UAB
Universitat Autònoma de Barcelona

Workshop in Modelling

2026/2027

Code: 100099
Credits: 9

Degree programme	Type	Course
Mathematics	OB	2

Contact lecturer

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Group languages

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

Prerequisites

(See the official version in catalan)

Objectives

(See the official version in catalan)

Mathematics is frequently motivated and driven by the need to solve real-world problems-often more so than might initially appear. This entails a process of "modeling" that encompasses aspects such as analyzing the problem, adopting simplifying assumptions, comparing model results with empirical data, and progressively refining the model. Indeed, various branches of science and technology are largely the product of this mathematical modeling process, which can sometimes be far from trivial. However, we may occasionally encounter a specific problem that requires the development of a tailored mathematical model-a task that might not be overly difficult to undertake. The general aim of this course is to familiarize students with this type of work.

In principle, the more mathematical knowledge one possesses, the easier it is to find a tool suited to the problem at hand. Yet, there is a common tendency to apply familiar tools unthinkingly, rather than properly analyzing the problem and developing more appropriate tools. Given this, it is entirely appropriate for this course to appear relatively early in the mathematics curriculum-before other subjects that expand the available

mathematical toolkit. In any case, it is quite likely that ideas will emerge at various points which actually lead into well-established areas of mathematics.

The course is essentially practical in nature-hence the name "workshop." Its main component is a project to be carried out by students working in teams. As explained below, this task is supervised by a professor, though generally, they do not intervene directly in the project's development. At the same time-and here the course instructors will be more directly involved-other examples will be developed to illustrate various types of mathematical models as well as the general concepts of mathematical modeling.

Given the above, it is evident that this is an essentially interdisciplinary course. This fact, combined with the relatively basic prerequisites, makes it suitable not only for mathematics students but also for students from other degree programs.

In short, the Mathematical Modeling Workshop is a highly practical, interdisciplinary course that bridges the gap between mathematics and the real world, aiming to traverse that bridge in both directions.

Learning outcomes

- CM18 (Explain to a specialist and non-specialist audience the results produced by the mathematical modelling of an elementary real-life problem.) Explain to a specialist and non-specialist audience the results produced by the mathematical modelling of an elementary real-life problem.
- CM19 (Propose new or alternative mathematical solutions for modelling an elementary real-life problem.) Propose new or alternative mathematical solutions for modelling an elementary real-life problem.
- CM20 (In specific real-life cases, discuss the limits of mathematical modelling with respect to the real situation being modelled.) In specific real-life cases, discuss the limits of mathematical modelling with respect to the real situation being modelled.
- KM28 (Select the relevant mathematical notions in the modelling of a real elementary problem.) Select the relevant mathematical notions in the modelling of a real elementary problem.
- SM23 (Build a simple mathematical model of a real-life problem.) Build a simple mathematical model of a real-life problem.
- SM24 (After solving a model, contrast the solution obtained in terms of its adjustment to the real phenomenon that was modelled.) After solving a model, contrast the solution obtained in terms of its adjustment to the real phenomenon that was modelled.
- SM25 (Structure the available information to select an appropriate mathematical model.) Structure the available information to select an appropriate mathematical model.
- SM26 (Describe a problem mathematically, drawing on the available information to select an appropriate model.) Describe a problem mathematically, drawing on the available information to select an appropriate model.

Contents

(See the official version in catalan)

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Lectures	15	0.6	
Team working seminars	60	2.4	
Personal work	148	5.92	

(See the official version in catalan)

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Oral exams and presentations	30%	2	0.08	CM18, CM19, CM20, KM28, SM23, SM24, SM25, SM26
Written memoir on the individual project and other possible individual submissions	30%	0	0	CM18, CM19, CM20, KM28, SM23, SM24, SM25, SM26
Written memoir and a possible exam on the team project	40%	0	0	CM18, CM19, CM20, KM28, SM23, SM24, SM25, SM26

(See the official version in catalan)

Assessment will be based on the various oral and written presentations given throughout the course. Since most of the work revolves around a project developed over the entire course, the assessment is continuous in nature, and the final result cannot be recovered or retaken .

To distinguish between a "fail" and "did not sit" (non-submission), a deadline is set for students to withdraw from the assessment; in such cases, they will be recorded as "did not sit." To withdraw, students must notify the professor in writing or via email and obtain an acknowledgment of receipt.

Assessment will focus on the following areas: specific aspects of mathematical modeling; the logical and formal organization of oral and written discourse; oral and written expression skills; and the originality of the content and the accuracy of the mathematical work. The project assessment will adopt the perspective of an entity interested in the problem at hand. Conceptually, a passing grade could correspond to a decision by that entity to "purchase the product," while the numerical grade would correspond to the price it would be willing to pay.

Although a significant portion of the work will be done in teams, the assessment is individual. Accordingly, the professor may assign individual tasks within each project. Furthermore, the division of labor must not prevent any team member from being able to account for the project's core content. In exceptional cases where a student has clearly contributed less to the team project than their peers, their project grade will be multiplied by a factor of less than 1. If deemed necessary, individual interviews and written exams regarding the project may also be conducted. Given the inevitable subjective component of the assessment criteria, the course instructors may seek the opinion of other professors if they consider it appropriate.

A minimum score of 3.5 must be obtained in each activity for them to be averaged according to the respective weightings. All work completed throughout the course will be taken into account when awarding any *Matrícula d'Honor* (distinction) grades, with special emphasis placed on individual assignments.

Bibliography

- Dilwyn Edwards, Mike Hamson, 2001 (2a ed). *Guide to Mathematical Modelling*. Macmillan-Palgrave.

- Frank R. Giordano, William P. Fox, Steven B. Horton, Maurice D. Weir, 2006 (4a ed). *A First Course in Mathematical Modeling*. Brooks/Cole.

- K. Eriksson, D. Estep, C. Johnson, 2004. *Applied Mathematics: Body and Soul* (3 vol). Springer.

- Christiane Rousseau, Yvan Sant-Aubin, 2008. *Mathematics and Technology*. Springer.

- Norman E. Steenrod, Paul R. Halmos, Menahem M. Schiffer, Jean A. Dieudonné, 1973. *How to Write Mathematics*. American Mathematical Society.

- Nicholas J. Higham, 1998. *Handbook of Writing for the Mathematical Sciences*. SIAM.

- Erica Thompson, 2022. Escape from model land: how mathematical models can lead us astray and what we can do about it. Hodder & Stoughton.

Software

No specific software is used in the course.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	second semester	morning-mixed
(SEM) Seminars	1	Catalan	second semester	morning-mixed
(SEM) Seminars	2	Catalan	second semester	morning-mixed