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340367 - FISI-I1O21 - Physics

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering

Teaching unit: 748 - FIS - Department of Physics

Academic year: 2019

Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2018). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)

ECTS credits: 7,5 Teaching languages: Catalan

Teaching staff

Coordinator: JAVIER NAVARRO BOSQUE

Others: MANUEL MORENO LUPIAÑEZ - ARCADI PEJUAN ALCOBE

Degree competences to which the subject contributes

Specific:

2. D11. Knowledge of beginning of electric and electronic systems and its application to resolve engineering problems.

7. CEFB2. Ability to understand and to have a good command of physical and informatic technological fundamentals: electromagnetism, waves, circuit theory, electronics and photonics and its application to resolve problems related to engineering.
6. CEFC2. Ability to plan, conceive, develop, manage informatic projects, services and systems in all areas, leading their implementation and continuous improvement assessing their economic and social repercussions.
9. CEFC4. Ability to work out technical conditions of an informatic installation observing standard and current rules.

Teaching methodology

-In the theory classes, the theoretical fundamentals of the scheduled matters shall be explained and developed and some typical problems shall be solved. They will consist of theory explanations complemented with activities intended for stimulating the students' participation, discussion and critical analysis.
- In the practical classes (problem solving), problems about the matters dealt with shall be presented and solved. Students, individually or in groups, have to solve the established problems. A the due time, the solving of problems or other activities to be graded will be proposed. To reach a positive mark, these activities have to be carried out or delivered within the time scheduled.
-In the laboratory classes, students have to carry out the corresponding laboratory activities and simulations. They have to deliver the resulting laboratory report with the calculations and comments asked. At the beginning of each laboratory session, each student has to deliver a previous study or questionnaire (accessible at ATENEA) about the activity to be carried out. Within the laboratory category, some activities to be carried out outside the laboratory may be proposed (reports, simulations, bibliographic research, etc.).

Learning objectives of the subject

- To know and understand the basic principles of Electromagnetism. To acquire the ability to analyse electric and magnetic fields, and to be able to solve simple electric circuits. To recognize the different electric and magnetic behaviours of matter.
- To know and be able to apply the fundamental concepts concerning waves, especially electromagnetic waves, and the phenomena linked to them.
- To learn how to use measuring instruments. To know how to estimate experimental uncertainties or ?errors?. To be able to carry out simple experiments, as well as to analyse and explain the results obtained.

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- To know how to use the computer as a tool for computing and simulating physical processes.

Study load

Total learning time: 187h 30m	Hours large group:	67h 30m	36.00%
	Hours medium group:	0h	0.00%
	Hours small group:	7h 30m	4.00%
	Guided activities:	0h	0.00%
	Self study:	112h 30m	60.00%

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Content

(ENG) C1: Electric field and electric potential

Learning time: 32h 20m

Theory classes: 4h
Practical classes: 8h
Laboratory classes: 2h
Self study : 18h 20m

Description:
Electric charge. Coulomb?s Law. Electric field of point electric charges. Charge distributions. Electric field of charge distributions.
Electric potential energy. Electric potential and Electric potential difference.

(ENG) C2: Conductors and dielectrics. Capacitors. Electric current

Learning time: 32h 20m

Theory classes: 6h
Practical classes: 6h
Laboratory classes: 2h
Self study : 18h 20m

Description:
Conductors. Electric field and electric potential in conductors in electrostatic equilibrium. Capacity of a conductor. Capacitors. Capacity and stored energy of a capacitor. Capacitor networks Dielectrics: polarization phenomena. Capacitors with dielectrics.
Electric current. Ohm?s law. Joule effect. Electric generators: EMF. Electric consumers: CEMF. Generalized Ohm?s law.

Related activities:
Laboratory practice: V-I relationship in resistors and diodes

(ENG) C3: Electromagnetism

Learning time: 34h 10m

Theory classes: 6h
Practical classes: 6h
Laboratory classes: 0h
Self study : 22h 10m

Description:
Force of a magnetic field on electric point charges and electric currents.
Generation of magnetic fields by electric currents.
Electromagnetic induction.

Related activities:
Laboratory practice: Magnetic force on a current.

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(ENG) C4: Electromagnetic waves ? Fundamentals of Optics	Learning time: 40h 40m Theory classes: 6h 30m Practical classes: 10h Laboratory classes: 2h Self study : 22h 10m

Description:
Nature of electromagnetic waves. Propagation speed. Refractive index.
Reflection and refraction. Total internal reflection.

Related activities:
Laboratory practice: Law of refraction

(ENG) C6: Written tests. Simulations and other optional activities	Learning time: 14h Laboratory classes: 1h 30m Guided activities: 7h 30m Self study : 5h

Description:
Written tests. Optionally, completion of assignments, as well as multi-choice questionnaires and PC simulations.
Checking of the knowledge and skills achievement level.

Qualification system

The mark will be the higher of both following results:

15%AC + 15%PL + 35%EP + 35%EF
15%AC + 15%PL + 70%EF

where the maximum value of every partial mark (AC, PL, EP i EF) is 10. The partial marks are:
AC = mark for activities (problem solving, simulations, etc.) carried out along the course (**)
PL = mark for laboratory activities (**)
EP = mark for a first partial exam approximately at the middle of the semester.
EF = mark for a final exam.
Only this exam (EF) will be a re-evaluable test, with the established weighing of 70%. The students who can do the re-evaluation are those established by the general regulations of the School.

(**) These qualifications may be VALIDED for a series of test questions (usually no more than three) that will be made to the final exam and in an extraordinary way that of re-evaluation in sections that can be independent of the exam or form part of it. Once the qualification (AC and PL) has been obtained, it will be affected by a factor that will be proportional to the qualification of the validation questions of each of the parties. The type of proportionality will be established by the teachers each year.

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Regulations for carrying out activities

Each of the two tests, EP and EF, will consist of two parts: a theory test and/or very simple problems (which can be up to a maximum of 30% of the note) and a certain number of exercises (up to complete 100%). For the completion of the exercises, a list of formulas, and possibly other material that, as the case may be, responsible teachers will be established and announced sufficiently in advance. Only the final exam will be re-evaluable, with the established weighting of 70%. In laboratory practices, the previous questionnaire will be scored, as appropriate, together with the results of the laboratory practice. All the practices will have the same weight within the 1.5 points corresponding to the laboratory note. During the course, problems will be proposed to solve individually (or in group) in the same session in or out of the classroom and/or other activities. The total of these activities represents 15% of the final grade of the course.

Bibliography

Basic:

Tipler, P.A.; Mosca, Gene. Fisica para la ciencia y la ingeniería. 6a ed. Barcelona [etc.]: Reverté, 2010. ISBN 9788429144284.

Giró i Roca, Antoni; Canales Gabriel, Manel; Rey Oriol, Rossend; Sesé i Castel, Gemma; Trullàs i Simó, Joaquim. Física per a estudiants d'informàtica [on line]. Barcelona: Fundació per a la Universitat Oberta de Catalunya, 2005 [Consultation: 26/07/2019]. Available on: <https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=3206945>. ISBN 8497881443.

Montoto San Miguel, Luis. Fundamentos físicos de la informática y las comunicaciones. Madrid: Thomson, cop. 2005. ISBN 8497324005.

Complementary:

Alarcon Jordán, Marta [et al.]. Física: problemes resolts. Vol. 2, Electricitat i magnetisme. 3a ed. Barcelona: Edicions UPC, 2000. ISBN 8483014157.

Alarcon Jordan, Marta [et al.]. Física: problemes resolts. Vol. 3, Ones, física quàntica i electrònica. Barcelona: Edicions UPC, 1997. ISBN 8476534647.

Moreno Lupiáñez, Manuel ; José Pont, Jordi. Simulacions en física. Barcelona: Edicions UPC, 1995. ISBN 847653504X.

Others resources:

Hyperlink

Curso Interactivo de física en internet. Simulacions de física per ordinador d'accés lliure

Simulacions de física per ordinador d'accés lliure

Curso de Física Básica