

27022 - Mathematical Modelling

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	453 - Degree in Mathematics
ECTS	6.0
Year	4
Semester	Half-yearly
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

Techniques and illustrative examples on Mathematical Modeling are provided. The student should be able to apply mathematics to other fields and to analyze and interpret mathematical models. Magistral classes, problems classes and practical sessions will be provided.

5.2.Learning tasks

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Magistral theoretical classes, with the development of practical cases.

Problems class that help students to solve problems.

There will be several practical sessions using the computer to illustrate mathematical models.

5.3.Syllabus

1. Mathematical Modeling: phases, types of models and techniques
2. Finite difference equations and discrete dynamic systems.
3. Positive matrices, Perron-Frobenius Theorem and applications to Economy and to Markov and Leslie processes.
4. Graph techniques, equilibrium models and applications to hydrocarbons.
5. Geometric Modeling and representation and fitting techniques for the models construction.
6. Evolution continuous models and applications to populations growth.

5.4.Course planning and calendar

Theoretical classes: 2 hours per week

Problems: 1 hour per week

Practical sessions: 1 hour per week

Tutorized groups: at least one session

5.5.Bibliography and recommended resources

- Adam, John A.: Mathematics in nature : Modeling Patterns in the natural world / John A. Adam . Princeton [etc.] : Princeton University Press, cop. 2003
- Gershenfeld, Neil A.: The nature of mathematical modeling / Neil Gershenfeld . - 1st ed., reprinted with corrections Cambridge : Cambridge University Press, 2003
- Mooney, Douglas D.: A course in mathematical modeling / Douglas D. Mooney and Randall J. Swift [Washington] : The mathematical Association of America, cop. 1999
- Ruth, M. and Hannon, B.: Modeling Dynamic Economic Systems, Springer, New York, 2012.
- Yang, X.-S.: Mathematical Modeling with Multidisciplinary Applications, John Wiley and Sons, Chichester, 2013.