UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: PHYSICS FOR COMPUTER SCIENCE
Code: 42301
Type: BASIC
ECTS credits: 6
Degree: 406 - UNDERGRADUATE DEGREE IN COMPUTER SCIENCE AND ENGINEERING (AB)
Academic year: 2023-24
Center: 604 - SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (AB)
Group(s): 10 11 12 13 14
Year: 1
Duration: First semester
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: N
Web site:
Bilingual: Y

Lecturer: **ENRIQUE ARRIBAS GARDE** - Group(s): **11 12**

Building/Office	Department	Phone number	Email	Office hours
E S Ing. Informática/0B7	FÍSICA APLICADA	967599200 ext 2460	enrique.arribas@uclm.es	Mondays 16 h - 19 h Tuesdays 11:30 h - 14:30 h

Lecturer: **ISABEL MARIA ESCOBAR GARCIA** - Group(s): **10 13**

Building/Office	Department	Phone number	Email	Office hours
E S Ing. Informática/0B6	FÍSICA APLICADA	967599200-4848	isabelmaria.escobar@uclm.es	Mondays 13:15 h-15:15 h Tuesdays 11:30 h - 14:40 h Tuesdays 15 h - 16 h

2. Pre-Requisites

It is recommended that the student has had physics as part of their high school or college degree.

It is also advisable that the student has acquired some of the following competencies in order to help with the subjects covered by this course

Mathematics:

- Vector operation
- Basic notions of differential calculus
- Basic notions of integral calculusTaylor series expansion
- Trigonometry
- Complex numbers
- Basic Geometry
- Matrices
- Calculating determinants
- Solving systems of linear equations: Cramer method
- Know how to use a scientific calculator

Physics:

- International System of Units
- Kinematics
- Newton's laws
- Conservation of momentum
- Conservation of energy

Other recommended competencies:

- Basic knowledge of Windows, Mac OS and/or Linux
- A good use of email
- Basic knowledge of a word processor
- Elemental handling of a spread sheet
- Basic knowledge of the internet

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

Physics is part of the basic subjects taught in any scientific-technological university degree. Seeing that computing as a discipline was born in physics research laboratories and that the early computing developments were carried out by prominent physicists, physics is fundamental in the formation of any computing student.

Tim Berners-Lee created the web in 1989 at the Laboratory for Particle Physics at CERN, Rolf William Landauer (1927-1999) was an IBM physicist who in 1961 argued, that when information is lost in an irreversible circuit, the information becomes entropy and an associated amount of energy is dissipated as heat. This is a principle that applies to quantum information and quantum computation in which Juan Ignacio Cirac Sasturain (at one time a physics teacher at the UCLM) is one of the leading experts in research on the development of quantum computers.

The physics course within the curriculum of the Computer Engineering degree aims to provide students with the skills necessary for the proper handling of the technology they will use throughout their careers. However the study of physics goes further, in that it allows students to structure their thoughts and prepare them to face future problems, always from a purely scientific point of view.

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

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

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: PHYSICAL QUANTITIES
Unit 2: ERROR CALCULUS
Unit 3: VECTOR ANALYSIS
Unit 4: ELECTRIC FIELD
Unit 5: ELECTRIC POTENTIAL
Unit 6: CAPACITORS AND DIELECTRICS
Unit 7: DIRECT CURRENT
Unit 8: MAGNETIC INTERACTION
Unit 9: SOURCES OF MAGNETIC FIELDS
Unit 10: ELECTROMAGNETIC INDUCTION
Unit 11: MAGNETIC PROPERTIES OF MATTER
Unit 12: ALTERNATING CURRENT
Unit 13: INTRODUCTION TO SEMICONDUCTORS

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	0.8	20	N	-	Presentation of the topics by the teacher, usually using a Power Point presentation
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	BA02 INS01 INS03 INS04 PER01	0.88	22	N	-	Problem classes with student participation
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.48	12	Y	Y	Performing multiple lab sessions which will consist of data collection, necessary data fitting and plotting, interpretation of results and answer related questions. Detailed information of this activity can be consulted on the Moodle of the subject.
Other off-site activity [OFF-SITE]	Self-study	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.32	8	N	-	Study and preparation of lab sessions
Study and Exam Preparation [OFF-SITE]	Self-study	BA02 INS01 SIS01 SIS03	2.4	60	N	-	Individual study by the student
							Students need to answer a questionnaire for each of the topics

Writing of reports or projects [OFF-SITE]	Problem solving and exercises	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.88	22	Y	N	covered by the course. Detailed information of this activity can be consulted on the Moodle of the subject.
Mid-term test [ON-SITE]	Assessment tests	BA02 INS01 INS03 INS04 PER01 SIS01 SIS03	0.24	6	Y	N	There will be 2 written tests throughout the course. It will be able to compensate from 4. Each non-compensable part can be recovered in the regular exam session. Detailed information of this activity can be consulted on the Moodle of the subject.
		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
Assessment of problem solving and/or case studies	10.00%	10.00%	This percentage corresponds to the average mark of all multiple choice tests done during the course, All students [including those repeating the course] need to do these tests.
Assessment of active participation	5.00%	5.00%	Make activities in class individually or in group
Practicum and practical activities reports assessment	20.00%	20.00%	Students needs to write their own report on the experiments they have performed during the course. In order to pass the course, it is essential to obtain a positive assessment in the laboratory
Mid-term tests	65.00%	65.00%	2 mid-term tests will be made. The mid-term tests will be compensable with a mark greater than or equal to 4. The final test will consist of two parts. The student may choose not to perform any of the parts if he has reached the minimum score previously compensable in the corresponding mid-term tests
Total:	**100.00%**	**100.00%**	

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:

During the course students need to realise various activities/assignments: assist to all lab sessions, write associated lab reports, do the mid-term tests, make activities and questionnaires.
In order to pass the course, the student needs to obligatory assist to all lab sessions. We will asses the application in the laboratory of previously obtained knowledge, skills acquired doing the experiments and the correct preparation of the associated lab reports. In order to pass the course, it is essential to obtain a positive assessment in the laboratory. If a positive evaluation is not obtained in this section, the student can not pass the course.
The grade obtained in the laboratory part will be kept for the next academic year, provided that it is greater or equal to 5 out of 10 and the evaluation criteria of the subject are not modified in the next academic year.
The mark of each mid-term test must be at least 4. Below this minimum, the student will have to take the corresponding parts in the regular exam session.
The student passes the subject if he obtains a minimum mark of 5 out of 10 in the global subject and a positive evaluation in the labs.
The student who does not pass the mandatory activities/assignments required in the subject will have a mark not higher than 4.00 even if the obtained average was another, including more than 5.00.
By default, the student will be evaluated by continuous evaluation. If you wish to change to non-continuous evaluation, you must indicate it through the following link https://www.esiiab.uclm.es/alumnos/evaluacion.php before the end of the term and as long as you have not been evaluated 50% or more of the subject by continuous evaluation.

Non-continuous evaluation:

The student who does not take the mid-term tests during the course will have to take the corresponding parts in the regular exam session.
The students who don't carry out the laboratory practices will have to take a laboratory exam. In order to pass the course, it is essential to obtain a positive assessment in the laboratory. If a positive evaluation is not obtained in this section, the student can not pass the course.
The student passes the subject if he obtains a minimum mark of 5 out of 10 in the global subject and a positive evaluation in the labs.
The student who does not pass the mandatory activities/assignments required in the subject will have a mark not higher than 4.00 even if the obtained average was another, including more than 5.00.

Specifications for the resit/retake exam:

The final exam will be a global test of the entire subject that will have a weight of 80% of the final grade of the course. The laboratory practices will correspond to the remaining 20%.
The students who don't carry out the laboratory practices will have to take a laboratory exam. In order to pass the course, it is essential to obtain a positive assessment in the laboratory. If a positive evaluation is not obtained in this section, the student can not pass the course.

Specifications for the second resit / retake exam:

The same as for the extraordinary exam session

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]	12

Other off-site activity [AUTÓNOMA][Self-study]	8
Study and Exam Preparation [AUTÓNOMA][Self-study]	60
Mid-term test [PRESENCIAL][Assessment tests]	6

General comments about the planning: This course schedule is APPROXIMATE. It could vary throughout the academic course due to teaching needs, bank holidays, etc. A weekly schedule will be properly detailed and updated on the online platform (Virtual Campus). Note that all the lectures, practice sessions, exams and related activities performed in the bilingual groups will be entirely taught and assessed in English. Classes will be scheduled in 3 sessions of one hour and a half per week.

Unit 1 (de 13): PHYSICAL QUANTITIES

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 2 (de 13): ERROR CALCULUS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 3 (de 13): VECTOR ANALYSIS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 4 (de 13): ELECTRIC FIELD

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

Unit 5 (de 13): ELECTRIC POTENTIAL

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

Unit 6 (de 13): CAPACITORS AND DIELECTRICS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 7 (de 13): DIRECT CURRENT

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

Unit 8 (de 13): MAGNETIC INTERACTION

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 9 (de 13): SOURCES OF MAGNETIC FIELDS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 10 (de 13): ELECTROMAGNETIC INDUCTION

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	2

Unit 11 (de 13): MAGNETIC PROPERTIES OF MATTER

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1

Unit 12 (de 13): ALTERNATING CURRENT

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

Unit 13 (de 13): INTRODUCTION TO SEMICONDUCTORS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1

Global activity

Activities	**hours**

Class Attendance (theory) [PRESENCIAL][Lectures]	20
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	22
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	12
Other off-site activity [AUTÓNOMA][Self-study]	8
Study and Exam Preparation [AUTÓNOMA][Self-study]	60
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	22
Mid-term test [PRESENCIAL][Assessment tests]	6
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Arribas E. y Escobar I.	Lecciones de la asignatura https://campusvirtual.uclm.es/					
Young H.D., Freedman R.A., Sears F.W. y Zemansky M.W.	Física Universitaria (volumen 2). Decimotercera edición	Pearson Addison Wesley			2013	
Young H.D., Freedman R.A., Sears F.W. y Zemansky M.W.	University Physics, thirteenth edition	Pearson		0-321-76218-5	2012	
Arribas Garde, Enrique	Introducción a la física: (magnitudes, errores, vectores y c	Moralea		84-95887-02-9	2001	
Escobar, I., Arribas, E., Ramirez-Vazquez, R.	Solved electromagnetic problems	Herso Ediciones	Albacete	9788417881214	2021	