become leaders in the field of sustainable construction, making a significant contribution to the clean energy transition and building a more sustainable future for all.



Profile of degrees program

- » Degree: Master of Science
- » Language of instruction: English
- » Total credits: 120 credits (ECTS)
- » Specializations:
 1. Structural Engineering
 2. Advanced Mechanics
 3. Resource-efficient Design
 4. Innovative Materials and Structures
- » Admission rhythm: winter semester
- » Assignment: research-oriented



Admission requirements, application and enrolment

Admission requirements are specified in the Admission Regulations of this program. Admission and enrolment of students are subject to the following requirements: a first-cycle degree in civil engineering according to the European Qualifications Framework or an equivalent degree. This equivalence will be established by the Admissions Board of the program.

The qualifying degree must have been completed with an average grade of at least B (or a final grade of at least B) according to the ECTS grading system, i.e. the best 35% of the students (corresponding to a grade of up to 2,8 („befriedigend“/„satisfactory“) in the German grading system). Knowledge of English, native speaker or at least B2 level, is required.

Application deadline:

- 02.01 - 15.07 (international Bachelor) or
- 15.03 - 15.08 (German/European Bachelor)

Estimated tuition fees: 1500€ per semester



Information on studying and applying



Faculty of Architecture and Civil Engineering;

August-Schmidt-Straße 8, DE-44227 Dortmund
<https://bmsd.ab.tu-dortmund.de/en/studium/ms2/>



Department of Civil, Environmental and Mechanical Engineering;

Via Mesiano 77, IT-38123 Trento
<https://www.dicam.unitn.it/en>



Department of Mechanics, Materials and Civil Engineering;

1 Rue de la Noe, FR-44321 Nantes
<https://www.ec-nantes.fr/english-version/study/joint-msc-programmes>



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MECHANICS OF SUSTAINABLE MATERIALS AND STRUCTURES (M.SC.)



Multiple Degrees offered on a joint curriculum by



Faculty of Architecture and Civil Engineering, TU-Dortmund University (Germany)



Department of Civil, Environmental and Mechanical Engineering, University of Trento (Italy)



Department of Mechanics, Materials and Civil Engineering, Ecole Centrale de Nantes (France)



Short portrait of the study program

The Master's program "Mechanics of Sustainable Materials and Structures" is a multiple-degree diploma offered through joint training activities by the Faculty of Architecture and Civil Engineering of TU-Dortmund University (Germany), the Department of Civil, Environmental and Mechanical Engineering of the University of Trento (Italy) and the Department of Mechanics, Materials and Civil Engineering of the Ecole Centrale de Nantes (France).

This program is designed to train the next generation of civil engineers with the expertise to design and implement innovative building technologies with a focus on sustainable materials and structures. The goal of the master's program is to educate future leaders in the development of innovative solutions for sustainability and performance in the built environment by fostering creative and independent thinking and promoting low-impact oriented problem-solving.

This is done by providing a solid background in fundamental mechanics, coupled with cutting-edge research in innovative materials and structures, and a research and development environment in the private sector. This cocktail of solid fundamental skills, innovative research and link to the private sector is the perfect environment to train engineers who are able to provide innovative solutions to the global today's challenges.

The program qualifies graduates for research-related and technical professional activities in the areas of

- » *Advanced Mechanics for Innovative Materials and Structures,*
- » *Materials and Structures under Extreme Conditions,*
- » *Materials and Structures in their Environment.*

It also prepares students for Ph.D. studies on advanced research topics related to the mechanics of materials and structures in the field of civil engineering.

Three Master's degrees in total – each university will award a separate Master's degree.

» **Master of Science in Bauingenieurwesen** in Germany

» **Laurea Magistrale in Ingegneria Civile** in Italy

» **Master sciences, technologies, santé, mention génie civil / Civil engineering** in France



Mechanics of Sustainable Materials and Structures (M.Sc.)

As of: 09/2023

1. Semester (WS)		2. Semester (SS)		3. Semester (WS)		4. Semester (SS)	
	Credits		Credits		Credits		Credits
						Master Thesis	
Engineering Mathematics	5 Cr					» Master Thesis at one of the three partner institutions » Possible collaboration with associate partners	
Advanced Continuum Mechanics	8 Cr						
Enriched Continua and Metamaterials	5 Cr						
Nonlinear Structural Analysis	6 Cr						
		Modeling and Simulation of Structures	6 Cr	Coupled problems in mechanics		6 Cr	
		Stability of Structures	6 Cr	Homogenization Methods for Materials and Structures		5 Cr	
		Mechanics of Solids and Structures under Extreme Conditions	6 Cr	Mechanics of Porous Media		5 Cr	
		Machine Learning for Wireless Structural Health Monitoring	6 Cr	Design and Behavior of Modern Concrete		5 Cr	
				Modern Languages		2 Cr	
				Summer School		2 Cr	
Elective Module I+II	3+3 Cr	Elective Module III » Metastructures » Risk analysis and structural reliability		Elective Module IV » Durability and Structural Maintenance » Earthquake Engineering			
» Construction with trees in practice							
» "How sustainable can building materials be?"							
» Structural Systems in Engineering Practices							
» Organic design and structures							
Credits (ETCS)	30	Credits (ETCS)	30	Credits (ETCS)	30	Credits (ETCS)	30