29910 - Mathematics III

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Course	1
Period	Half-yearly
Subject Type	Basic Education
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 has been designed for this subject is based on the following:

- Exposition of contents and results on the subject together with problem solving and practical exercises in the classroom, encouraging student participation.
- Student daily work on classroom's activities.
- Application of the methods, concepts and results presented in the classroom to the resolution of problems and exercises by the students, both individually and in groups.
- Development of lab sessions in small groups using computer resources available at the School.
- Development of optional additional activities throughout the semester to provide incentives for continued and

autonomous student work.
- Personal attention to the students during the office hours established by the teacher.

5.2.Learning activities

The following activities are offered to the students to help them to achieve the expected results:
1) Classroom expositions.

3 hours a week will be devoted to theoretical and problem classes. Theoretical results will be complemented with problem solving and practical exercises to make the development of the subject as clear as possible.

A collection of problems and exercises will be available to the students. Some of them will be solved in the classroom, and others will be given as recommended material for the student.

2) Lab.

A 2 hours lab session every other week will take place using computer resources available at the School. The student will get a guide to be developed in each session.

3) Supervised work.

Students may perform some work directed or supervised by the teacher. The teacher will inform the students about its evaluation date.

5.3.Program

The contents of the course can be divided into two sections: Ordinary Differential Equations (ODE's) and Partial Differential Equations (PDE's).

Section 1: Ordinary Differential Equations:

- First-order equations: Geometric aspects. Existence and uniqueness of solutions. Basic methods of integration.
- Higher-order linear equations: homogeneous and nonhomogeneous. Equations with constant coefficients. Undetermined coefficients method. Variation of parameters. Reduction of order. Cauchy-Euler equation.
- Linear systems: homogeneous and nonhomogeneous systems. First-order systems with constant coefficients. Variation of parameters. Stability of first-order systems.
- Numerical solutions of ordinary differential equations: Runge-Kutta methods.

Section 2: Partial Differential Equations:

- Fourier series.
- Separation of variables.
- Boundary-value problems for second-order linear equations: heat equation, wave equation and Laplace's equation.

5.4.Planning and scheduling
Schedule of classes and works' evaluation Classes and practical sessions in the laboratory are held according to the schedule
and times established by the Engineering School, available on its website. Each teacher will inform about the office hours.
Other activities will be planned and announced well in advance.

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5.5.Bibliography and recomended resources

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BB	Zill, D.G., Cullen, M.R.. Matemáticas avanzadas para Ingeniería, vol. 1: Ecuaciones diferenciales / D.G. Zill, M.R. Cullen. 3ª edición. McGraw-Hill Interamericana, México 2006.
BC	Boyce, William E.. Ecuaciones diferenciales y problemas con valores en la frontera / William E. Boyce, Richard C. DiPrima . - 4ª ed., [reimp.] México [etc.] : Limusa Wiley, cop. 2007
BC	Burden, R.L., Faires, J.D., Reynolds, A.C.. Análisis numérico / R.L. Burden, J.D. Faires, A.C. Reynolds, Grupo Editorial Iberoamericano, México 2004
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BC	Marcellán, Francisco. Ecuaciones diferenciales : problemas lineales y aplicaciones / Francisco Marcellán, Luis Casasus, Alejandro Zarzo . [1a ed. en español] Madrid [etc.] : McGraw-Hill, D.L. 1990
BC	Métodos numéricos para la Física y la Ingeniería / Luis Vázquez Martínez ... [et al.] . Madrid [etc.] : McGraw Hill, cop. 2009
BC	Nagle, R. Kent. Ecuaciones diferenciales y problemas con valores en la frontera / R. Kent Nagle, Edward B. Saff, Arthur David Snider ; traducción, Óscar Palmas Velazco ; revisión técnica, Juan Carlos del Valle Sotelo . - 3ª ed. México [etc.] : Pearson Educación, 2001
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BC	Simmons, George Finlay. Ecuaciones diferenciales : con aplicaciones y notas históricas / George F. Simmons ; con un capítulo sobre métodos numéricos de John S. Robertson ; traducción Lorenzo Abellanas Rapun . - 2ª ed. Madrid [etc.] : McGraw-Hill, D.L. 1993