

**Información del Plan Docente**

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|-------------------------|---|
| <b>Academic Year</b>    | 2017/18   |
| <b>Faculty / School</b> | 110 - Escuela de Ingeniería y Arquitectura        |
| <b>Degree</b>           | 430 - Bachelor's Degree in Electrical Engineering |
| <b>ECTS</b>             | 6.0   |
| <b>Year</b>             | 2   |
| <b>Semester</b>         | Half-yearly                                       |
| <b>Subject Type</b>     | Basic Education                                   |
| <b>Module</b>           | ---   |

**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 learning process that has been designed for this subject is based on the following:

- *An account of the contents and problem solutions in blackboard classes, encouraging students to participate.*
- *Study and the daily personal work of the student in relation to classroom's activities.*
- *Aplicación of concepts and methods discussed in the sessions overseen by the teacher to the solving of problems,*

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- both individually or in a group.*
- Problem solutions in practical laboratory sessions, taking advantage of the calculations and graphics offered by a computer.*
- Personalized attention of students during tutorial sessions that the teacher establishes.*

### 5.2.Learning tasks

The following activities are offered to the students to help them to achieve the expected aims:

Classroom expositions.

*They will spend 3 hours per week of theoretical and problems classes. Classes are designed to allow students to practise and develop a wide range of discipline-based techniques and personal skills. They are developed on the board, in which the theoretical contents will be completed with problems solution. Both activities are properly combined so that the development of the subject is carried out as clearly as possible.*

*Special attention is devoted to solving problems of Electrical Engineering.*

*Students will be provided a collection of exercises. Some of them will be solved in class, and others will be recommended as material for student work.*

Laboratory sessions.

*Six practical sessions will be held with computer two hours each, which will be held in one of the computer labs. The Maxima free software program allows students to work with symbolic, numerical and graphical calculation, facilitating the understanding of the proposed learning.*

*Students are divided into groups to be formed at the beginning of the course.*

*Some topics of the subject are developed in the laboratory practical classes.*

*Students will be provided well in advance of a script for each of the practices that will contain a brief summary of the theoretical contents that are being used and an explanation of the commands needed to solve the proposed problems, as well as a list of exercises that student must solve.*

*Practices are held individually and may propose activities carried out by groups of two students.*

Tutored projects.

Students develop tutored projects individually or in groups and are guided by the teacher through interviews or seminars. During meetings with the teacher, the progress of the working group will be monitored.

### 5.3.Syllabus

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

Section 1: Ordinary Differential Equations.

- *First-order equations: Geometric aspects. Existence and uniqueness of solutions of initial value problems. Basic methods of integration.*
- *Higher-order linear equations: Homogeneous linear equations with constant coefficients. Nonhomogeneous linear equations with constant coefficients. Undetermined coefficients method. Variation of parameters. Reduction of order.*
- *Linear systems: Homogeneous linear systems with constant coefficients. Nonhomogeneous linear systems. Variation of parameters. Stability of systems.*
- *Laplace Transforms. Applications to the solution of initial value problems.*
- *Numerical solution of initial value problems for ODEs. One-Step Methods.*
- *Numerical solution of boundary value problems for ODEs. Finite Difference Methods.*

Section 2: Partial Differential Equations:

- *Fourier series.*
- *Separation of variables for boundary value problems for PDEs.*
- *Numerical solutions of boundary value problems for PDEs. Finite Difference Methods.*

### 5.4.Course planning and calendar

Organizing theoretical and practical sessions in the laboratory and presentation of tutored projects.

*The sessions in classroom and practical sessions in the laboratory are held according to the schedule and times and are available on its website.*

*The temporal organization of the subject is published and communicated to students at the beginning of the semester, according to the official calendar of the academic year.*

*The teachers of the subject inform your tutoring schedule.*

*As a guideline follows a distribution of the estimated 150 hours of student dedication to the activities proposed in the subject:*

- *Sessions in classroom (3h / week): 42h.*
- *labs: 15h.*

- *tutored projects: 15h.*
- *personal study: 75h.*
- *evaluation: 3h.*

## 5.5. Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Bronson, Richard. Ecuaciones diferenciales / Richard Bronson, Gabriel B. Costa ; revisor técnico Raúl Gómez Castillo . México D. F. : McGraw-Hill Interamericana, cop. 2008
- [BB] Ecuaciones diferenciales y problemas con valores en la frontera / R. Kent Nagle, Edward B. Saff, Arthur David Snider ; traducción, Óscar Alfredo Palmas Velazco ; revisión técnica, Ernesto Filio López ... [et al.] . 4ª ed. México [etc.] : Pearson Educación, 2005
- [BB] Edwards, Charles Henry, Jr.. Ecuaciones diferenciales elementales y problemas con condiciones en la frontera / C.H.Edwards, Jr, David E.Penney ; traducción, María del Consuelo Hidalgo y Mondragón ; revisión técnica, Oscar Alfredo Palmas Velasco. 2a. ed. en español México [etc.] : Prentice-Hall Hispanoamericana, cop.199
- [BB] Kreyszig, Erwin. Matemáticas avanzadas para ingeniería / Erwin Kreyszig . 3a. ed. México : Limusa, cop. 2000
- [BB] Simmons, George F.. Ecuaciones diferenciales : teoría, técnica y práctica / George F. Simmons, Steven G. Krantz ; revisión técnica Raúl Gómez Castillo . 1ª ed. en español México D. F. : McGraw-Hill/Interamericana, D. L. 2007
- [BB] Zill, Dennis G.. Ecuaciones diferenciales con aplicaciones de modelado / Dennis G. Zill . 8ª ed. México [etc.] : Thomson, cop. 2007