COURSE DATA

Data Subject	
Code	33162
Name	Physics
Cycle	Grade
ECTS Credits	6.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
1102 - Degree in Biotechnology	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
1102 - Degree in Biotechnology	78 - Physics	Basic Training

Coordination

Name	Department
ROLDAN GARCIA, CLODOALDO	175 - Applied Physics and Electromagnetism

SUMMARY

The course "Physics" is a subject of the degree in Biotechnology that is tought in the second semester of the first year and consists of 6 ECTS credits.

Physics is a basic subject in many of the degrees of Sciences. In the case of Biotechnology, the concepts introduced in Physics establish the foundations of many biological processes and some of the most advanced measurement techniques. Within the first year, the course is related to the subjects "Mathematics" and "Chemistry." In more advanced courses the subject Physics allows understanding basic aspects of chemistry and biology.

Experience has shown that the majority of students reaching the first year of studies in the area of "life sciences" have serious deficiencies that affect the performance of students in the subject of Physics. The shortcomings identified are related mainly to the subjects chosen in the options of high school.

Given this evidence we decided to make a physics course in which the contents make clear the connection between physics and life sciences, including in each chapter detailed applications of physics to biological systems. The aim is to motivate the student to demonstrate the clear relationship between these disciplines. For each of the physical quantities introduced in the different chapters we emphasize their physical meaning and their relation with biological systems.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1102 - Degree in Biotechnology

- Saber expresarse correctamente en términos matemáticos, estadísticos, químicos, físicos y biológicos.
- Emplear correctamente herramientas informáticas de cálculo, análisis y representación de datos (hojas de cálculo).
- Dominar bien los cálculos numéricos y el análisis de errores.
- Emplear correctamente y con soltura la calculadora científica y otras herramientas de cálculo.
- Saber aplicar herramientas estadísticas a resultados experimentales.
- Calcular correctamente los parámetros relevantes de un proceso o experimento mediante representación de datos experimentales.
- Ser capaz de resolver problemas de aplicaciones físicas relacionadas con mecánica de fluidos, termodinámica y electricidad.
- Ser capaz de comprender el comportamiento físico de las ondas electromagnéticas y su interacción con la materia.
- Saber relacionar los conocimientos de física nuclear con los efectos de las radiaciones sobre los organismos vivos.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

English version is not available

DESCRIPTION OF CONTENTS

1. Theoretical Unit

Physic of Fluids:
1.1 Static of fluids. Surface phenomena.
1.2 Dinamic of fluids. Ideal fluids: Bernouilli's equation. Viscous fluids: Poiseuille's equation.
1.3 Movement of solids in fluids: sedimentation.

Principles of bioelectromagnetism:
2.1 Force and electric field.
2.2 Electric potential.
2.3 The cell membrane. Capacity.
2.4 Electric current. Resistance.
2.5 DC electric circuits with a mesh,
2.6 Magnetic field. Force on a moving charge.
2.7 Applications of electric and magnetic fields. Mass spectrometer.

Wave motion:
3.1 Wave types.
3.2 Equation of wave motion: wavelength, frequency and speed.
3.3 Superposition of waves.
3.4 Energy and intensity of a wave. Absorption.
3.5 Brief introduction to acoustics.

Optics:
4.1 The electromagnetic spectrum.
4.2 Refractive index. Laws of reflection and refraction.
4.3 Diopters and lenses.
4.4 Formation of images in lenses.
4.5 Instrumental optics: the magnifying glass and the microscope.
4.6 The human eye as an optical system.
4.7 Defects of the vision.

Radioactivity:
5.1 Nuclear structure. Nuclear forces.
5.2 Nuclear masses and binding energy.
5.3 The radioactive decay and its laws.
5.4 Dating in archeology and geology.
5.5 Artificial radioactivity. Applications.
5.6 Ionizing radiation. Biological effects of radiation. Dosimetric units.

2. Experimental Unit

System of units. Analysis and representation of data. Calculation of uncertainties. Relations between magnitudes: graphic analysis.
Measurement of the density and viscosity of a liquid.
Electrical circuits.
Standing waves.
Formation of images and microscope.
Examination.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	35,00	100
Laboratory practices	15,00	100
Classroom practices	10,00	100
Study and independent work	32,00	0
Preparation of evaluation activities	10,00	0
Preparation of practical classes and problem	39,00	0
Resolution of online questionnaires	9,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

English version is not available

EVALUATION

Learning assessment:

A continuous evaluation will be carried out based on:

- On-line questionnaires carried out in the Virtual Classroom. The percentage of this part is 5% of the total score.

- The ability to access information, the ability to synthesize and the ability to disseminate the knowledge acquired, which will be assessed through the active participation of students in face-to-face classes and in carrying out tasks related to theoretical and practical content of the subject. These tasks may be requested from students through the tools of the Virtual Classroom. The percentage of this part is 10% of the total score.

- Experimental practices in the laboratory of the subject, that will be evaluated from the memories presented by the students and from an exam that, depending on the circumstances, will be done in person or using the Virtual Classroom tools. The percentage of this part is 25% of the total score. A minimum score of 4 out of 10 is required. It is obligatory to do the laboratory practices. The laboratory score is valid for the two calls of the course in which it has been carried out and, in case of passing the laboratory with a qualification greater than or equal to 5 out of 10, this score is maintained for the immediately subsequent course.

- An “official” exam that will evaluate the theoretical and practical contents of the subject and that, depending on the circumstances, will be done in person or using the Virtual Classroom tools. This exam will consist of questions and problems. The percentage of this part is 60% of the total score. A minimum score of 4 out of 10 is required.

To pass the course, the final averaged score must be greater or equal than 5 out of 10.

REFERENCES

Basic

- J.M. Kane, FISICA, Ed. Reverté.
  F. Cussó, C. López, R. Villar, FISICA DE LOS PROCESOS BIOLOGICOS, Ed. Ariel.

Additional

- M. Ortuño, FISICA PARA BIOLOGÍA, MEDICINA, VETERINARIA Y FARMACIA, Ed. Critica.
  D. Jou, J.E. Llebot, C. Pérez, FISICA PARA LAS CIENCIAS DE LA VIDA, Ed. McGraw Hill.
  A.H. Cromer, FISICA PARA LAS CIENCIAS DE LA VIDA, Ed. Reverté.
  P.A. Tipler, FISICA (2 volumenes), Ed. Reverté.
  A.S. Frumento, BIOFISICA, Ed. Intermédica.
  J. Catalá, FISICA, Ed. Saber.