

Course guide

330057 - F2 - Physics II

Last modified: 22/05/2024

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

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
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 2016). (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 MINERAL RESOURCE ENGINEERING AND MINERAL RECYCLING (Syllabus 2021). (Compulsory subject).

Academic year: 2024 **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 Mumbriu, Marc

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Understanding and mastery of the fundamental concepts on the general laws of fields, waves and electromagnetism, and their application for solving problems specific to engineering.

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
Hours small group	30,0	20.00
Self study	90,0	60.00

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: <https://fisicalaboratori.epsem.upc.edu/>

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: <https://fisicalaboratori.epsem.upc.edu/>

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: <https://fisicalaboratori.epsem.upc.edu/>

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 electric 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: 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 magnetic 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 not passed one of the three continuous assessment tests, it is recommended to recover the pending part in the final exam.

Final exam 66% of the final mark

EXAMINATION RULES.

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

BIBLIOGRAPHY

Basic:

- Bauer, W.; Westfall, G. D. Física para ingeniería y ciencias, Vol. 1 [on line]. 2ª ed. México: McGraw-Hill/Interamericana Editores, 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).
- Serway, R. A.; Jewett, J. 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, Vol. 1 [on line]. Barcelona: Reverté, 2010 [Consultation: 27/05/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=5758258>. ISBN 9788429144321.
- Walker, J. S. Physics. 5th ed. Upper Saddle River: Upper Saddle River: Pearson Prentice, 2017. ISBN 9780321976444.
- 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?pq-origsite=primo&docID=5758259>. ISBN 9788429144338.
- 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.
- Young, Hugh D.; Freedman, Roger A. Física universitaria con física moderna, Vol. 2 [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=8237. ISBN 9786073244404.

Complementary:

- 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: 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.
- Valiente, A. Física para ingenieros: 176 problemas útiles [on line]. Madrid: García-Maroto, 2012 [Consultation: 10/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1055. ISBN 9788415475194.
- Conangla, L.; Ciriano, Y.; Ferreres, E.; Mercadé, J.. Pràctiques de física: graus EPSEM. Manresa: EPSEM, 2023.

RESOURCES

Other resources:

Web page <https://fisicalaboratori.epsem.upc.edu/>