Universitat de Lleida

DEGREE CURRICULUM

PHYSICS II

Coordination: CARRERA VILANOVA, MIQUEL

Academic year 2019-20

Subject's general information

Subject name	PHYSICS II
Code	102105
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Bachelor's Degree in Mechanical Engineering	1	COMMON	Attendance-based
Not informed	1	COMMON	Attendance-based
Bachelor's Degree in Automation and Industrial Electronic Engineering	1	COMMON	Attendance-based
Bachelor's Degree in Energy and Sustainability Engineering	1	COMMON	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRALAB	PRAULA	TEORIA
Number of credits	0.4	2.6	3
Number of groups	12	3	3

Coordination	CARRERA VILANOVA, MIQUEL
Department	ENVIRONMENT AND SOIL SCIENCES
Important information on data processing	Consult this link for more information.
Language	Catalan

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
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Subject's extra information

SECURITY RULES IN THE LABORATORY

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Blue laboratory gown from UdL (unisex)
- Protection glasses
- Mechanical protection gloves

They can be purchased through the shop Údels of the UdL:
C/ Jaume II, 67 baixos
Centre the Cultures i Cooperació Transfronterera
http://www.publicacions.udl.cat/

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI. Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the consequences in the evaluation of the subject that are described in this course guide.

GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratoy gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.

- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the Servei de Prevenció de Riscos Laborals de la UdL: http://www.sprl.udl.cat/alumnes/index.html

Learning objectives

General objectives:

Acquire basic knowledge about the concepts and methods of General Physics. These are both theoretical and practical knowledge. Theoretical knowledge is necessary to understand the concepts and laws of physics, while also allowing know how to use the scientific language . Practical knowledge must provide a domain in solving problems of physics.

Use adequated systems units.

Arguing in a properly scientific and technical context.

Properly argue a conclusion based on some assumptions.

To acquire a sufficient basis to deal with normal subjects later based on the application of the laws of classical physics.

Specific objectives:

Understanding the fundamental principles of thermodynamics and apply them to simple physical systems analysis

Understand the principles and fundamental laws of electromagnetism

Apply basic laws for calculating electric field and potential distributions of electric charge point and continuous distributions with simple geometries

Apply basic laws for calculating magnetic systems and magnetic forces or loads drivers running simple geometry

Understand and apply the principle of electromagnetic induction

Competences

Degree-specific competences

- GEEIA2. Understanding and commanding basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application to solve problems in engineering.

Degree-transversal competences

- EPS1. Capacity to solve problems and prepare and defence arguments inside the area of studies.
- EPS5. Capacity of abstraction and of critical, logical and mathematical thinking.
- EPS6. Capacity of analysis and synthesis.
- EPS8. Capacity of planning and organizing the personal work.

Subject contents

Thermodynamics:

1. Temperature

- Thermal balance
- Principle zero of Thermodynamics
- Measuring temperatura.Escales. Thermometers.
- Thermometers gas. Absolute temperature scale.
- The ideal gas law
- Thermal expansion of solids and liquids

2. First law of thermodynamics

- Introduction of a system state, equation of state, thermodynamic diagrams
- Heat capacity and specific heat
- Phase change. Latent heat
- First law of thermodynamics
- Working in a gas. PV diagram
- Internal energy of an ideal gas
- Heat capacity of gases
- Heat capacity of solids
- Quasi-static adiabatic processes in a gas

3. Heat Engines, Entropy and Second Law of thermodynamics

- Introduction: Irreversible Processes
- The thermal machines: second law of thermodynamics
- Refrigerators: second law of thermodynamics
- Equivalence between the statements of the thermal machine and refrigerator
- Machine Carnot
- Scale absolute or thermodynamic temperature
- Irreversibility and disorder
- Entropia

Electromagnetism:

4. Electric field. Electric potential.

- Electric charge. Coulomb's law.

- Electric field.

- Calculation of electric field by Coulomb's law.

- Flux electric field. Gauss' law.

- Calculation of the electric field by Gauss's law.

- Electrostatic potential energy and electric potential.

- Potential of a system of charges.

- Potential of continuous charge distributions.

- Relationship between general electric field and potential.

- Equipotential surfaces

5. Conductors and dielectrics. Capacitors.

- Capacitors. Capacity.

- Electric energy stored in a capacitor.

- Energy density of an electrostatic field.

- Capacitors with dielectric

6. Magnetic Field. Magnetic forces. Sources of the magnetic field.

6.1. Magnetic field and magnetic forces

- Definition and properties of the magnetic field. Magnetic force.

- Magnetic force on a load cell.

    - Magnetic force on a current element and conductor

    - Magnets inside a magnetic field. Magnetic moment.

    - Effect of a uniform magnetic field on a current loop.

    - Movement of loads inside a magnetic field. Applications.

    - Hall effect. Magnetic Field Sensors

6.2. Generation of magnetic field

    - Magnetic field created by mobile point charges.

    - Biot and Savart Law. Field created by a current.

    - Calculation of magnetic field using the Biot-Savart law.

    - Magnetic forces between parallel conductors.

    - Ampere law. Application to the calculation of the magnetic field.

    - Magnetic flux.

7. Electromagnetic induction.

- Phenomena of magnetic induction

- Lenz-Faraday law. Electromotive force induced.

- Electromotive force of motion

- Foucault currents.

- Generators and motors. Operating principles.

- Mutual induction and self-induction.

- Magnetic energy.

Methodology

The development of the course is based on three activities:

1) Classes of **Theory**

Exposition of the concepts, principles and fundamental relations of each subject

Approach of examples illustrating the application

2) Solving **problems** classes

Discussion and resolution of problems and applications related concepts for each topic

3) **Laboratory experiences**

Development plan

WEEK	**Subject - Activities**
1	Introduction. Unit 1
2	U 1 U 2
3	U 2 U 3
4	U 3
5	U 3
6	U 3 U 4
7	U 4 **Laboratory session 1**
8	U 4
9	**Evaluation: EXAM 1st Part**
10	U 4 U 5
11	U 5

12	U 6
13	U 6 **Laboratory session 2**
14	U 6 U 7
15	U 7
16-17	**Evaluation: EXAM 2nd Part**
18	
19	**Evaluation: Final EXAM**

Evaluation

I. Activities that constitute the continuous evaluation throughout the semester:

- CORE ACTIVITIES EVALUATION

These activities are required in order to pass the course through the process of continuous assessment. When the student/s have not done any/s of the three compulsory activities (PA1, PA2, PA3) will get a final maximum of 3.5 points, regardless of the application of percentages can give another top result. Therefore, it must be submitted to the Recovery.

1) PA1: 1st Partial Exam, Week 9

Content: 1,2,3 issues (Thermodynamics)

Percentage: 35%

2) PA2: 2nd Partial Exam, Week 16-17

Content: 4,5,6,7 issues (Electromagnetism)

Percentage: 40%

3) PA3: Laboratory practices

Suppose:

a) Attendance at two laboratory sessions (scheduled time in weeks 5 and 13, to confirm the start of the semester)

Warning: Being a lab, there is no possibility of recovering them out of traineeships established. Any incident affecting attendance at the meeting that has not been communicated promptly to the teacher will NOT be attended.

b) Presentation of a report of the laboratory work (during week 14)

Percentage: 15%

- OPTIONAL Assessment activity (NOT COMPULSORY)

A) Group Afternoon:

PA4 Participation. 5% share classes of problems. Test 5%

Percentage: 10%

B) Groups Morning:

PA4: written test 1 (problem solving), Week 6 (topics: course developed until week 5 included); written test 2

(problem solving), Week 13 (topics: the block of electromagnetism developed until week 12 included)

Percentage: 10%

II. Final mark resulting of continuous assessment throughout the semester

The final mark will be obtained by applying the percentages established, and the following condition: must have obtained a minimum of 3 points in each of the two partial exams PA1 and PA2 to apply percentages. Who does not satisfy this condition will be submitted to Retake exam (PA5). In case of no show, you will finish the course with a maximum mark of 3.5 points.

III. RETAKE

PA5 Retake exam, Week 19

Content: all units

Grading Criteria:

a) The final mark of the students who make the retake is given by:

80% Retake exam PA5

15% Laboratory PA3

5% Activity evaluation PA4

b) Having done the Retake exam but without having done the Laboratory practices PA3, the final mark will be a maximum of 4, regardless of the result obtained applying the percentages referred in (a).

c) Without having done the Laboratory practices PA3 and the Retake exam, then the final mark will be NP.

III. Validation of the Laboratory practices

- The students who passed the Laboratory practices last academic course 18-19, will validate Laboratory and maintain their Laboratory mark for this current course, as far as their final mark was not a NP

- The Laboratory practices passed in previous years to 18-19 are not validated.

Bibliography

Resources

- Exercices

- Laboratory guide

Bibliography

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