

## 330057 - F2 - Physics II

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 ENERGY AND MINING RESOURCE ENGINEERING (Syllabus 2012). (Teaching unit Compulsory) BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2016). (Teaching unit Compulsory) BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2016). (Teaching unit Compulsory) BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2016). (Teaching unit Compulsory) BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits:	6
Teaching languages:	Catalan

### Teaching staff

Coordinator:	Conangla Triviño, Laura
Others:	Ciriano Nogales, Yolanda Lladó Valero, Jordi Vallbe Mumbrau, 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.



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- Handle laboratory instruments, collect data correctly, process these data and draw up a report.

### Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	30h	20.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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### Content

<p>1. ELECTRIC FIELDS</p>	<p>Learning time: 60h Theory classes: 12h Laboratory classes: 12h Self study : 36h</p>
<p>Description: Coulomb's law, electric field, Gauss's law, electric potential. Capacitors, dielectrics. Electric current. Circuits.</p> <p>Related activities: Activity 1: Laboratory practicals Activity 4: Continuous assessment test Activity 7: Deliverables Activity 8: Final exam</p>	
<p>2. MAGNETIC FIELDS</p>	<p>Learning time: 40h Theory classes: 8h Laboratory classes: 8h Self study : 24h</p>
<p>Description: Magnetic field, sources of magnetic fields, magnetic materials, Faraday's law of induction.</p> <p>Related activities: Activity 2: Laboratory practical Activity 5: Continuous assessment test Activity 7: Deliverables Activity 8: Final exam</p>	
<p>3. WAVES</p>	<p>Learning time: 50h Theory classes: 10h Laboratory classes: 10h Self study : 30h</p>
<p>Description: Wave motion, sound waves and electromagnetic waves</p> <p>Related activities: Activity 3: Laboratory practicals Activity 6: Continuous assessment test Activity 7: Deliverables Activity 8: Final exam</p>	

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### Planning of activities

<b>LABORATORY PRACTICAL: ELECTRIC FIELDS (TOPIC 1)</b>	Hours: 10h Laboratory classes: 4h Self study: 6h
<p><b>Description:</b> 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.</p> <p><b>Support materials:</b>            Practicals book (available on the ATENEA digital campus)            Web page: <a href="http://www.epsem.upc.edu/practiquesfisica">http://www.epsem.upc.edu/practiquesfisica</a>            All the materials needed for the practical.</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b>            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.</p> <p><b>Specific objectives:</b>            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.</p>	
<b>LABORATORY PRACTICAL: MAGNETIC FIELDS (TOPIC 2)</b>	Hours: 5h Laboratory classes: 2h Self study: 3h
<p><b>Description:</b> 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.</p> <p><b>Support materials:</b>            Practicals book (available on the ATENEA digital campus)            Web page: <a href="http://www.epsem.upc.edu/practiquesfisica">http://www.epsem.upc.edu/practiquesfisica</a>            All the materials needed for the practical</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b>            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.</p> <p><b>Specific objectives:</b>            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.</p>	
<b>LABORATORY PRACTICAL: WAVES (TOPIC 3)</b>	Hours: 10h Laboratory classes: 4h Self study: 6h
<p><b>Description:</b> 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.</p>	

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### Support materials:

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

### Descriptions of the assignments due and their relation to the assessment:

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.

### 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.

### INDIVIDUAL CONTINUOUS ASSESSMENT TEST: ELECTRIC FIELDS (TOPIC 1)

Hours: 7h  
Theory classes: 2h  
Self study: 5h

### Description:

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

### Support materials:

Test paper and calculator.

### Descriptions of the assignments due and their relation to the assessment:

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

### Specific objectives:

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

### INDIVIDUAL CONTINUOUS ASSESSMENT TEST: MAGNETIC FIELDS (TOPIC 2)

Hours: 7h  
Theory classes: 2h  
Self study: 5h

### Description:

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

### Support materials:

Test paper and calculator.

### Descriptions of the assignments due and their relation to the assessment:

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

### Specific objectives:

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

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<p><b>INDIVIDUAL CONTINUOUS ASSESSMENT TEST: WAVES (TOPIC 3)</b></p>	<p>Hours: 7h Theory classes: 2h Self study: 5h</p>
<p><b>Description:</b> Individual test in the classroom covering part of the theory on waves and exercises and problems related to the learning objectives.</p> <p><b>Support materials:</b> Test paper and calculator.</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b> The completed test It represents 22% of the final mark.</p> <p><b>Specific objectives:</b> On completion of the activity, students must be able to: Understand and use the basic principles of waves.</p>	
<p><b>DELIVERABLES (TOPICS 1, 2 AND 3)</b></p>	<p>Hours: 13h Laboratory classes: 3h Self study: 10h</p>
<p><b>Description:</b> A set of individual or group deliverables covering part of the theory of the subject and exercises and problems related to the learning objectives.</p> <p><b>Support materials:</b> Instructions.</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b> Solution of the problems 9% of the final mark</p> <p><b>Specific objectives:</b> 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.</p>	
<p><b>FINAL EXAM (TOPICS 1, 2 AND 3)</b></p>	<p>Hours: 13h Theory classes: 3h Self study: 10h</p>
<p><b>Description:</b> Individual test in the classroom covering part of the theory of the subject and exercises and problems related to the learning objectives.</p> <p><b>Support materials:</b> Exam paper and calculator.</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b> The completed exam 66% of the final mark</p>	

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### 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.

### Qualification 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

### Regulations for carrying out activities

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

### Bibliography

#### Basic:

- Bauer, W.; Westfall, G. D. Física para ingeniería y ciencias. 2ª ed. México: McGraw-Hill/Interamericana Editores, 2014. ISBN 9786071511911 (V. 1), 9786071511928 (V. 2).
- Young, H. D.; Freedman, R. A. Física universitaria: Sears y Zemansky. 13ª ed. México: Pearson Education, 2013. ISBN 9786073221245 (V. 1), 9786073221900 (V. 2).
- 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, 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](https://discovery.upc.edu/iii/encore/record/C__Rb1510154?lang=cat)>. ISBN 9788429144314.
- Walker, J. S. Physics. 5th ed. Upper Saddle River: Upper Saddle River: Pearson Prentice, 2017. ISBN 9780321976444.

#### 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. Madrid: Pearson Educación, 2006. ISBN 8420544477.
- 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.

#### Others resources: