COURSE DATA

Data Subject	
Code	33076
Name	Physics
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	114 - Physics	Basic Training

Coordination

Name	Department
UTRILLAS ESTEBAN, MARIA DEL PILAR	345 - Earth Physics and Thermodynamics

SUMMARY

Physics is a basic subject in the first-year course, taught in the first quarter. There is a part of theory, problems and seminars taught in the classroom with the entire group and another part of laboratory practice provided in the General Physics Laboratory (Faculty of Physics, ground floor, Building C) in subgroups of 16 students.
Physics is a basic subject that is present in all degrees of Sciences. It covers a wide range of topics that are of great help in planning, understanding and resolution of problems that explain natural phenomena affecting the environment. Within the first year is related mainly to subjects such as Chemistry, Mathematics I and II, Biology and Geology. In subsequent courses, Physics provides the knowledge base for subjects such as Meteorology and Climatology, Pollution Assessment, Geographic Information System and Fundamentals of Environmental Engineering, among others.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

The subject "Physics" is structured considering a starting level of knowledge equivalent to high school studies. It is recommended to first year students of Degree of Biology. They should have studied Physics, Chemistry and Maths in the High School getting the necessary level for their studies.

OUTCOMES

1104 - Degree in Environmental Sciences

- Uso de herramientas matemáticas para la resolución de problemas relacionados con el medio ambiente.
- Ser capaz de evaluar claramente los órdenes de magnitud, de desarrollar una percepción de las situaciones que son físicamente diferentes pero que muestran analogías, permitiendo la aplicación de soluciones conocidas a nuevos problemas.
- Conocer y comprender los fundamentos de la física, de los fenómenos físicos involucrados y de las aplicaciones mas relevantes.
- Adquirir, desarrollar y ejercitar destrezas necesarias para el trabajo de laboratorio y la instrumentación básica en física, química y biología.

LEARNING OUTCOMES

Solving problems involving qualitative and quantitative data collection in the laboratory. Analysis of these data and their interpretation in a theoretical context.

Understanding the basics and most important physical phenomena and their applications to the environment.

Resolution of problems related to physical transformation processes, identifying the essential elements of a situation and making the necessary approximations.

Making simple physical experiments, describing, analyzing and critically evaluating data and experimental results

DESCRIPTION OF CONTENTS

1. Introduction

Unit systems. Vectors. Fields. Partial derivatives

2. Fluid static

Pressure. Fundamental equation of fluid statics. Applications: Principles of Pascal and Archimedes. Free surface of a liquid. Surface tension. Pressure due to curvature. Law of Laplace. Contact angle. Capillarity. Jurin law.

3. Fluid dinamics

Description of the dynamic state of a fluid. Conservation of mass: continuity theorem. Energy conservation. Bernoulli's theorem. Applications of Bernoulli's theorem. Viscosity. Laminar and turbulent regime. Reynolds number. Motion of solids within a fluid. Sedimentation

4. Waves

Wave phenomena. Wave equation. Energy and intensity of a wave. Spherical waves. Doppler Effect.

5. Acoustics

Pressure wave. Magnitudes of the acoustic field. Qualities of sound. Weber-Fechner Law. Intensity level. Sound sense. Reflection, absorption, dispersion.

6. thermodynamic systems

Thermodynamic systems. Basic concepts. Thermodynamic equilibrium. Thermodynamic processes and zeroth law. Temperature. Thermal equation of state. The ideal gas. Thermodynamic work.

7. First law. Intern Energy

Internal energy. First law. Concept of heat. Heat capacity and latent heat. Enthalpy. Specific heats. Mayer relationship. Thermodynamic processes for an ideal gas.

8. Second law. Entropy

Need of a second law. Classic statement of the second law. Carnot cycle. Thermodynamic temperature scale. Entropy.

9. Electric field. DC

Electric charge. Coulomb's law. Field and electric potential. Gauss theorem. Electricity. Ohm's and Joules laws. Ohmic resistance. Generators.

10. Magnetic field

Strenth of magnetic fields on a moving charge. Strength of magnetic field on a current element. Magnetic field created by a moving charge. Biot-Savart Law. Ampère theorem between electric currents.

11. Laboratory

Measures of small lengths: The students learn to use different instruments for the measurement of small lengths accurately. They learn how to choose the most suitable measuring device in each case depending on the accuracy required and the measures to be determined.

Measurement of densities and viscosities of liquids: The students learn to measure densities and viscosities of different liquids taken as a reference the density and the viscosity of water at room temperature.

Calorimetry: The students learn to calculate the heat absorbed and transferred in a process and also the different specific heats of solids that will be identified from this value.

Electrical measurements: The students learn to know the usefulness of electrical measuring instruments most commonly used in the laboratory. They learn to use a multimeter, having to choose the function and scale more suitable in any particular measurement. They must know how to place voltmeters and ammeters in a circuit and how to interpret basic electrical circuits.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	45,00	100
Laboratory practices	12,00	100
Tutorials	3,00	100
Development of group work	8,00	0
Development of individual work	6,00	0
Study and independent work	28,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	16,00	0
Preparation of practical classes and problem	12,00	0
Resolution of case studies	6,00	0
Resolution of online questionnaires	4,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course consists of several parts, with a different methodology:
• Theory and problems (blackboard classes)
• Seminars
• Tutoring
• Laboratory.
Each of them follows a different methodology development:

Theory and problems:
Three classes a week, two of them of theory and other one of problems. In the classes of theory the teacher gives the theoretical contents by means of materials (slides, notes, pictures and diagrams) previously provided to the students. For each issue of theory, the student is provided with a problem set. The professor explains in detail 3-5 of them each week. The remaining problems are left to the students as home work. Lately they will have to show some of them for evaluation.

Tutorials:
In the tutorials (small subgroups of less than 16 students), the teacher monitors the work and progress of students, resolving the questions raised. The teacher will review, correct and evaluate the issues previously proposed. The questions and problems proposed in tutorials will be offered to the students by means of the virtual class tool.
Seminars
6 additional sessions of attendance at seminars are also proposed to the students in order to learn some details related to the physics and the environment.

Laboratory
4 sessions are programmed in the laboratory. These are developed in small subgroups (16 students), with a teacher assigned to each subgroup. The sessions are dedicated to laboratory practices, where students, in pairs, perform the experimental setup and data collection. For each practice, the couple must submit a report for the collection of experimental data and their treatment (errors, graphic settings), and the conclusions reached. Emphasis will be placed on the use of software for the processing of data (spreadsheet), which can be done during practice sessions with the computers available in the laboratory.

EVALUATION

The evaluation of the course is done taking into account the various different parts of it:
a) Theory and problems;
b) Tutorials
c) Seminars
d) Laboratory.
The evaluation of all parties is done separately, with the criteria outlined below.

a) Evaluation of theory and problems (60 points):
The evaluation of this part of the course will be based on a written exam.
The exam will consist of a part of theory and a part of problems. The theory has a weight of 60% and the problems of 40%. To weight theory and problems, it is necessary that the student gets a note of not less

than 4 (out of 10)

b) Tutorials (10 points)
The problems and questions proposed by the students during the course will be evaluated and rated by the professor. Also class attendance will be considered.The total score is the sum of ratings given the problems and issues, divided by the number of problems presented during the course. Attendance at tutorials is obligatory
c) Seminars and questionnaires in the virtual class tool (10 points)
The student will have to do a small summary of some of the seminars attended. Its punctuation will be added to the final note. Also attending to the seminars will be punctuated. In the virtual class tool there will be also some questionnaires on the theory studied that students must complete following the indications proposed by the professor.
d) Laboratory evaluation (20 points)
Laboratory work is evaluated based on reports made by students for each of the practices provided during the course (4 in total). Every memory will be marked from 0 to 10. In order to consider the punctuation obtained in the laboratory it is necessary to complete all practices (4) and that the note is greater than 5 (out of 10).

The evaluation of the course will be made by considering the following criteria:
A) 60 points: a written exam. This examination will consist of questions of theory and problems.
B) 15 points: reports (exercises, problems, questionnaires, etc) delivered during the course or made during the supervised work sessions or seminars if necessary.
C) 5 points, attendance at seminars of Physics, whose evaluation will be done through the presentation of a summary or by the solution of the proposed problems and the note obtained from the questionnaires.
D) 20 points: work in the laboratory.

The final grade is obtained as the sum of the scores for sections A, B, C and D, provided that in section A) is obtained a minimum of 24 points and in section D) a minimum of 10 points.

To apply for the advancement of the exam of this subject, students should be aware that the mandatory activities outlined in this guide have to be accomplished.

REFERENCES

Basic

- Martínez-Lozano y Utrillas. Apuntes de clase. http://aulavirtual.uv.es/
- Martínez-Lozano y Utrillas: Bases Físicas del Medio Ambiente (Moliner-40)
- Tippler: Física (Reverté, 2010).

Additional

- D. Jou, J.E. Llebot, C. Pérez, FISICA PARA LAS CIENCIAS DE LA VIDA, Ed. McGraw Hill.
- A. Rex, R. Wolson. " Fundamentos de Fisica". Ed: Pearson, 2011.

ADDENDUM COVID-19

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

English version is not available