Universitat de Lleida

DEGREE CURRICULUM

PHYSICS

Coordination: CARRERA VILANOVA, MIQUEL

Academic year 2022-23

PHYSICS 2022-23

Subject's general information

<table>
<tr><td>Subject name</td><td>PHYSICS</td></tr>
<tr><td>Code</td><td>102008</td></tr>
<tr><td>Semester</td><td>1st Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's Degree in Computer Engineering</td><td>1</td><td>COMMON/CORE</td><td>Attendance-based</td></tr>
<tr><td>Double bachelor's degree: Degree in Computer Engineering and Degree in Business Administration and Management</td><td>2</td><td>COMMON/CORE</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><td>PRALAB</td><td>PRAULA</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>0.4</td><td>2.6</td><td>3</td></tr>
<tr><th>Number of groups</th><td>6</td><td>3</td><td>2</td></tr>
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</td></tr>
<tr><td>Coordination</td><td>CARRERA VILANOVA, MIQUEL</td></tr>
<tr><td>Department</td><td>ENVIRONMENT AND SOIL SCIENCES</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Catalan</td></tr>
<tr><td>Distribution of credits</td><td>Miquel Carrera 12
Francesc Perelló 4,2</td></tr>
</table>

PHYSICS 2022-23

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CARRERA VILANOVA, MIQUEL	miquel.carrera@udl.cat	12	
PERELLO SANS, FRANCESC	francesc.perello@udl.cat	4,2	

Subject's extra information

Physics is a subject that corresponds to Common module in the Degree curriculum.

1st semester of the 1st curs.

Learning objectives

The course aims to introducing the fundamental principles and basic laws of physics that will enable a better understanding of how works the technologies related to computer science and communications networks. Knowledge that allow, for example, understand the technical conditions of a computer installation according to actual regulations, etc.

For this reason, the program has the following specific objectives:

• Understanding and application of basic principles of electromagnetism related to the concepts of electric and magnetic field.

• The introduction of the basic techniques for analyze electrical circuits

• Determination of currents, voltages and power in DC circuits and AC sinusoidal circuits.

• Determination of currents and voltages in simple circuits containing diodes or transistors.

• Description of an harmonic electromagnetic wave and understanding of the parameters that identify it and determine their properties.
• Determination of the intensity of energy carried by an harmonic electromagnetic wave.

• Knowing the properties of light propagation.

• Understanding the operating principle of the optical fiber and laser.

See also the section "Competences" to have an overview of the context in which these objectives are located.

Competences

Strategic competences of the UdL

- CT5. Acquire knowledge in scientific thinking.

Degree-specific competences

- GII-FB2. Understanding and commanding basic concepts of fields and waves and electromagnetism, theory of electrical circuits, electronic circuits, physical principle of the semiconductors and logical families, electronic and photonic devices, and his application for the resolution of problems in the 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.

Subject contents

1. Electrostatic.
1.1. Electric charge. Coulomb's Law.
1.2. Electric field.
1.3. Electrostatic potential energy and electric potential.
1.4. Capacitors. Capacity. Stored energy.

2. Circuit Analysis I: DC circuits.
2.1. Electric current.
2.2. Resistance. Ohm's Law.
2.3. Power.
2.4. Basic elements of a circuit.
2.5. Kirchhoff's laws.
2.6. General methods of circuit analysis: method of node voltages and method of network currents.

3. Circuit Analysis II: AC circuits (sinusoidal alternating current)

3.1. Transient state: RL and RC circuits.

3.2. Elements R, L, C in AC circuits: relationship voltage-intensity. Phasors.
3.3. R-L-C circuit with generator. Stationary state.
3.4. Complex impedance. Ohm's Law in AC.

3.5. Series and parallel circuits. Impedance association. Admittance.

3.6. Ohm's Law applications. Examples.

3.7. Power in AC circuits.

3.8. Resonance in series circuits R-L-C.

3.9. Transformers.
3.10. Signals superposition. Bandwidth.
3.11. Filters.

4. Introduction to Electronics and logic gates.
4.1. p-n junction diode.
4.2. Light emitting diode (LED).
4.3. MOSFET transistor.
4.4. CMOS inverter.

5. Waves

5-I. Harmonic wave motion.

1. General concepts of wave motion.

2. Harmonic wave motion.

2.1. Formal description of wave motion: wave function.

2.2. Characteristic parameters of the harmonic wave.

2.3. Harmonic wave function.

3. Energy and intensity of the harmonic wave.

4. Superposition of harmonic waves of the same characteristics.

5. Phase displacement produced by path difference.

5-II. Harmonic electromagnetic waves (HEW).

1. Introduction.

2. Properties of the HEW.

3. Harmonic electromagnetic wave function.

4. Energy of the HEW.

5. Generation and detection: electric dipole radiation.

6. Electromagnetic spectrum.

7. Propagation properties of light.

7.1. Law of reflection.

7.2. Refraction. Snell's Law.

8. Optical fiber.

9. Polarization of light.

10. Laser

Methodology

The development of the course is based on three activities:

1) Classes Theory

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

Approach of examples illustrating the application.

2) Group classes PraAula

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

3) Laboratory experiences

Laboratory sessions that are developed in smaller groups. Group distribution and schedules will be announced in

advance.

Development plan

Week	Subjects/Activities
1	Introduction Unit 1
2	U 1
3	U 2
4	U 2
5	U 3
6	U 3
7	U 3 U 4
8	U 3
9	**Evaluation PA1**
10	U 4
11	U4
12	U 5 **Laboratory: Oscilloscope**
13	U 5 **Laboratory: circuits RC and RLC**
14	U 5
15	U 5
16-17	**Evaluation PA2**
18	
19	**Evaluation: Retake exam**

Evaluation

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

- COMPULSORY EVALUATION ACTIVITIES

These activities are required in order to pass the course through the process of continuous assessment. When the student have not done any of the three compulsory activities (PA1, PA2) will get a final maximum of 3.5 points,

regardless of the application of percentages can give another result. Therefore, it must be submitted to the Retake exam.

When the student have not done the second compulsory activity PA2, neither Retake Exam, the final qualification will be Not Presented.

1) PA1: **1st Partial Exam**, Week 9

Content (to confirm): units1, 2

Percentage: 38 %

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

Content (to confirm): units 3, 4, 5

Percentage: 39 %

- OPTIONAL Assessment activities (NOT COMPULSORY)

3) PA3: **Laboratory**

All the following must be fulfilled:

a) Attendance at 2 laboratory sessions

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

b) Presentation of a laboratory work report

Percentage: 15 %

4) **PA4: Participation in class**. Two activities, throughout the course, consisting of a problem solving or test (classroom or virtual mode). The specific activities will be announced at least one week in advance.

Percentage: 8 %

II. RETAKE

PA5 **Retake Exam**, Week 19

Content: all topics

Grading criteria:

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

80% Retake exam PA5

15% Laboratory PA3

5% PA4

III. Validation of the Laboratory practices

- The students who passed the Laboratory practices last academic course 21-22, 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 21-22 are not validated.

Bibliography

Resources

Exercices

Laboratory work guides

References:

(*) TIPLER,P.A, MOSCA, G. *Física para la Ciencia y la Tecnología (6ª ed.).* Vol.II, (ISBN-978-84-291-4430-7), Ed. Reverté, Barcelona, 2010.

(*) also in older editions

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SEARS, F.W., ZEMANSKY, M.W., YOUNG, H.D., FREEDMAN,R.A. *Física* Vol. 2. Novena edición. Addison-Wesley Longman, 1999.

IRWIN, J. D. *Análisis básico de circuitos enIngeniería*. Prentice-Hall, 1997. (5ª ed.)

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GONZÁLEZ, F.A. *La Física en Problemas*. Ed. Tébar, 2000

RAMOS, A., RIVAS, J.M., JIMÉNEZ, M.A. *Ejercicios de Electricidad.* Ed.Tébar Flores. Madrid.

BURBANO DE ERCILLA, S., BURBANO GARCÍA, E., GRACIA MUÑOZ, C. *Problemas de Física General* (26ªed.). Mira Editores, Zaragoza, 1994.