

Course guide

330213 - F - Physics

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 ICT SYSTEMS ENGINEERING (Syllabus 2010). (Compulsory subject).		
Academic year: 2023	ECTS Credits: 6.0	Languages: Catalan	

LECTURER

Coordinating lecturer:	Conangla Triviño, Laura
Others:	Ciriano Nogales, Yolanda Lladó Valero, Jordi Miquel Grau, Ramon Rota Font, Francesc Temes Mendoza, David Vallbe Mumbrau, Marc Vilanova Arnau, David

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Knowledge of the basic foundations of: electric and magnetic fields, wave motion, sound and electromagnetic waves and their application to the solution of engineering problems.

Transversal:

2. 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.
3. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
4. 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

The subject consists of 4 hours a week distributed as follows: 2 hours a week and 2 hours fortnightly in large groups, in which the theoretical concepts are worked, exercises are solved for their application and continuous assessment tests are performed; 2 hours fortnightly in small groups in which the deliveries are proposed and the skills to be acquired in the experimental work in the laboratory are worked on, as well as the oral and written communication skills. All classes are face-to-face.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student must be able to:

- Understand and know how to apply the basic principles of electric and magnetic fields.
- Understand wave magnitudes and apply them in the study of mechanical waves, sound and light.
- Apply experimental techniques and know the handling of measuring equipment.
- Maintain correct oral and written communication.
- Be more efficient in planning, organizing and learning both personally and as a team.
- Apply reasoning techniques and strategies to analyse and solve problems.
- Maintain a critical view of the different processes related to the subject.



STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	10.00
Hours large group	45,0	30.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

1. ELECTRIC FIELDS

Description:

Electric field; Coulomb and Gauss laws; electric potential; capacitors; dielectrics; semiconductors; electric current.

Related activities:

Activity 1a: work in the laboratory

Activity 2a: deliverables

Activity 3a: continuous assessment test

Activity 4a: final exam

Full-or-part-time: 50h

Theory classes: 15h

Laboratory classes: 5h

Self study : 30h

2. MAGNETICS FIELDS

Description:

Magnetic field, sources of magnetic field, magnetic materials, Faraday's law of induction.

Related activities:

Activity 1b: work in the laboratory

Activity 2b: deliverables

Activity 3b: continuous assessment test

Activity 4b: final exam

Full-or-part-time: 50h

Theory classes: 15h

Laboratory classes: 5h

Self study : 30h

3. WAVES

Description:

Wave motion, sound waves and electromagnetic waves.

Related activities:

Activity 1c: work in the laboratory

Activity 2c: deliverables

Activity 3c: continuous assessment test

Activity 4c: final exam

Full-or-part-time: 50h

Theory classes: 15h

Laboratory classes: 5h

Self study : 30h

ACTIVITIES

ACTIVITY 1: LABORATORY WORK (CONTENTS 1, 2 AND 3)

Description:

Practical work in the laboratory, in pairs, lasting two hours per session. The student reads the script beforehand and makes a sheet where he writes down the experimental data.

Specific objectives:

At the end of the activity (of all contents), the student must be able to handle the devices used and to interpret the physical concepts involved in the practical work.

Material:

Practice book (available on the digital campus).

web: http://www.epsem.upc.edu/~practiques_fisica

All the necessary material to carry out the practical work.

Delivery:

In pairs and according to established guidelines, the students draw up a report of the practical work that they hand it in to the professor. The report is corrected and returned in the next session. The evaluation of the set of reports represents a 25% of the final grade for the course.

Full-or-part-time: 25h

Laboratory classes: 12h

Self study: 13h

ACTIVITY 2: DELIVERABLES (CONTENT 1, 2 AND 3)

Description:

Set of individual or team deliveries related to the learning objectives (generic and specific).

Specific objectives:

At the end of the activity, the student must be able to work independently and in a team and communicate results effectively.

Material:

Script of the activity.

Information on the BCUM and on the Internet.

Delivery:

Solution of the problems.

The evaluation of the set of deliveries represents a 9% of the final grade for the course.

Full-or-part-time: 12h

Theory classes: 3h

Self study: 9h

ACTIVITY 3: CONTINUOUS ASSESSMENT TEST (CONTENTS 1, 2 AND 3)

Description:

Individual test in class on the knowledge of theoretical concepts and the resolution of practical exercises related to the learning objectives of contents 1, 2 and 3.

Specific objectives:

At the end of the activity, the student must be able to know, understand and use the basic principles of the corresponding content and those previously studied.

Material:

Test paper and calculator.

Delivery:

Carrying out the test.

Each test represents a 22% of the final grade for the course.

Full-or-part-time: 20h

Theory classes: 6h

Self study: 14h

ACTIVITY 4: FINAL TEST (CONTENTS 1, 2 AND 3)

Description:

Individual test in class on the knowledge of theoretical concepts and the resolution of practical exercises related to the learning objectives of contents 1, 2 and 3.

Specific objectives:

At the end of the activity, the student must be able to know, understand and use the basic principles of all the contents of the subject.

Material:

Test paper and calculator.

Delivery:

Carrying out the test.

66% of the final grade for the course.

Full-or-part-time: 17h

Theory classes: 3h

Self study: 14h

GRADING SYSTEM

- Activities 1a, 1b and 1c (laboratory): The evaluation of the set of reports of the work in the laboratory represents a 25% of the final grade for the subject.
- Activities 2a, 2b and 2c (deliveries): The evaluation of the set of deliveries represents a 9% of the final grade for the course.
- Activities 3a, 3b and 3c (continuous assessment tests): The assessment of the set of continuous assessment tests represents a 66% of the final grade for the course.
- Activity 4a, 4b and 4c (final test): Students who have not passed one of the three continuous assessment tests, it is recommended to recover the pending part in the final exam.

EXAMINATION RULES.

It is an essential condition to pass the course having carried out the work in the laboratory and having submitted the corresponding reports.

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.
- Bauer, W.; Westfall, G. D. Física para ingeniería y ciencias, Vol. 1 [on line]. 2ª ed. México: McGraw-Hill/Interamericana, 2014 [Consultation: 03/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5626. ISBN 9786071511911 (V.1).
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- Míguez Camiña, Juan Vicente; et al. Fundamentos físicos de la ingeniería: electricidad y electrónica [on line]. 2ª ed. Madrid: McGraw-Hill, 2010 [Consultation: 14/09/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4342. ISBN 9788448174989.
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- Young, Hugh D.; Freedman, Roger A. Física universitaria con física moderna, Vol. 1 [on line]. México: Pearson Educación de México, S. A. de C. V, 2018 [Consultation: 08/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=8236. ISBN 9786073244398.
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Complementary:

- Ferreres, E.; Mercadé, J.; Conangla, L. Pràctiques de física: grau TIC EPSEM. Manresa: Servei de Publicacions de l'EPSEM, 2016.
- Abad Toribio, L.; Iglesias Gómez, L. M. Problemas resueltos de física general. 2ª ed. Madrid: Bellisco, 2006. ISBN 8496486273.
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- Garcia-Maroto, A. Física: 200 problemas útiles [on line]. Madrid: Garcia-Maroto, 2006 [Consultation: 02/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=35. ISBN 8493478512.

RESOURCES

Other resources:

Web page <http://epsem.upc.edu/~practiquesfisica/>