Universitat de Lleida

DEGREE CURRICULUM

PHYSICS

Coordination: CASTELLVI SENTIS, FRANCESC

Academic year 2023-24

PHYSICS 2023-24

Subject's general information

<table>
<tr><td>Subject name</td><td>PHYSICS</td></tr>
<tr><td>Code</td><td>102411</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 Forest Engineering</td><td>1</td><td>COMMON/CORE</td><td>Attendance-based</td></tr>
<tr><td>Double degree: Bachelor's degree in Forest Engineering and Bachelor's degree in Nature Conservation</td><td>1</td><td>COMMON/CORE</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>9</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>1.4</td><td>2.2</td><td>5.4</td></tr>
<tr><th>Number of groups</th><td>4</td><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>CASTELLVI SENTIS, FRANCESC</td></tr>
<tr><td>Department</td><td>ENVIRONMENT AND SOIL SCIENCES AND CHEMISTRY</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>Master class 20%
Activities 30%</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>2.4 and 1.2 in class and lab, respectively.</td></tr>
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PHYSICS 2023-24

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CASTELLVI SENTIS, FRANCESC	francesc.castellvi@udl.cat	9,6	To be agreed
POLLS FABREGAT, MIREIA	mireia.polls@udl.cat	3,6	To be agreed

Subject's extra information

All the information is subject to alterations that may arise from rules imposed due to the COVID -19 pandemic.

The subject aims to achieve different skills related to the understanding of laws and basic concepts of mechanics, thermodynamics, fields, waves, electricity and magnetism to understand and solve problems and facilitate multidisciplinary comprehension. It is not a subject oriented to specific skills, but useful to assimilate new challenges.

Recommendations. It is recommended to have studied the baccalaureate in science or technology. If you have not taken these courses, it is recommended to take a preparatory course in general physics.

On the other hand, the coordination of the ETSEA establishes the following regulations (approved on September 4, 2014):

1. It is necessary to carry out all the laboratory practices and work to deserve a continuous evaluation. Otherwise, the student will have to pass a final exam.

2. With regard to practical classes (in the classroom and in the laboratory), it is not allowed to modify the groups.

3. It is not allowed to use the mobile in class.

4. Regarding the evaluation. For assessment and attendance, it is necessary to participate in the 80% of the total teaching load.

Learning objectives

The goal is to achieve the following Learning Outcomes:

LO1. Evaluate orders of magnitude to discriminate phenomena that may be irrelevant.

LO2. Identify situations that are physically different show analogies, allowing the use of known solutions to new problems.

LO3. Correctly interpret fundamental laws or principles.

LO4. Know how to locate the physical phenomenon that can be described through them.

LO5. Interpret the essence of a process / situation.

LO6. Establish a work / work model in order to reduce the problem to a manageable level.

LO7. Interpret scientific texts.

LO8. Summarize and present the information in a concise and clear way.

LO9. Develop the ability to work individually and organize to meet deadlines.

LO10. Gain experience in group work and be able to interact constructively in the team.

Competences

Basic skills

CB1. That students have demonstrated to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects involving knowledge from the forefront of their field of study

CB2. That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study

CB3. That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific, or ethical issues.

CB4. That students can convey information, ideas, problems and solutions to both specialized and non-specialized audiences

CB5. That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy

General skills

CG1. Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection , conservation and uses in the forestry field.

CG9. Knowledge of hydraulics, construction, electrification, forest roads, machinery and mechanization necessary both for the management of forest systems and for their conservation.

Specific skills

CEFB5. Understanding and mastery of the basic concepts about the general laws of mechanics, thermodynamics, fields, and waves and electromagnetism and their application for solving problems specific to engineering.

Subject contents

Introduction

1.- Development of the subject.

2.- Justification of the content.

The subject is structured in five thematic blocks:

Block I. Thermodynamics

SUBJECT 1. BASIC CONCEPTS. Thermodynamic equilibrium concept. Thermometry. Equation of state.

SUBJECT 2. FIRST PRINCIPLE OF THE THERMODYNAMICS. Heat. Heat capacity. Work. Internal Energy. First law of thermodynamics. Applications to closed systems. Ideal gas. Study of the stretching of a thread. Hooke's law.

SUBJECT 3. SECOND PRINCIPLE OF THE THERMODYNAMICS. Thermal machines, refrigerators and heat pumps. Performance and efficiency. Carnot cycle. Combustion engines. Stirling cycle. Turbines.

Block II. Static. Fluids

SUBJECT 1. STATICS OF A RIGID BODY. Center of gravity. Types of forces. Static balance.

SUBJECT 2. STATICS AND DYNAMICS OF FLUIDS. Fundamental equation of fluid statics. Forces on submerged surfaces. Archimedes' principle. Balance of submerged and floating bodies. Continuity equation. Bernouilli's theorem. Real fluids. Consequences of viscosity. Laminar and turbulent regimes. Reynolds name. Hagen-Poiseuille. Darcy-Weisbach. Moody's diagram.

Block III. Electrostatics. Field and Electric current

SUBJECT 1. FIELD AND ELECTROSTATIC POTENTIAL. Electrostatic field. Electrostatic potential. Gauss's theorem. Case study.

SUBJECT 2. CONDUCTORS IN BALANCE. DILECTRIC. Electrostatics of a conductor. Capacitors. Capacity. Capacitor association. Energy of a capacitor. Dielectrics.

SUBJECT 3. ELECTRIC CURRENT. DC CIRCUITS. Current intensity and density. Ohm's law. Power. Kirchoff's laws.

Block IV. Magnetic field. Alternating current circuits

SUBJECT 1.- MAGNETIC FIELD AND ELECTROMAGNETIC INDUCTION. Magnetic force. Biot and Savart law. Magnetic flux. Electromagnetic induction. Henry - Faraday - Lenz law. Self-induction. Electric generators and motors. Establishment of a current in an RL and RC circuit. Hall effects. Applications to AC circuits.

SUBJECT 2. ALTERNATING CURRENT. Alternating current generator. Effective values. Fasors. Ohm's law. Kirchoff's laws. Complex impedance. Impedance association. Power. Resonance. Power factor correction.

Block V. Waves. Heat transfer

SUBJECT 1. PROPERTIES OF THE WAVES AND WAVE PHENOMENA. Wave concept. Classification and characteristics of waves. Equation of a one-dimensional harmonic wave. Dynamic and energetic analysis of wave motion. Doppler effects. Interferences.

SUBJECT 2. MECHANICAL AND ELECTROMAGNETIC WAVES. Examples of mechanical and electromagnetic waves. Sound analysis. Electromagnetic spectrum analysis.

SUBJECT 3. Driving. Fourier's law. Convection. Thermal radiation. Stefan-Boltzmann's law. Wien's law. Newton's law of cooling.

Laboratory practices:

Block I. Determination of the heat capacity of a solid. Stretching a thread.

Block II. Density of a body. Stokes' law. Hagen-Poiseuille's law.

Block III. Determining the parameters of a generator. Wheatstone Bridge. Kirchhoff's laws.

Block V. Law of cooling.

Methodology

Learning activities

Notation: Hours in classroom (lectures and case studies with problems), C, in the laboratory or computer room, L, and autonomous work (estimated value), AW.

Activities	Distribution C	L	AW	Total
Introduction	1			1
Block I				
Lecture 1. Report	5			
Lecture. Report. Lab	2	4		
Lecture 3. Report. Lab	6			
Summary	**13**	**4**	**10**	**27**
Block II				
Lecture 1. Report. Lab	4	2		
Lecture 2. Report. Lab	6	4		
Summary	**10**	**6**	**15**	**31**
Block III				
Lecture 1. Report.	3			
Lecture 2. Report.	4			
Lecture 3. Report. Lab	4	6		
Summary	**11**	**6**	**10**	**27**
Block IV				
Lecture 1. Report.	12			
Lecture 2. Report.	15			
Summary	**27**		**20**	**47**
Block V				
Lecture 1. Report.	2			
Lecture 2	2			
Lecture 3. Report. Lab	4	2		
Summary	**8**	**2**	**10**	**20**
Accumulated	**70**	**18**	**65**	**152**

Development plan

Master classes for theory.

Acitivities can be performed in class and in the lab.

The lab activities are performed in group (two people).

Evaluation

Exams. Weight per exam 20%.

Activities (class and Lab). Total weight, 20%

Bibliography

Tipler, P.A., 1994: Física.Tomos I y II. 3 ed. Ed. Reverté.

Ohanian, H.C., y Markert, J.T., 2010. Física para ingeniería y ciencias. Volúmenes 1 y 2. Ed. Mc Graw Hill.

Dias de Deus, J., M. Pimenta, A. Noronha, T. Peña y P. Brogueira, 2001: Introducción a la Física. Ed. McGraw-Hill. (Pag. web: http://www.mcgraw-hill.pt).

Serway,W.A., 1992: Física. Tomos I y II. Ed. McGraw-Hill

Burbano, S. y E. Burbano, 1995: Problemas de Física. Ed. Librería General.

Castellví, F., P.J. Pérez, M.C.Ramos y J.I. Rosell, 1993: Pràctiques de Física. Ed. PPU - UdL.

Notes. The bibliography is available at the library. The year of publication corresponds to the original version. Later editions can be used (also available in the library).