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330503 - F1 - Physics 1

Coordinating unit: 330 - EPSEM - Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Teaching unit Compulsory)
ECTS credits: 4,5 Teaching languages: Catalan

Teaching staff

Coordinator: 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

Basic:

CB1. The students have demonstrated to possess and to understand knowledge in an area of study that starts from the base of the general secondary education, and is usually found to a level that, although it relies on advanced textbooks, also includes some aspects that involve knowledge from the vanguard of their field of study.
CB2. Students can apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and problem solving within their area of study.

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 in basic and technological subjects that will enable them to learn new methods and theories and give them the versatility 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.

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.

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- 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

Total learning time: 112h 30m	Hours large group:	22h 30m	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	22h 30m	20.00%
	Guided activities:	0h	0.00%
	Self study:	67h 30m	60.00%

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Content

Topic 1: Particle mechanics and systems of particles

Learning time: 37h 30m

Theory classes: 7h 30m
Laboratory classes: 7h 30m
Self study : 22h 30m

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

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

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

Topic 2: Wave motion and mechanical waves

Learning time: 37h 30m

Theory classes: 7h 30m
Laboratory classes: 7h 30m
Self study : 22h 30m

Description:
Wave motion, mechanical waves.

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

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

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Topic 3: Thermodynamics	Learning time: 37h 30m Theory classes: 7h 30m Laboratory classes: 7h 30m Self study : 22h 30m

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

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

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

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Planning of activities

Activity 1: Laboratory practical

Hours: 4h 30m
Laboratory classes: 1h 30m
Self study: 3h

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

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

Descriptions of the assignments due and their relation to the assessment:
The team prepare and deliver a report to the professor, following the instructions.

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.

Activity 2: Assessment test

Hours: 7h 30m
Theory classes: 1h 30m
Self study: 6h

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

Support materials:
Test paper and calculator.

Descriptions of the assignments due and their relation to the assessment:
Completed test.

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

Activity 3: Delivery

Hours: 3h
Self study: 3h

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

Support materials:
Test paper and calculator.

Descriptions of the assignments due and their relation to the assessment:
Delivery of the completed test on time.

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

Activity 4: Final assessment test	Hours: 13h Theory classes: 3h Self study: 10h

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

Support materials:
Test paper and calculator.

Descriptions of the assignments due and their relation to the assessment:
Completed test.

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

Qualification 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. To pass the subject, students must pass this assessment.
- 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 must sit a final assessment test (Activity 4).

Regulations for carrying out activities

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.

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Bibliography

Basic:

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Young, Hugh D; Freedman, Roger A. Física universitaria: Sears y Zemansky. 13ª ed. México: Pearson Educación, 2013. ISBN 9786073221245 (V. 1), 9786073221900 (V. 2).

Serway, Raymond A; Jewett, John W. Física: para ciencias e ingeniería. 7ª ed. México: Cengage Learning, 2008. ISBN 9789706868220 (V.1), 9789706868374 (V. 2).

Tipler, Paul Allen; Mosca, Gene. Física per a la ciència i la tecnologia [on line]. Barcelona: Reverté, 2010 [Consultation: 18/06/2019]. Available on: <https://discovery.upc.edu/iii/encore/record/C__Rb1510154?lang=cat>. ISBN 9788429144314.

Walker, James S. Physics. 5th ed. Boston: Pearson, 2017. ISBN 9780321976444.

Complementary:

Abad Toribio, Laura; Iglesias Gómez, Laura Mª. Problemas resueltos de física general. 2ª ed. Madrid: Bellisco, 2006. ISBN 8496486273.

Alcaraz i Sendra, Olga; López López, José; López Solanas, V. Física: problemas y ejercicios resueltos. Madrid: Pearson Educación, 2006. ISBN 8420544477.

Valiente Cancho, Andrés. Física para ingenieros: 176 problemas útiles. Ed. estudiante. Madrid: García-Maroto, [2012]. ISBN 9788415475194.

Ferreres, E.; Mercadé, J.; Conangla, L.. Pràctiques de física: graus EPSEM. Manresa: EPSEM, 2018.

Others resources: