UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: FUNDAMENTALS OF PHYSICS
Code: 57700
Type: BASIC
ECTS credits: 12
Degree: 344 - CHEMICAL ENGINEERING
Academic year: 2022-23
Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY
Group(s): 21
Year: 1
Duration: AN
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **JUAN ANTONIO GONZALEZ SANZ** - Group(s): **21**

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Lecturer: **FERNANDO JOSE TERAN SIERRA** - Group(s): **21**

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2. Pre-Requisites

Not established

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

For the training of an engineer, the scientific base in physics and mathematics is fundamental. In this subject, students will be provided with basic knowledge of most of the branches of classical physics so that, in the future, students can go deeper into the areas most involved with their professional training from a solid base. Training in solving exercises, insofar as it teaches to think in an orderly and systematic way, also provides interesting training in facing difficulties of all kinds, and not only in the field of physics. Laboratory practices, finally, teach the importance of rigor and meticulousness in the development of Science.

4. Degree competences achieved in this course

Course competences

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
E02	Understanding and mastery of basic concepts about the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and its application for the resolution of engineering problems.
G03	Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Chemical Engineering.
G04	Knowledge for the realization of measurements, calculations, valuations, appraisals, surveys, studies, reports, work plans and other analogous works.
G13	Proper oral and written communication
G14	ethical commitment and professional ethics
G18	Capacity for teamwork
G19	Ability to analyze and solve problems
G20	Ability to learn and work autonomously
G21	Ability to apply theoretical knowledge to practice
G22	Creativity and initiative

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To acquire the knowledge of the basic physical magnitudes necessary to face the most advanced chemistry concepts that will appear throughout the degree, being able to establish relationships between the different concepts.

To acquire skills in search and selection of information in the field of Physics, know how to process it and present it properly both orally and in writing, being critical and objective.

To foster, in general and in a transversal way, all those values and attitudes inherent in scientific activity will be aroused and promoted in the student.
To master the basic scientific terminology as well as the handling of units and their conversions.

To homogenize the knowledge of Physics of the class, while providing them with the minimum base of physics that every technician must have.

To know the data analysis software to elaborate professional presentations of your experimental results.

To know how to solve problems that require relating to each other different branches of the physics studied and interpret the results obtained.

To know how to take experimental measures controlling the sources of error, quantifying the scope of these and correctly expressing the result of a measurement accompanying error and units.

To know how to use abstract reasoning

6. Units / Contents

Unit 1: Kinematics
- **Unit 1.1** Movement in 1D, 2D and 3D
- **Unit 1.2** Relative motion

Unit 2: Dinamics
- **Unit 2.3** Newton laws
- **Unit 2.4** Friction forces
- **Unit 2.5** Non inertial reference frames
- **Unit 2.6** Work and Energy

Unit 3: Fluid mechanics
- **Unit 3.1** Statics
- **Unit 3.2** Dinamics

Unit 4: Rotation

Unit 5: Armonic movement and mechanical waves

Unit 6: Thermodinamics

Unit 7: Vectorial calculus
- **Unit 7.1** Line surface and volumen integrals
- **Unit 7.2** Divergence operator
- **Unit 7.3** Curl operator
- **Unit 7.4** COnservative fields

Unit 8: Electrostatics
- **Unit 8.1** Coulomb force
- **Unit 8.2** GAuss theorem
- **Unit 8.3** Capacitors

Unit 9: Electrostatics inside matter
- **Unit 9.1** Metals
- **Unit 9.2** Insulators

Unit 10: Electrical current

Unit 11: Magnetostatics

Unit 12: Magnetic field depending on time

Unit 13: Maxwell equations

Unit 14: Optics

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	CB01 CB03 CB04 CB05 E02 G03 G04 G14 G18 G20 G21 G22	2.6	65	N	-	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E02 G13 G19	1	25	Y	Y	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E02 G03 G20 G22	0.6	15	N	-	
Group tutoring sessions [ON-SITE]	Group Work	E02 G03 G19	0.2	5	Y	N	
Mid-term test [ON-SITE]	Assessment tests	E02 G03	0.16	4	Y	N	
Final test [ON-SITE]	Assessment tests	E02 G03 G13 G14 G18 G19 G20 G22	0.24	6	Y	Y	
Study and Exam Preparation [OFF-SITE]		E02 G03 G13 G18 G20 G21 G22	7.2	180	N	-	
		Total:	**12**	**300**			
Total credits of in-class work: 4.8			**Total class time hours: 120**				
Total credits of out of class work: 7.2			**Total hours of out of class work: 180**				

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
Mid-term tests	70.00%	80.00%	Two partial exams or final test
Assessment of active participation	15.00%	0.00%	Continuous assessment tests throughout the course

Practicum and practical activities reports assessment	15.00%	20.00%	It also includes the evaluation of the attitude during the practices and a multiple choice exam on the handling of experimental data that is carried out just before the practices. This activity is compulsory.
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:

Two partial eliminatory tests will be carried out throughout the course: the first after Christmas and the second on the day of the final exam of the non-continuous evaluation partners. The mark of each exam must be greater than 4.0 points to make the average between them. Once this requirement has been met, the exam will account for 70% of the final grade. 15% can be obtained from the various activities of continuous evaluation throughout the course, the same as for the experimental work in the laboratory (another 15%). The final mark must be greater than 5.0 points to pass.
The partial exams will consist of mixed questions on theoretical issues and practical exercises in variable proportion.
If the first partial exam is failed, the student will have the option of making a recovery of this part immediately after the exam corresponding to the second part. The minimum grade for each exam is 4 points.
If in any call the student has any of the parts with less than 4 points, he will be failed and his mark in the minutes will be the average of the marks of his exams with a maximum of 4.0 points (the marks of the exams do not come into play in this case). achievement in class or practical laboratory).

Non-continuous evaluation:

In this case, the mark will be obtained from the final exam mark (80%) and the laboratory mark (20%), both having to be more than 4 points and the final mark greater than 5/10. This test is passed or failed as a whole, parts cannot be passed separately to save for the extraordinary

Specifications for the resit/retake exam:

The extraordinary exam will also have two differentiated parts, so that each student of the "continuous evaluation" option is obligatorily examined only in those in which he has not reached 4.0 points in the previous tests. The type of exam will be similar to that of the ordinary call. The calculation of the note as in the conv. ordinary

Specifications for the second resit / retake exam:

There will be a single exam of all the subject matter of the course, separated into two parts (corresponding to the two partial exams of the ordinary call) and each of them must obtain more than 4 points and a global average of more than 5 points (on 10).

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]	2
Study and Exam Preparation [AUTÓNOMA][]	180
Unit 1 (de 14): Kinematics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 2 (de 14): Dinamics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Unit 3 (de 14): Fluid mechanics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Group tutoring sessions [PRESENCIAL][Group Work]	1
Unit 4 (de 14): Rotation	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Group tutoring sessions [PRESENCIAL][Group Work]	1
Unit 5 (de 14): Armonic movement and mechanical waves	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Group tutoring sessions [PRESENCIAL][Group Work]	1
Unit 6 (de 14): Thermodinamics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Mid-term test [PRESENCIAL][Assessment tests]	1
Final test [PRESENCIAL][Assessment tests]	2
Unit 7 (de 14): Vectorial calculus	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Unit 8 (de 14): Electrostatics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6

Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 9 (de 14): Electrostatics inside matter	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 10 (de 14): Electrical current	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Group tutoring sessions [PRESENCIAL][Group Work]	1
Mid-term test [PRESENCIAL][Assessment tests]	1
Unit 11 (de 14): Magnetostatics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 12 (de 14): Magnetic field depending on time	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 13 (de 14): Maxwell equations	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	1
Mid-term test [PRESENCIAL][Assessment tests]	1
Final test [PRESENCIAL][Assessment tests]	2
Unit 14 (de 14): Optics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Group tutoring sessions [PRESENCIAL][Group Work]	1
Final test [PRESENCIAL][Assessment tests]	3
Global activity	
Activities	**hours**
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	25
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Group tutoring sessions [PRESENCIAL][Group Work]	5
Mid-term test [PRESENCIAL][Assessment tests]	3
Final test [PRESENCIAL][Assessment tests]	7
Study and Exam Preparation [AUTÓNOMA][]	180
Class Attendance (theory) [PRESENCIAL][Lectures]	65
Total horas:	300

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Burbano de Ercilla, Santiago (n. 1908)	Problemas de física	Tébar		978-84-95447-27-2	2007	
González, Félix A. (González Hernández)	La fisica en problemas	Tebar Flores		84-7360-141-6	1995	
Hewitt, Paul G.	Física conceptual	Pearson Educación		970-26-0447-8	2004	
Serway, Raymond A.	Física para ciencias e ingeniería con física moderna	Cengage Learning		978-970-686-837-4 (v	2011	
Tipler, Paul Allen (1933-)	Física para la ciencia y la tecnología	Reverté		978-84-291-4430-7 (v	2013	