Course guide
330503 - F1 - Physics 1

Last modified: 04/05/2023

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan

LECTURER

Coordinating lecturer: Ciriano Nogales, Yolanda

Others: Conangla Triviño, Laura
Lladó Valero, Jordi
Vallbe Mumbru, Marc
Vilanova Arnau, David
Rota Font, Francesc

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE2. Understanding and mastering the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application for solving engineering problems.

Generical:
CG3. Knowledge of basic and technological subjects that will enable students to learn new methods and theories and that will endow them with the versatility needed to adapt to new situations.

Transversal:
1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
2. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

Basic:
CB1. Students will be able to demonstrate their knowledge of a field of study that builds on secondary education and is usually found at a level that, while supported by advanced textbooks, also includes aspects that involve knowledge of the latest developments in the field of study.
CB2. Students will be able to apply their knowledge to their work or vocation in a professional manner and demonstrate that they possess the competencies that are typically demonstrated by elaborating and defending arguments and solving problems in the field of study.

TEACHING METHODOLOGY

MD1 Master class or lecture (EXP)
MD2 Problem solving and case study (RP)
MD3 Practical work in laboratory or workshop (TP)
MD7 Assessment activities (EV)

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, students should be able to do the following:
- Understand and use the basic principles of particle mechanics and systems of particles.
- Understand wave motion quantities applied to the study of mechanical waves.
- Understand the fundamental principles of thermodynamics and relate them to practical applications.
- Handle laboratory instruments, properly collect data, process data and prepare a report.

STUDY LOAD

Type	Hours	Percentage
Hours large group	22,5	20.00
Self study	67,5	60.00
Hours small group	22,5	20.00

Total learning time: 112.5 h

CONTENTS

Topic 1: Particle mechanics and systems of particles

Description:
Kinematics and dynamics of particles. Work and energy. Systems of particles and conservation of linear momentum. Collisions.

Specific objectives:
To understand and use the basic principles of particle mechanics.

Related activities:
Activity 1: Laboratory practical
Activity 2: Assessment test
Activity 3: Delivery
Activity 4: Final assessment test

Full-or-part-time: 37h 30m
Theory classes: 7h 30m
Laboratory classes: 7h 30m
Self study : 22h 30m

Topic 2: Wave motion and mechanical waves

Description:
Wave motion, mechanical waves.

Specific objectives:
To understand wave motion quantities applied to the study of mechanical waves.

Related activities:
Activity 1: Laboratory practical
Activity 2: Assessment test
Activity 3: Delivery
Activity 4: Final assessment test

Full-or-part-time: 37h 30m
Theory classes: 7h 30m
Laboratory classes: 7h 30m
Self study : 22h 30m

Topic 3: Thermodynamics

Description:
Temperature. First law of thermodynamics. Second law of thermodynamics.

Specific objectives:
To understand the fundamental principles of thermodynamics and relate them to practical applications.

Related activities:
Activity 1: Laboratory practical
Activity 2: Assessment test
Activity 3: Delivery
Activity 4: Final assessment test

Full-or-part-time: 37h 30m
Theory classes: 7h 30m
Laboratory classes: 7h 30m
Self study : 22h 30m

ACTIVITIES

Activity 1: Laboratory practical

Description:
- Laboratory teamwork.
- The students read the instructions and produce a sheet to record the experimental data.

Specific objectives:
At the end of the activity, students should be able to do the following:
- Effectively handle the devices used in the activity.
- Understand the physical concepts involved in the activity.

Material:
- Web page: http://www.epsem.upc.edu/ practiquesfisica
- All necessary equipment for carrying out the practical.

Delivery:
The team prepare and deliver a report to the professor, following the instructions.

Full-or-part-time: 4h 30m
Laboratory classes: 1h 30m
Self study: 3h

Activity 2: Assessment test

Description:
Individual classroom test on the theoretical concepts of particle mechanics with exercises related to the learning objectives.

Specific objectives:
After the activity, students should be able to understand and use the basic principles of particle mechanics.

Material:
Test paper and calculator.

Delivery:
Completed test.

Full-or-part-time: 7h 30m
Theory classes: 1h 30m
Self study: 6h

Activity 3: Delivery

Description:
Individual multiple choice test about the theoretical concepts of particle mechanics, and/or problem solving related to the topic being studied.

Specific objectives:
After the activity, students should be able to understand and use the basic principles of particle mechanics.

Material:
Test paper and calculator.

Delivery:
Delivery of the completed test on time.

Full-or-part-time: 3h
Self study: 3h

Activity 4: Final assessment test

Description:
Individual classroom test on the theoretical concepts of the subject with exercises related to the learning objectives.

Specific objectives:
After the activity, students should be able to understand and use the basic principles of the subject.

Material:
Test paper and calculator.

Delivery:
Completed test.

Full-or-part-time: 13h
Theory classes: 3h
Self study: 10h

GRADING SYSTEM

- Activity 1 (Laboratory practical) is repeated for each topic and is assessed within the denomination EV5 "Performance and quality of the work group (TG)". The set of three topics represent 25% of the final mark. It is an essential condition to pass the subject to have done the practices and present the reports associated with them.
- Activity 2 (Assessment test) is repeated for each topic and is assessed within the denomination EV1 "Written test of knowledge (PE)", with 20% of the final mark for each topic.
- Activity 3 (Delivery) is repeated for each topic and is assessed as EV3 "Work done throughout the course (TR)", with 5% of the final mark for each topic.
- Students who have not passed one or more of the topics in Activity 2 it is recommended to recover the pending part in the final exam (Activity 4).

EXAMINATION RULES.

Each activity will be carried out according to the course schedule. An alternative day will be scheduled for students who are unable to perform one or more of the topics in Activity 1 on the day scheduled. Students who are unable to attend the tests in Activity 2 must sit the test in Activity 4. Activity 3 must be carried out on the day set.

BIBLIOGRAPHY

Basic:

- Bauer, W; Westfall, Gary D; Bauer, W; Bauer, W. Física para ingeniería y ciencias, Vol. 2 [on line]. Segunda edición. México, D. F: McGraw-Hill Education, [2014] [Consultation: 03/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5627. ISBN 9786071511928.
- Tipler, Paul Allen; Mosca, Gene. Física per a la ciència i la tecnologia, Vol. 2 [on line]. Barcelona [etc.]: Reverté, 2010 [Consultation: 10/06/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=5758259. ISBN 9788429144338.
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Complementary:

- Ferreres, E.; Mercadé, J.; Conangla, L.. Pràctiques de física: graus EPSEM. Manresa: EPSEM, 2018.
- Alcaraz i Sendra, Olga; López López, José; López Solanas, V. Física: problemas y ejercicios resueltos [on line]. Madrid: Pearson Educación, 2006 [Consultation: 02/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1249. ISBN 8420544477.
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