Universidad Zaragoza

Year : 2019/20

30101 - Physics I

Syllabus Information

Academic Year: 2019/20
Subject: 30101 - Physics I
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
179 - Centro Universitario de la Defensa - Zaragoza
Degree: 457 - Bachelor's Degree in Industrial Organisational Engineering
563 - Bachelor's Degree in Industrial Organisational Engineering
425 - Bachelor's Degree in Industrial Organisational Engineering
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Basic Education
Module: ---

1.General information

1.1.Aims of the course

The subject and its expected results respond to the following approaches and objectives:

Expose the universal nature of physical laws, their inexorable character and the enormous benefits that are obtained from their knowledge in the field of engineering.

1.2.Context and importance of this course in the degree

Physics I is a basic training subject, with 6 ECTS credits that is taught during the first year of the degree in Industrial Organization Engineering.

It aims to provide the student with the basic knowledge of the most relevant phenomena and physical laws of application in the study of engineering; as well as the necessary tools to apply this theoretical knowledge to the resolution of engineering problems. More specifically, it focuses on the study of mechanics and thermodynamics.

1.3.Recommendations to take this course

It is a basic subject that must provide a first contact with the foundations, methods and scientific procedures of Physics. A close relationship is established with other analogous subjects such as Physics II, Mathematics I, II, III inserted within the degree itself.

In order to face the subject with guarantees, it is recommended to have completed physics and mathematics in the second year of high school or equivalent.

2.Learning goals

2.1.Competences

General:

1. Ability to solve problems and take decisions with initiative, creativity and critical reasoning.

2. Ability to continue learning and develop self-learning strategies.

Specific:

3. Mastery of basic concepts about the principles of general mechanics, fields and waves, electromagnetism and its application to solve engineering problems.

2.2.Learning goals

- Knows the fundamental concepts and laws of mechanics and thermodynamics and their application to basic problems in engineering.

- Analyzes problems that integrate different aspects of Physics, recognizing the varied physical foundations that underlie a technical application, device or real system.

- Knows the units, orders of magnitude of the defined physical magnitudes and solves basic engineering problems, expressing the numerical result in the appropriate physical units.

- Correctly uses basic methods of experimental measurement or simulation and treats, presents and interprets the obtained data, relating them to the appropriate physical magnitudes and laws.

- Uses bibliography, by any of the available means at present, and uses a clear and precise language in its explanations on questions of physics.

- Correctly applies the fundamental equations of mechanics to various fields of physics and engineering: rigid solid dynamics, oscillations, elasticity and fluid mechanics.

- Understands the meaning, utility and relationships between magnitudes, modules and fundamental elastic coefficients used in solids and fluids.

- Performs mass and energy balances correctly in fluid movements in the presence of basic devices.

- Uses correctly the concepts of temperature and heat. He/She applies them to calorimetric, dilation and heat transmission problems.

- Applies the first and second principles of thermodynamics to processes, basic cycles and thermal machines.

2.3.Importance of learning goals

The activities carried out in this subject are of high formative content since they encourage the development of the reasoning, analysis and synthesis skills, problem solving and application cases and initiation to laboratory work and to the application of the scientific method.

Due to its condition as a basic training subject, the competences acquired correspond to what is required in every degree in the fields of Engineering and Architecture.

Being a subject taught during the first course, on the one hand it should serve to strengthen and homogenize the knowledge acquired in previous educational stages and, on the other hand, act as a foundation to build on it the most specific technological knowledge that will be addressed in other subjects of the degree. In particular, all those that are related to mechanics, thermodynamics, elasticity and fluid mechanics.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

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- Written tests: There will be 3 written partial tests throughout the course and if the student suspends it can perform a global exam in two calls.

- Laboratory practices are compulsory face-to-face activities that the student must complete. To pass the subject, students must pass the corresponding part in the evaluation of contents during the laboratory practices and their assessment will be part of the final grade.

- Participation in the subject (PS). In this subject the proactivity of the students is valued

The evaluation criteria will be:

The final grade (NF) will be **NF = W * 0.70 + LP * 0.20 + PS * 0.1.**

To pass the subject it is necessary that NF is equal to or greater than 5.

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- Written tests (WE): There will be 3 written tests throughout the course: an intermediate test (partial exam) and two global assessment tests (final exams of first and second call).

- Laboratory practices (LP) are compulsory face-to-face activities that the student must complete. To pass the subject, students must pass the corresponding part in the evaluation of contents during the laboratory practices and their assessment will be part of the final grade.

The evaluation criteria will be:

Partial exam: will be carried out during the semester covering part of the theoretical and practical contents of the subject

(part A). A grade equal to or greater than 5 will exempt the completion of part A during the final examination in the first call.

Final exam of the first call: A written exam will be held at the end of the semester, which will consist of two parts: part A (contents already evaluated in the partial exam) and part B (new contents).

The grade of this written test (NEF) will be **NEF = NPA * 0.6 + NPB * 0.4**; as long as the mark of part A (NPA) is equal to or greater than 5.0, and that of part B (NPB) is equal to or greater than 4.5. If one of the two partial marks is lower than the indicated thresholds, 5.0 and 4.5 respectively, or NEF is less than 5, the test will fail.

The final grade (NF) in the first call will be **NF = NPR * 0.10 + NEF * 0.90** as long as both the practical mark (NPR) and NEF are equal to or greater than 5.0.

To pass the subject it is necessary that NF is equal to or greater than 5.

Final exam of the second call: The marks obtained in the partial exam or the practices will not be saved, and therefore the student will be examined of all the theoretical-practical contents.

The final grade will be the overall mark obtained in this test **NF = NPR * 0.10 + NEF *0.90** as long as both the practical mark (NPR) and the written test (NEF) are equal to or greater than 5,0.

To pass the subject in second call it is necessary that NF be equal to or greater than 5.

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

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The learning process that is designed for this subject is based on the following:

The subject consists of 6 ECTS credits, which represents 150 hours of student work on the subject during the semester. 40% of this work (60 h.) Will take place in the classroom, and the rest will be autonomous. One semester consists of 15 teaching weeks. To make the timing is used to measure the school week, in which the student must devote to the study of the subject 10 hours.

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The course corresponds to 6 ECTS credits which are equivalent to 150 hours of student work. Of these, 60 hours correspond to work in the classroom, where laboratory sessions and evaluation activities are included; the remaining 90 hours are the approximate number of independent learning hours needed to pass the course. It is recommended that students try and solve a problem a day on their own. Problems to solve should be chosen among those proposed.

4.2.Learning tasks

The course includes the following learning tasks:

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- Theoretical classes: theoretical activities so fundamentally expository given by the teacher.
- Practical classes: practical discussion activities and conducting exercises conducted in the classroom and requiring high student participation.
- Laboratory Practice: Practical activities in laboratories.
- Office Group tutorials hours.
- Office individual tutorials hours.

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Classroom teaching: Involves Lectures and sessions on problem-solving. The lectures will provide the means to give a concise, focused presentation of the subject matter of the course.

Laboratories: Laboratory experiments enhance and consolidate the basic principles discussed in the theoretical section of the course. Students will work in small groups of about 2-3 students and complete an experiment during each lab meeting. Procedures for each lab can be accessed via Moodle in the Experiments section. Labs are mandatory and are part of the grade. Students must complete each lab session in order to pass the course. A grading lab writes up for each group should be handed over after the lab session.

Independent study: involves activities such as preparing submitted work (e.g. laboratory reports), working through any worked examples provided by the lecturer or further examples, on problem-solving, on an independent study of the lecture course material and textbooks, and on revision.

Office hours: Lecturers can be reached during Office Hours to answer questions and provide assistance with the course material, homework or other questions about the class. Office hours work best if students have their textbooks, class notes, and lecture tutorials with them. Students are highly encouraged to arrange appointments by email.

4.3.Syllabus

The course will address the following topics:

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I. Kinematics
II. Dynamics of one and several particles. Static.
III. Rigid body dynamics
IV. Oscillatory movement
V. Elasticity and fluids
VI. Thermodynamics

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1. Introduction. Measurements, errors, and uncertainty
2. One-body Mechanics
3. Many-body Mechanics
4. Elasticity
5. Fluid Mechanics
6. Oscillations
7. Thermodynamics
    7.1. Temperature and Heat. Energy transfer
    7.2. The first law of thermodynamics
    7.3. The second law of thermodynamics

Labs

1. Measurements, Errors, and Uncertainty
2. One-body dynamics. Motion in the presence of resistive forces. Stokes law.
3. Mathematical and Physical Pendulum
4. Specific heat of metals

4.4.Course planning and calendar

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Planning for weeks about the subject is as follows:

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Topic	I	I	II	II	III	III	III/IV	IV	IV	V	V	VI	VI	VI	R
Exams				1º					2º					3º	

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Timetabled activities will be available on Moodle at the beginning of the term. To access the planning, go to http://moodle2.unizar.es with your username and password to log in. To check the school calendar and timetables visit http://cud.unizar.es/calendarios.

4.5.Bibliography and recommended resources

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Resources:

Students will have the Moodle virtual platform where you will find notes, powerponit slides, corollary of exercise, laboratoy practices manuals and any other material.

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Class materials such as copies of PowerPoint slides, lecture notes, electronic versions of handouts, guide notes for each experiment and exam reviews will be available through Moodle http://moodle2.unizar.es.. Other supplementary texts and audiovisual packages will also be available. These materials may be utilized to reinforce the lecture and lab material or to provide material for independent study by the student.

Bibliography avaliable in http://biblos.unizar.es/br/br_citas.php?codigo=30101&year=2019