Dynamic Systems

Academic Year: (2022 / 2023)   **Review date: 08-04-2016**

Department assigned to the subject: Mathematics Department

Coordinating teacher: GARCIA GARCIA, ANTONIO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Mathematical Methods I and Advanced Mathematical Methods I.
Mathematical Methods II and Advanced Mathematical Methods II.

OBJECTIVES

SPECIFIC SKILLS:

The main goal of this course is to introduce the students into the study of both ordinary differential, and difference equations, with special emphasis on their dynamical aspects. More specifically, it is to be expected that, upon completion of this course students will:

1. Be able to solve linear differential equations , and systems of linear equations, with constant coefficients.
2. Know and be able to make use of the general theory of linear differential equations.
3. Be able to draw apprimately the phase map of linear systems in the plane.
4. Be able to perform a qualitative analysis of the phase space of autonomous differential equations.
5. Be able to solve linear difference equatiosn, and systems of linear difference equations, with constant coefficients.
6. Be able to perform a qualitative analysis of linear systems of difference equations on the plane.

TRANSVERSAL SKILLS:

1. Analysis and synthesis.
2. Modelling and solving problems.
3. Oral and written communication.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Differential equations
1.1. Linear equations.
1.2. Linear systems in the plane.
1.3. Linear systems.
1.4. Autonomous equations: qualitative analysis.

2. Difference equations
2.1. Linear equations.
2.2. Linear systems in the plane.
2.3. Linear systems.

LEARNING ACTIVITIES AND METHODOLOGY

The course will be taught mostly through lectures, with supporting material available on the web. These classes should be complemented with the students' autonomous reading on some aspects of the syllabus, especially with regard to motivation and applications.

Some of the lectures will be devoted to solving exercises singled out from the collection of exercises the students will be given at the beginning of the semester.

The students' work throughout the semester will be monitored through periodic tests. These tests which will be written exams containing one or more short questions regarding the content of certain topics specified in advance. The tests can take

place during teaching hours, or can also be taken out of the classroom schedule.
Grades for the tests will be made available to the students the week following the test.

ASSESSMENT SYSTEM

Tests will be given every other week, up to six of them, with a global weight of 40% of the final grade. The remaining 60% corresponds to the final exam.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

 - C. Fernández, F. J. Vázquez y J. M. Vegas Ecuaciones diferenciales y en diferencias (Sistemas dinámicos), Thomson, 2003
 - R. K. Nagle y E. B. Saff Ecuaciones diferenciales y problemas en la frontera, Addison-Wesley, 2005