

Información del Plan Docente

Academic Year	2018/19
Subject	27031 - Dynamical Systems
Faculty / School	100 - Facultad de Ciencias
Degree	453 - Degree in Mathematics
ECTS	6.0
Year	4
Semester	First semester
Subject Type	Optional
Module	---

1.General information**1.1.Aims of the course****1.2.Context and importance of this course in the degree****1.3.Recommendations to take this course****2.Learning goals****2.1.Competences****2.2.Learning goals****2.3.Importance of learning goals****3.Assessment (1st and 2nd call)****3.1.Assessment tasks (description of tasks, marking system and assessment criteria)****4.Methodology, learning tasks, syllabus and resources****4.1.Methodological overview**

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.

4.2.Learning tasks

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

Methodology: Participatory Lectures in large group.

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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.

4.3.Syllabus

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

4.4.Course planning and calendar

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.

4.5.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