UAB
Universitat Autònoma de Barcelona

Modelling Workshop

Code: 42255
ECTS Credits: 6

2025/2026

Degree	Type	Year
Modelización para la Ciencia y la Ingeniería / Modelling for Science and Engineering	OP	1

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Students must have mathematical and computational skills at the level of a science degree.

Objectives and Contextualisation

The Mathematical Modelling Workshop is aimed at analyzing and solving real-world problems by means of mathematics. It has a very practical and interdisciplinary character.

Learning Outcomes

1. CA15 (Competence) Properly integrate modelling tools at different scales or levels of description in the context of multidisciplinary work environments.
2. CA16 (Competence) Effectively communicate, both to an expert and general audience, the procedures and results obtained from modelling work and projects.
3. CA17 (Competence) Incorporate, in studies or modelling projects, ethical, sustainability, gender equality and/or social justice criteria.
4. KA13 (Knowledge) Identify the most common programming languages and environments in the field of modelling, as well as their applications.
5. KA14 (Knowledge) Describe the main mathematical tools to construct models, as well as the main results and/or predictions that can be obtained from them.

6. SA15 (Skill) Use specific software to solve modelling, optimisation and/or data processing problems.
7. SA16 (Skill) Apply mathematical analysis and optimisation techniques to construct mathematical models.
8. SA17 (Skill) Properly interpret the consequences of applying different mathematical tools/models to solve specific problems.

Content

Mathematical modelling, i.e. solving real-world problems by means of mathematics.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	38	1.52	
Project	112	4.48	

The
main activity of the workshop is the development of mathematical modeling projects by students organized in teams.

The
course is organized in three fundamental parts, in addition to some preparation sessions for the presentation of the projects and their evaluation.

Each
of the fundamental parts consists of five sessions of two hours each. The first two sessions of each part are dedicated to the presentation of a real life problem and to the introduction of the basic mathematical and computational tools necessary to address the solution of the proposed problem. In the following three sessions of each part of the course, students work in teams to provide a solution to the proposed problem. In these sessions the students are supervised and have the advice of the teaching staff of the subject to complete the projects.

At
the end of the course the three projects will be presented in the form of an oral dissertation and a written report.

The
projects that will be covered in this course are:

Solving
Resource Constrained Scheduling Problems

Predictive
Analysis of Extreme Geomagnetic Storm Occurrences Based on Historical Data

Identifying
the optimal population pharmacokinetics (popPK) model

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1. Team project. Written report	40	0	0	CA15, CA16, CA17, KA13, KA14, SA15, SA16, SA17
2. Team project. Oral presentation	30	0	0	CA15, CA16, CA17, KA13, KA14, SA15, SA16, SA17
3. Exam	30	0	0	

The mark of the evaluation items 1 will be the same for all members of each team, whereas those of items 2 and 3 have an individual character. In exceptional cases where a component of a team has collaborated clearly less than his/her teammates, his/her grades in item 1 will be multiplied by a factor less than 1.

Items 1 and 2 refer to the organization and expression of the discourse, both in writing (item 1) and in speech (item 2).

The exam (item 3) will deal with (a) the general concepts and illustrative examples addressed in the projects.

Bibliography

General: Ch. Rousseau + Y. Saint-Aubin, 2008. Mathematics and Technology. Springer.

The necessary bibliography and references are provided for each project.

Software

No specific software is required

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(TEm) Theory (master)	1	English	first semester	afternoon