29710 - Mathematics III

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	330 - Complementos de formación Máster/Doctorado 434 - Bachelor's Degree in Mechanical Engineering
ECTS	6.0
Year	---
Semester	Indeterminate
Subject Type	Basic Education, ENG/Complementos de Formación
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

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Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in classroom, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

5.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (1.68 ECTS): 42 hours.

- Laboratory sessions (0.48 ECTS): 12 hours.

- Guided assignments (0.24 ECTS): 6 hours.

- Autonomous work (3 ECTS): 75 hours.

- Tutorials (0.6 ECTS): 15 hours.

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks (6 sessions in total) and last 2 hours each. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

Guided assignments: students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures. They will be submitted at the beginning of every laboratory sessions to be discussed and analyzed. If assignments are submitted later, students will not be able to take the assessment test.

Autonomous work: students are expected to spend about 75 hours to study theory, solve problems, prepare lab sessions, and take exams.

Tutorials: the professor's office hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

5.3.Syllabus

The contents of the course can be divided into two sections: Ordinary Differential Equations (ODEs) and Partial Differential Equations (PDEs).

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Section 1: Ordinary Differential Equations (ODEs)

- First-order differential equations: Existence and uniqueness of solutions. Basic methods of integration. Applications.
- Linear differential equations of higher order: Equations with constant coefficients. The Cauchy-Euler equation. Applications.
- Linear differential systems: First order differential systems with constant coefficients. Applications.
- Numerical solution of ODEs systems: Runge-Kutta methods. Applications.

Section 2: Partial Differential Equations (PDEs)

- Sturm-Liouville problems and Fourier Series.
- The separation of variables method for solving second-order PDEs.
- Numerical solution of boundary value problems of PDEs.

5.4.Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Escuela de Ingeniería y Arquitectura " website (https://eina.unizar.es/)

5.5.Bibliography and recommended resources

[BB: Basic Bibliography / BC: Additional Bibliography]

- [BB] Zill, Dennis G. : Matemáticas avanzadas para ingeniería / Dennis G. Zill, Warren S. Wright, Michael R. Cullen ; revisión técnica, Natella Antonyan ... [et al.] . - 4ª ed. México [etc.] : McGraw Hill, cop. 2012
- [BC] Burden, Richard L.. Análisis numérico / Richard L. Burden, J. Douglas Faires . 7ª ed., [reimp.] México [etc.] : International Thomson, imp. 2004
- [BC] Edwards, Charles Henry, Jr.. Ecuaciones diferenciales elementales con aplicaciones / C.H. Edwards,jr., David E. Penney ; traducción Habacuc Pérez Castillo ; revisión técnica Francisco Javier Sánchez Bernabé . [1a. ed. en español, reimp.] México [etc.] : Prentice-Hall Hispanoamericana, 1991
- [BC] Kreyszig, Erwin. Matemáticas avanzadas para ingeniería. Vol. 1 / Erwin Kreyszig . 3a. ed. México : Limusa, cop. 2002
- [BC] Kreyszig, Erwin. Matemáticas avanzadas para ingeniería. Vol. 2 / Erwin Kreyszig . 3a. ed. México : Limusa, cop. 2003
- [BC] Quarteroni, Alfio. Cálculo científico con MATLAB y Octave / A. Quarteroni, F. Saleri . Milano : Springer, cop. 2006