UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: PHYSICS FOR COMPUTER SCIENCE
Code: 42301
Type: BASIC
ECTS credits: 6
Degree: 407 - DEGREE PROGRAMME IN COMPUTER SCIENCE ENGINEERING
Academic year: 2023-24
Center: 108 - SCHOOL OF COMPUTER SCIENCE OF C. REAL
Group(s): 20 21 22 23
Year: 1
Duration: First semester
Main language: English
Second language: Spanish
Use of additional languages:
English Friendly: N
Web site:
Bilingual: Y

Lecturer: **VICTORIANO FERNANDEZ VAZQUEZ** - Group(s): **21 22 23**

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Edif. Casiano de Prado/1.02	FÍSICA APLICADA	+34926052866	Victoriano.Fernandez@uclm.es	Consult in https://esi.uclm.es/index.php/grado-en-ingenieria-informatica/profesorado/

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2. Pre-Requisites

Basic mathematical skills (geometry, trigonometry, complex numbers, matrix and determinant algebra, differential and integral calculus) and physics (vectorial and scalar physical quantities, basics concepts of Mechanics and Electromagnetism).

It is recommended that students have studied Physics at the level of “A level” (UK system) or “international bachiller” (mainland Europe).

Students are advised to register for and attend the beginner’s course (“curso cero”) in Maths and Physics that takes place in Ciudad Real in the Computer Science School (la Escuela Superior de Informática, ESI) just before the start of the academic year (i.e. at the beginning of September).

3. Justification in the curriculum, relation to other subjects and to the profession

The subject of Physics forms part of the set of basic subjects taught in any university degree of scientific-technological character. The study of Physics is particularly pertinent in the case of a Computer Science degree, since a great deal of the technology used to build a computer or to operate a communication network began to emerge from Physics research laboratories around the time of the Second World War.

The Physics course lays the conceptual foundations for understanding the scientific and technological concepts underlying information technology and communication. These foundations are related to other subjects in the degree course, for example, Technology of Computers, Structure of Computers, Computer Networks I and II, Organization of Computers and Architecture of Computers. Furthermore, the study of Physics helps students to structure their thoughts, allowing them to confront future tasks and problems from a purely scientific basis.

4. Degree competences achieved in this course

Course competences

Code	Description
BA02	Understanding and knowledge of basic terms about fields, waves and electromagnetism, theory of electric circuits, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices and their use to solve engineering problems.
INS01	Analysis, synthesis, and assessment skills.
INS03	Ability to manage information and data.
INS04	Problem solving skills by the application of engineering techniques.
PER01	Team work abilities.
SIS01	Critical thinking.
SIS03	Autonomous learning.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowledge of basic concepts about fields and waves, electromagnetism, theories of circuits, and their application in the resolution of Computer Engineering problems.

Knowledge of fundamental concepts of physics linked to technological processes which are present in computer systems.

Utilization of scientific-technical software which is appropriate for the resolution of hardware problems applied in the frame of Computer Science and Engineering.

6. Units / Contents

Unit 1: ELECTRIC FIELD
Unit 2: ELECTRIC POTENTIAL
Unit 3: ELECTROSTATICS IN CONDUCTORS AND DIELECTRICS
Unit 4: ELECTRIC CAPACITY AND CAPACITORS
Unit 5: ELECTRIC CURRENT. DC CIRCUITS
Unit 6: MAGNETIC FIELD. SOURCES OF MAGNETIC FIELD
Unit 7: MAGNETIC PROPERTIES OF MATERIALS
Unit 8: ELECTROMAGNETIC INDUCTION
Unit 9: ALTERNATING CURRENT (AC) CIRCUITS
Unit 10: WAVES
Unit 11: INTRODUCTION TO SEMICONDUCTORS AND THEIR DEVICES

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	BA02 INS01 INS03	0.72	18	N	-	Presentation of the subject topics by the course lecturer. (MAG)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	BA02 INS01 INS03 INS04 PER01	0.6	15	N	-	Detailed solution of exercises in class, involving student participation. (PRO)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.6	15	Y	Y	Realization of laboratory practicals and their corresponding reports. (LAB)
Individual tutoring sessions [ON-SITE]	Combination of methods	BA02 INS04 SIS01	0.18	4.5	N	-	Individual or small-group tutorials in the office of the course lecturer or in an alternative place (e.g. teaching laboratory) in the Computer Science School. (TUT)
Study and Exam Preparation [OFF-SITE]	Combination of methods	BA02 INS01 SIS01 SIS03	2.1	52.5	N	-	Individual study on the part of the student. (EST)
Writing of reports or projects [OFF-SITE]	Group Work	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	1.2	30	Y	N	Realization, by a student group, of a paper or a report proposed by the course lecturer, and the oral presentation of this work by the same group. (RES)
Other off-site activity [OFF-SITE]	Self-study	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.3	7.5	N	-	Preparation for the subject's practice sessions. (PLAB)
Final test [ON-SITE]	Assessment tests	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.3	7.5	Y	N	Final test of the complete syllabus of the subject. (EVA)
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Laboratory sessions	20.00%	20.00%	Compulsory activity that can be retaken. To be carried out during lab sessions.
Theoretical papers assessment	10.00%	10.00%	Non-compulsory activity that can be retaken. To be carried out during the theory/lab sessions.
Assessment of active participation	5.00%	0.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period.
Final test	65.00%	65.00%	Compulsory activity that can be retaken (rescheduling) to be carried out within the planned exam dates of the final exam call (convocatoria ordinaria).
Total:	**100.00%**	**95.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. A compulsory activity cannot be divided into eliminatory parts, nor can minimum marks be established for each of its parts. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).
The final exam will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the final exam will be evaluated by the same lecturer for all the students.
A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.
For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake examcall (convocatoria extraordinaria). If an activity is not recoverable, its assessment will be preserved for the resit/retake exam call (convocatoria extraordinaria) even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.
The mark of the passed activities in any call, except for the final exam, will be conserved for the subsequent academic year at the request of the student, provided that mark is equal or greater than 50% and that the activities and evaluation criteria of the subject remain unchanged prior to the beginning of that academic year.
he failure of a student to attend the final exam will automatically result in her/him receiving a "Failure to attend¿ (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

Non-continuous evaluation:

Students may apply at the beginning of the semester for the non-continuous assessment mode. In the same way, the student may change to the non-continuous evaluation mode as long as she/he has not participated during the teaching period in evaluable activities that together account for at least 50% of the total mark of the subject. If a student has reached this 50% of the total obtainable mark or the teaching period is over, she/he will be considered in continuous assessment without the possibility of changing to non-continuous evaluation mode.
Students who take the non-continuous evaluation mode will be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences), through the assessment systems indicated in the column "Non-continuous evaluation".
In the "non-continuous evaluation" mode, it is not compulsory to keep the mark obtained by the student in the activities or tests (progress test or partial test) taken in the continuous assessment mode.

Specifications for the resit/retake exam:

Evaluation tests will be conducted for all recoverable activities. The failure of a student to attend the final exam will automatically result in her/him receiving a "Failure to attend" (no presentado), except in the case that the student conserves the mark for the final exam from the final exam call (convocatoria ordinaria). In the latter case, the student's carrying out of any other evaluable activity in the resit/retake exam call (convocatoria extraordinaria) will result in a numerical mark.

Specifications for the second resit / retake exam:

Same characteristics as the resit/retake exam call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Individual tutoring sessions [PRESENCIAL][Combination of methods]	4.5
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	52.5
Writing of reports or projects [AUTÓNOMA][Group Work]	30
Other off-site activity [AUTÓNOMA][Self-study]	7.5
Final test [PRESENCIAL][Assessment tests]	7.5

General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week. Planning may be modified in the event of unforeseen circumstances.

Unit 1 (de 11): ELECTRIC FIELD

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5

Unit 2 (de 11): ELECTRIC POTENTIAL

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5

Unit 3 (de 11): ELECTROSTATICS IN CONDUCTORS AND DIELECTRICS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5

Unit 4 (de 11): ELECTRIC CAPACITY AND CAPACITORS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5

Unit 5 (de 11): ELECTRIC CURRENT. DC CIRCUITS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5

Unit 6 (de 11): MAGNETIC FIELD. SOURCES OF MAGNETIC FIELD

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2

Unit 7 (de 11): MAGNETIC PROPERTIES OF MATERIALS	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 8 (de 11): ELECTROMAGNETIC INDUCTION	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5
Unit 9 (de 11): ALTERNATING CURRENT (AC) CIRCUITS	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 10 (de 11): WAVES	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 11 (de 11): INTRODUCTION TO SEMICONDUCTORS AND THEIR DEVICES	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Global activity	
Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	18
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Individual tutoring sessions [PRESENCIAL][Combination of methods]	4.5
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	52.5
Writing of reports or projects [AUTÓNOMA][Group Work]	30
Other off-site activity [AUTÓNOMA][Self-study]	7.5
Final test [PRESENCIAL][Assessment tests]	7.5
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Edminister, J.	Electric circuits (sixth edition)	Schaum's outline series			2013	
Purcell, E.	Electricity and magnetism	Cambridge University Press			2013	
Tipler, P.	Physics for scientists and engineers	W.H. Freeman				Chapters 22-31, 36 & 38 in 6th edition - or equivalent in nth edition
Blanes, Nadal, Mora y otros	Problemas de electromagnetismo	Servcio Publicaciones UPV			2000	
Serway, R.A.	Física	Mac Graw Hill			2005	
Sears y Zemansky	Física Universitaria (13º edición)	Pearson			2013	
Terán, F. y Viñuela, U.	Apuntes de Fundamentos Físicos de la Informática	Casa Ruiz-Morote SL.			2010	
Edminister, J.	Circuitos eléctricos (4º edición)	Mac Graw Hill			2005	
Terán, F.J., Viñuela, U. y Arribas, E.	Magnitudes, vectores, campos	Tebar Flores			1994	
Tipler, P. y Mosca, G.	Física (5º edición)	Reverté			2009	
Michael G. Raymer	The Silicon Web: Physics for the Internet Age	Taylor & Francis			2009	