Course guides
330057 - F2 - Physics II

Last modified: 05/05/2020

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

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN ENERGY AND MINING RESOURCE ENGINEERING (Syllabus 2012). (Compulsory subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2016). (Compulsory subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2016). (Compulsory subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2016). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Conangla Triviño, Laura

Others: Ciriano Nogales, Yolanda
Lladó Valero, Jordi
Vallbe Mumbru, Marc
Vilanova Arnau, David
Rota Font, Francesc

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. (ENG) Comprensió i domini dels conceptes fonamentals sobre les lleis generals de camps, ones i electromagnetisme, i la seva aplicació per a la resolució de problemes propis de l¿enginyeria.

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 two hours a week of face-to-face lessons in the classroom (large group) and two hours a week in a small group in which applied aspects are worked on. Small-group classes will be held in the physics laboratory or the classroom.

LEARNING OBJECTIVES OF THE SUBJECT

On completion of the subject, students must be able to:
- Understand and use the basic principles of electric and magnetic fields.
- Understand wave magnitudes and apply them to the study of mechanical waves, sound and light.
- Handle laboratory instruments, collect data correctly, process these data and draw up a report.

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Self study	90,0	60.00
Hours small group	30,0	20.00

Total learning time: 150 h

CONTENTS

1. ELECTRIC FIELDS

Description:
Coulomb's law, electric field, Gauss's law, electric potential. Capacitors, dielectrics. Electric current. Circuits.

Related activities:
Activity 1: Laboratory practicals
Activity 4: Continuous assessment test
Activity 7: Deliverables
Activity 8: Final exam

Full-or-part-time: 60h
Theory classes: 12h
Laboratory classes: 12h
Self study : 36h

2. MAGNETIC FIELDS

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

Related activities:
Activity 2: Laboratory practical
Activity 5: Continuous assessment test
Activity 7: Deliverables
Activity 8: Final exam

Full-or-part-time: 40h
Theory classes: 8h
Laboratory classes: 8h
Self study : 24h

3. WAVES

Description:
Wave motion, sound waves and electromagnetic waves

Related activities:
Activity 3: Laboratory practicals
Activity 6: Continuous assessment test
Activity 7: Deliverables
Activity 8: Final exam

Full-or-part-time: 50h
Theory classes: 10h
Laboratory classes: 10h
Self study : 30h

ACTIVITIES

LABORATORY PRACTICAL: ELECTRIC FIELDS (TOPIC 1)

Description:
Two laboratory practicals in pairs, each lasting two hours. Students read the script beforehand and then draw up a sheet in which they record the experimental data.

Specific objectives:
On completion of the activity, students must be able to:
Use the apparatus for the practical effectively.
Interpret the physical phenomena involved in the practical.

Material:
Practicals book (available on the ATENEA digital campus)
Web page: http://www.epsem.upc.edu/ practiquesfisica
All the materials needed for the practical.

Delivery:
Students draw up a report in pairs following the instructions given and they hand it in to the professor. The report is corrected and returned. Feedback is given in the next lesson. It makes up 40% of the laboratory mark.

Full-or-part-time: 10h
Laboratory classes: 4h
Self study: 6h

LABORATORY PRACTICAL: MAGNETIC FIELDS (TOPIC 2)

Description:
Laboratory practical in pairs lasting two hours. Students read the script beforehand and then draw up a sheet in which they record the experimental data.

Specific objectives:
On completion of the activity, students must be able to:
Use the apparatus for the practical effectively.
Interpret the physical phenomena involved in the practical.

Material:
Practicals book (available on the ATENEA digital campus)
Web page: http://www.epsem.upc.edu/ practiquesfisica
All the materials needed for the practical

Delivery:
Students draw up a report in pairs following the instructions given and they hand it in to the professor. The report is corrected and returned. Feedback is given in the next lesson. It makes up 20% of the laboratory mark.

Full-or-part-time: 5h
Laboratory classes: 2h
Self study: 3h

LABORATORY PRACTICAL: WAVES (TOPIC 3)

Description:
Students carry out two practicals in pairs, in two 2-hour sessions. Student read the script beforehand and then draw up a sheet in which they record the experimental data.

Specific objectives:
On completion of the activity, students must be able to:
Use the apparatus for the practical effectively.
Interpret the physical phenomena involved in the practical.

Material:
Practicals book (available on the ATENEA digital campus)
Web page: http://www.epsem.upc.edu/ practiquesfisica
All the materials needed for the practical.

Delivery:
Students draw up a report in pairs following the instructions given and they hand it in to the professor. The report is corrected and returned. Feedback is given in the next lesson. It makes up 40% of the laboratory mark.

Full-or-part-time: 10h
Laboratory classes: 4h
Self study: 6h

INDIVIDUAL CONTINUOUS ASSESSMENT TEST: ELECTRIC FIELDS (TOPIC 1)

Description:
Individual test in the classroom covering part of the theory on thermodynamics and exercises and problems related to the learning objectives.

Specific objectives:
On completion of the activity, students must be able to:
Understand and use the basic principles of electric fields.

Material:
Test paper and calculator.

Delivery:
The completed test
It represents 22% of the final mark.

Full-or-part-time: 7h
Theory classes: 2h
Self study: 5h

INDIVIDUAL CONTINUOUS ASSESSMENT TEST: MAGNETIC FIELDS (TOPIC 2)

Description:
Individual test in the classroom covering part of the theory on magnetic fields and exercises and problems related to the learning objectives.

Specific objectives:
On completion of the activity, students must be able to:
Understand and use the basic principles of electric fields.

Material:
Test paper and calculator.

Delivery:
The completed test
It represents 22% of the final mark.

Full-or-part-time: 7h
Theory classes: 2h
Self study: 5h

INDIVIDUAL CONTINUOUS ASSESSMENT TEST: WAVES (TOPIC 3)

Description:
Individual test in the classroom covering part of the theory on waves and exercises and problems related to the learning objectives.

Specific objectives:
On completion of the activity, students must be able to:
Understand and use the basic principles of waves.

Material:
Test paper and calculator.

Delivery:
The completed test
It represents 22% of the final mark.

Full-or-part-time: 7h
Theory classes: 2h
Self study: 5h

DELIVERABLES (TOPICS 1, 2 AND 3)

Description:
A set of individual or group deliverables covering part of the theory of the subject and exercises and problems related to the learning objectives.

Specific objectives:
On completion of the activity, students must be able to:
Understand and use the basic principles of electric fields, magnetic fields and waves, work independently and in a team and communicate results effectively.

Material:
Instructions.

Delivery:
Solution of the problems
9% of the final mark

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

FINAL EXAM (TOPICS 1, 2 AND 3)

Description:
Individual test in the classroom covering part of the theory of the subject and exercises and problems related to the learning objectives.

Specific objectives:
On completion of the activity, students must be able to:
Understand and use the basic principles of electric fields, magnetic fields and waves.

Material:
Exam paper and calculator.

Delivery:
The completed exam
66% of the final mark

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

GRADING SYSTEM

Laboratory (activities 1, 2, 3 and 4) 25% of the final mark
Test on electric fields (Activity 4) 22% of the final mark
Test on magnetic fields (Activity 5) 22% of the final mark
Test on waves (Activity 6) 22% of the final mark
Deliverables (Activity 7) 9% of the final mark
Students who have passed the practicals but have not passed one of the three continuous assessment tests must take the part that is pending in the final exam.
Final exam 66% of the final mark

EXAMINATION RULES.

Students must have carried out the practicals competently to pass the subject.

BIBLIOGRAPHY

Basic:
- Bauer, W.; Westfall, G. D. Física para ingeniería y ciencias [on line]. 2ª ed. México: McGraw-Hill/Interamericana Editores, 2014 [Consultation: 30/07/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5627. ISBN 9786071511911 (V. 1), 9786071511928 (V. 2).
- Tipler, P. A.; Mosca, G. 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.
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- Walker, J. S. Physics. 5th ed. Upper Saddle River: Upper Saddle Riber: Pearson Prentice, 2017. ISBN 9780321976444.
- Serway, R. A.; Jewett, J. W. Física: para ciencias e ingeniería. 7ª ed. México: Cengage Learning, 2008. ISBN 9789706868220 (V. 1), 9789706868374 (V. 2).

Complementary:
- Valiente, A. Física para ingenieros: 176 problemas útiles. Madrid: García-Maroto, 2012. ISBN 9788415475194.
- Ferreres, E.; Mercadé, J.; Conangla, L. Pràctiques de física: graus EPSEM. Manresa: EPSEM, 2018.

- Abad, L.; Iglesias, L. M. Problemas resueltos de física general. 2ª ed. Madrid: Bellisco, 2006. ISBN 8496486273.
- Alcaraz, O.; López, J.; López, V. Física: problemas y ejercicios resueltos [on line]. Madrid: Pearson Educación, 2006 [Consultation: 30/07/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1249. ISBN 8420544477.