

27031 - Dynamical Systems

Syllabus Information

Academic Year: 2021/22

Subject: 27031 - Sistemas dinámicos

Faculty / School: 100 - Facultad de Ciencias

Degree: 453 - Degree in Mathematics

ECTS: 6.0

Year: 4

Semester: Second semester

Subject Type: Optional

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures and problem-solving sessions.

4.2. Learning tasks

This course is organized as follows:

- **Lectures.**
- **Problem-solving sessions.** Problem-solving and case studies. 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. Autonomous and group work. Oral presentation of the results.

The teaching activities and assessment tasks will take place in a face-to-face mode, except in the case that, due to the health situation, the dispositions emitted by the competent authorities and by the University of Zaragoza compel to take them to a greater or lesser extent in a telematic form.

4.3. Syllabus

This course will address the following topics:

- **Topic 1.** Dynamical Systems.
- **Topic 2.** Linear Dynamical Systems.
- **Topic 3.** Equilibrium points.
- **Topic 4.** Periodic orbits.
- **Topic 5.** Bifurcations
- **Topic 6.** Chaotic systems.

- **Topic 7.. Applications.**

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website and Moodle.

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.

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27031>