

Erasmus Mundus master's degree in Computational Mechanics

This bachelor's degrees does not offer places for 2018-2019 academic year.

The **Erasmus Mundus master's degree in Computational Mechanics** is designed for students who wish to develop their knowledge and competency in the field of computational mechanics with applications in solids, fluids and interdisciplinary fields. The goal is to provide them with the skills needed for modelling, formulating, analysing and implementing simulation tools for advanced engineering problems, as well as skills for understanding these approaches in the broader context of engineering science. An entrepreneurial component complements these skills, providing students with tools for setting up successful businesses and enhancing their own employability.

This master's degree has received the International **Master's Programme distinction** (2013 call) awarded by the Government of Catalonia's Agency for the Management of University and Research Grants (AGAUR).

This master's degree is organised by an international consortium of five leading universities in cooperation with the International Centre for Numerical Methods in Engineering (CIMNE): Swansea University (UK), Ecole Centrale Nantes (France), Universität Stuttgart (Germany), Tsinghua University (China) and the UPC.

GENERAL DETAILS

Duration and start date

Two academic years, 120 ECTS credits

Timetable and delivery

Mornings and afternoons. Face-to-face

Fees and grants

The Erasmus Mundus Masters fees are determined by the University Consortium that organizes the studies. These fees are the same for all the participant universities. For more information, please do not hesitate to contact the master web site.

Language of instruction

English

Information on [language use in the classroom and students' language rights](#).

Official degree

[Recorded in the Ministry of Education's degree register](#)

PROFESSIONAL OPPORTUNITIES

Professional opportunities

The field of Computational Mechanics is constantly growing within European industry. Cutting-edge technological advancements depend upon the implementation and use of advanced computational simulation tools. This consistent expansion is reflected in an increasing demand for highly qualified professionals within this field. The strength of this master's degree can be measured by the graduate employment rate in leading R&D departments in industry (55%) and

the number of graduates continuing their education on doctoral programmes related to Computational Mechanics (40%).

Competencies

Generic competencies

Generic competencies are the skills that graduates acquire regardless of the specific course or field of study. The generic competencies established by the UPC are capacity for innovation and entrepreneurship, sustainability and social commitment, knowledge of a foreign language (preferably English), teamwork and proper use of information resources.

Specific skills

On completing this master's degree, students will be able to:

- Complete and consolidate their basic training in problem-solving with numerical and computational methods.
- Attain advanced knowledge of the theory and application of numerical methods to the solution of engineering problems.
- Apply numerical methods using calculation programs, graphics pre- and post-processors, programming languages and calculation libraries.
- Complete and consolidate knowledge, criteria and critical thinking to come up with conventional solutions and analyse results in problems that are characteristic of numerical modelling.
- Acquire a critical awareness of the European Union and international vanguard in the use of numerical methods in engineering.
- Solve real engineering problems by the identification of the underlying mathematical model, the most appropriate method of calculation and the critical interpretation of the results.
- Independently use their knowledge and understanding of computational engineering to design solutions to new problems, incorporating theoretical and practical knowledge, from other disciplines where appropriate, and designing new, original and suitable problem-solving methods.
- Understand the applicability and the limitations of numerical modelling and existing calculation technologies.
- Attain knowledge of advanced numerical modelling and apply it to the different areas of engineering.
- Show knowledge of the latest numerical technologies for solving basic problems and also of the modern physical models of materials science.
- Learn and apply quality control techniques for numerical simulation using modern tools.
- Understand the applicability and the limitations of the different numerical simulation techniques and receive training in calculation methods: pre- and post-processing programs, programming languages and standard calculation libraries.

ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

European programme

Erasmus Mundus

UPC school

[Barcelona School of Civil Engineering \(ETSECCPB\)](#)

Participating institutions

[Universitat Politècnica de Catalunya \(UPC\)](#) - **coordinating** university

[École Central de Nantes \(France\)](#)

[Swansea University \(United Kingdom\)](#)

[Tsinghua University \(Xina\)](#)

[Universität Stuttgart \(Germany\)](#)

Academic coordinator

[Pedro Díez](#)

Academic calendar

[General academic calendar for bachelor's, master's and doctoral degrees courses](#)

Academic regulations

Academic regulations for master's degree courses at the UPC

CURRICULUM

Subjects	ECTS credits	Type
FIRST SEMESTER		
Advanced Discretization Methods	5	Optional
Advanced Fluid Mechanics	5	Compulsory
Communication Skills 1	5	Optional
Communication Skills 2	5	Optional
Computational Mechanics Tools	5	Optional
Continuum Mechanics	5	Compulsory
Entrepreneurship	5	Optional
Finite Element	5	Compulsory
Numerical Methods for Pdes	5	Compulsory
SECOND SEMESTER		
Computational Solid Mechanics	5	Optional
Computational Structural Mechanics and Dynamics	5	Optional
Coupled Problems	5	Optional
Domain Descomposition and Large Scale Scientific Computing	5	Optional
Finite Elements in Fluids	5	Optional
Programming for Engineers and Scientists	5	Optional
Master's Thesis	30	Project