Course: DIFFERENTIAL EQUATIONS
Code: 18873
Location: Faculty of Sciences
Degree: Science & Engineering Program Boston University-Faculty of Science UAM
Fall 2017-Spring 2018
Type: Compulsory subject
Number of credits: 6

1. ASIGNATURA / COURSE TITLE

ECUACIONES DIFERENCIALES/ DIFFERENTIAL EQUATIONS

1.1. Código / Course number

18873

1.2. Materia/ Content area

Differential Equations

1.3. Tipo /Course type

Required

1.4. Nivel / Course level

Bachelor (first cycle)

1.5. Year

2nd

1.6. Semester

2nd

1.7. Credit allotment

6 ECTS credits

1.8. Prerequisites

Some previous knowledge of CALCULUS I and CALCULUS II is highly advisable.
Students should be familiar with the notions acquired in SETS AND NUMBERS and LINEAR ALGEBRA.

1.9. Minimun attendance requirement

Attendance is obligatory

1.10. Faculty data

Coordinator:
Ernesto Nungesser
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Discussion Class:
Daniel Estévez Sánchez
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1.11. Course objectives

In this course, we study ordinary differential equations. Solutions are obtained using analytic, geometric and numerical techniques. All three approaches have their advantages, and we will learn when to use the appropriate technique. We begin by deriving a few classical examples with an emphasis on the phenomena that they model. We then discuss first-order equations using all of the techniques mentioned above. Next we study first-order systems. Using techniques from linear algebra, we derive a systematic approach to the solution of linear systems. Unfortunately, nonlinear systems are more difficult to investigate. However, we learn how to apply what we know from the linear case to the nonlinear case. The course concludes with a discussion of the method of separation of variables and the use of Fourier series. Our goal is to be able to say as much as possible about the solutions of a differential equation even if those solutions cannot be expressed in terms of the standard elementary functions (polynomials, rational functions, trigonometric functions, etc.).

1.12. Course contents

1. **INTRODUCTION TO DIFFERENTIAL EQUATIONS.**
2. **ELEMENTARY INTEGRATION.**
3. **LINEAR SYSTEMS.**
4. **EXISTENCE, UNIQUENESS AND NUMERICAL METHODS.**
5. **AUTONOMOUS SYSTEMS IN THE PLANE.**
6. **INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS.**

1.13. Course bibliography

- Blanchard, Devaney and Hall: Differential Equations, 4rd edition, Brooks/Cole Publishing Company, 2011. (Hardcover or the paperback international edition).

2. Teaching methodology

The teaching consists in lectures, discussion, practical lab and office hours. There will be three hour lectures per week or two one and a half hour lectures per week, depending on the schedule. Discussion is one hour per week.

3. Evaluation procedures and weight of components in the final grade

We will have two in-class midterm exams during the semester. They will be held at usual class time. In addition to the in-class exams, you will be required to submit written homework during the semester. Letter grades will be determined by applying the following weighting schemes to your grades.

Your best in-class exam 28%
The other in-class exam 12%
The final exam 30%
Homework 30%

In-class exam I Friday, March 10
In-class exam I Thursday, April 27
Final Exam Tuesday, May 14

4. Course calendar

Week	Contents	Presential Hours	Non Presential Hours
1	Part 1	3+1	6
2	Part 2	3+1	6
3	Part 2	3+1	6
4	Part 3	3+1	6
5	Part 3	3+1	6
6	Part 3	3+1	6
7	Part 4	3+1	6
8	Part 4	3+1	6
9	Part 4	3+1	6
10	Part 5	3+1	6
11	Part 5	3+1	6
12	Part 5	3+1	6
13	Part 6	3+1	6
14	Part 6	3+1	6

*This is orientative.