VNIVERSITAT DE VALÈNCIA

Course Guide
34283 Physics I. Physics for health sciences

COURSE DATA

Data Subject	
Code	34283
Name	Physics I. Physics for health sciences
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Faculty of Physics	1	First term

Subject-matter

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	1 - Physics	Basic Training

Coordination

Name	Department
ESTELLES LEAL, VICTOR	345 - Earth Physics and Thermodynamics
NICLOS CORTS, RAQUEL	345 - Earth Physics and Thermodynamics

SUMMARY

"Physics I" is a core subject in the first year, of a given quarterly in the first quarter and equipped with 6 ECTS. There is a part of theoretical concepts and solving practical exercises related to theory, taught in the classroom, complemented with hands-on labs in small groups. This course provides the "Geometrical Optics Physics I" the fundamentals of matter "physics" in the Grade.

The course aims to introduce students to classical phenomenological physics, with particular emphasis on the application fields of health sciences as deformable solids and fluids, waves, electricity and magnetism. The student will start in concepts and physical phenomena of interest that are of great help in planning, understanding and solving problems that affect both physical and geometrical optics, as the health sciences (physics of speech and hearing, sound measurement, ionizing radiation, medical applications of waves, physiological effects, drug properties, etc.), so it is necessary to address other subjects of the degree in the same course or advanced courses.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

It is highly desirable that students have taken the subjects of Mathematics and Physics II in 2nd year. Otherwise it will require extra effort to reach the student's initial level required.
Prior knowledge most important are:
Operations with fractions and logarithms. Concept of derivative and integral, with application to elementary functions. Basic concepts of trigonometry: sine, cosine and tangent. Solving equations of first and second degree. Exponential and logarithmic equations. Systems of equatio

OUTCOMES

1207 - Degree in Optics and Optometry

- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- To know the behavior of fluids and surface phenomena.
- To understand wave phenomena from oscillations and mechanical waves.
- To understand wave phenomena from oscillations and mechanical waves.
- To know the electric and magnetic fields until reaching the electromagnetic field and electromagnetic waves.
- To know and to handle laboratory materials and techniques.

LEARNING OUTCOMES

The student should acquire basic knowledge of General Physics qie are needed to successfully address the study of other subjects of the degree as geometrical optics and physical optics.

DESCRIPTION OF CONTENTS

1. Introductions

Quantities, units and errors. Dimensional Analysis.
Vector operations. Nabla operator.
Magnitudes of interest in fields

2. Elastic properties of solids

Stress and strain.
Elastic moduli.

3. Fluid statics

Defining fluid. Concept pressure.
Pascal's Principle.
Archimedes Principle.
Fluid dynamics.
Ideal fluid: equations of continuity and Bernoulli.
applications

4. Real Fluids

Viscosity.
Poiseuille Law.
Blood circulation.
Turbulence. Reynolds number
Sedimentation.
Non- newtonian fluids.
Applications

5. Surface phenomenons

Surface tension.
Drops and bubbles. Laplace equation
Contact angle. capillarity
applications

6. Waves

Definition and types of waves
mathematical description
Energy and intensity.
Attenuation and Absorption.
Interference and Diffraction. Beats. Polarization.
applications

7. Mechanical waves. Acoustics

Wave velocity.
Acoustics. Qualities of sound.
Perception of sound
Curves of human hearing.
ultrasound

8. Electric Field

Strength and electric field.
Electric dipole.
Gauss Law.
Potencial energy.
Electric potential.
Conductors and dielectrics.Capacitors.
Applications.

9. Direct Current

Direct Current
Resistance and Ohm's law. Generators and Power.
Resolution circuits.
Devices and electrical measurements.

10. Magnetic field

Magnetism.
Magnetic force on charges and currents.
Moving loads. Oscilloscope. Mass spectrometer.
Field produced by a current.
Magnetic properties of matter.
Applications.

11. Electromagnetic induction

Electromagnetic induction
Faraday's Law
applications

12. Maxwell's Laws

Maxwell's equations.
The spectrum of electromagnetic waves (OEM).
Medical and biological effects of exposure to radiation.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Tutorials	15,00	100
Laboratory practices	15,00	100
Development of group work	10,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	25,00	0
Preparation of practical classes and problem	30,00	0
Resolution of case studies	5,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Classroom activities
Theoretical and practical classes: classes modality (can be blended or modalities also include non-contact) which impart the theoretical content of the material. It will reinforce the use of visual methodologies, which more clearly exemplify the theoretical and examples to develop. Exercises will develop practical application of theoretical content.

Small Group Theory sessions: sessions are devoted to student group work, with suggested exercises to be analyzed and studied by the group. Interactivity will be sought through group presentations and classroom examples and accounted for continuous assessment.

Practical classes: classes modality to be developed in the theoretical concepts in a practical application in the laboratory. These classes, small group of up to 16 students, will be carried out using many real systems such as virtual labs, which can be developed interactively.

Student Work
- Study of theoretical
- Development of work and issues raised in class
- Individual tutorials.

EVALUATION

The assessment of the course will be based on the following sections:

1) Written exam:

Consist of problems, exercises and theoretical-numeric questions (level similar to those proposed at class). The test will last up to 2 hours. An evaluation of the understanding of the theoretical and conceptual formalism of the subject, both through theoretical questions or conceptual issues and simple numeric or special cases. The applicability of the formalism, by solving problems and exercises, as well as the critical capacity regarding the results will be assessed.

2) Continuous assessment:

Based on the work and problems presented by students during the supervised work sessions, on the resolution of the issues proposed and discussed in the classroom, and on the oral presentation of problems solved. It will also assess the degree of participation and involvement in the teaching-learning process.

3) Laboratory: The professor in charge of the laboratory group will assess the students based on the reports submitted (content and form), the experimental skills shown during the practice sessions, and the participation and involvement shown during the educational process. Attendance to every laboratory session is compulsory and a requirement to pass the subject.

The final grade will be the highest between the two options shown in the following table:

Assessment type	**Option A**	**Option B**
Written exam	50%	75%
Continuos assessment	25%	0%
Laboratory	25%	25%
Total	100%	100%

In order to pass the subject, the minimum grade in both examination and laboratory parts must be 4 out of 10. In total, the final grade to pass the course must be 5 out of 10.

Advancement of the exam

To apply for the advancement of the exam of this subject, students must be aware that the mandatory activities outlined in this guide have to be accomplished previously (i.e., laboratory).

REFERENCES

Basic

- Herráez J.V. y Delegido J. (2010), Elementos de Física Aplicada, Universitat de València
- Jou Mirabent, D., Llebot Rabagliati, J.E., Pérez García, C. (2008), Física para las ciencias de la vida, McGraw-Hill
- Kane, J.W., Stermhein, M.M. (1989). Física. Ed. Reverté.
- Ortuño, M. (2019). Física para las ciencias de la vida. Ed. Tébar-Flores.
- Tipler, P., Mosca, G. Física para la Ciencia y la Tecnología. 6ª edición. Reverté 2010.

Additional

- Davidovits P. (2008), Physics in Biology and Medicine, Academic Press
- FRANCO, A. Curso Interactivo de Física en Internet: http://www.sc.ehu.es/sbweb/fisica/default.htm
- F. Esquembre, E. Martín, W. Christian, M. Belloni, Fislets, Ed. Pearson Prentice Hall. 2002

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

TEACHING METHODOLOGY

In the event that the health situation requires a hybrid teaching model, the teaching modality approved in the Academic Degree Committee in a session of July 20, 2020 will be adopted, which consists of 100% presence of the students in all activities, but with a classroom capacity of 50% in theory classes.

If a total reduction in attendance is required, then the synchronous videoconference modality would be used, given at the time set by the subject and the group, during the period determined by the Health Authority.