

27031 - Dynamical Systems

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	453 - Degree in Mathematics
ECTS	6.0
Course	4
Period	First semester
Subject Type	Optional
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

The learning process that is designed for this subject is based on the following: lectures and problem solving classes will alternate, by the teacher and later by students. The computer will be used to perform the calculations necessary to apply the theory. The student must study assiduously the results explained and solve the proposed problems.

5.2. Learning activities

Formative activity 1: Acquisition of basic knowledge of Dynamical Systems.

27031 - Dynamical Systems

Methodology: Participatory Lectures in large group.

Formative activity 2: Use of scientific calculation programs for problem solving. Methodology: Learning to manage scientific calculation programs. Work experience

Formative activity 3: Problem Solving and analysis of case studies.

Methodology: problem-based learning. Teamwork and individual. Oral presentation of the results.

5.3.Program

- Dynamical Systems.
- Linear Dynamical Systems.
- Equilibrium points.
- Periodic orbits.
- Bifurcations
- Chaotic systems.
- Applications.

5.4.Planning and scheduling

Classes are held according to the academic calendar established by the University of Zaragoza and schedule approved by the Faculty of Sciences (see website). The specific dates for the presentation of solved exercises and other work will be announced in advance.

5.5.Bibliography and recommended resources

- Verhulst, Ferdinand. Nonlinear Differential Equations and Dynamical Systems: Springer, 1996.
- Perko, Lawrence. Differential equations and dynamical systems- 3rd ed. New York: Springer, 2001
- Strogatz, Steven H.. Nonlinear dynamics and chaos : with applications to physics, biology, chemistry, and engineering: Perseus Books, 2000
- Meiss, James D.. Differential dynamical systems: Society for Industrial and Applied Mathematics, cop. 2007
- Hirsch, Morris W.. Differential equations, dynamical systems, and an introduction to chaos- 2nd. ed. Amsterdam: Elsevier Academic Press, 2004.
- Wiggins, Stephen. Introduction to applied nonlinear dynamical systems and chaos- 2nd ed. New York: Springer, 2010