Physics I

Academic Year: (2020 / 2021) **Review date: 10-07-2020**

Department assigned to the subject: Physics Department

Coordinating teacher: GARCIA GONZALO, LUIS

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Physics and Mathematics at high school level (Bachillerato)

OBJECTIVES

The student will acquire during this course the knowledge of basic physical phenomena related to aerospace engineering in the area of Mechanics and Waves. At the end of the course, the student will be able to:
- Understand the mathematical models involved in general physics.
- Understand and use the scientific method and scientific language.
- Develop reasoning strategies and techniques for analysing and solving problems.
- Analyse and interpret experimental data.
- Deal with laboratory instruments.

DESCRIPTION OF CONTENTS: PROGRAMME

01. Kinematics of a particle.
02. Kinetics of a particle. Force and acceleration.
03. Kinetics of a particle. Work and energy. Impulse and momentum.
04. Kinetics of a system of particles.
05. Planar kinematics of a rigid body.
06. Relative motion.
07. Planar kinetics of a rigid body.
08. Vibrations.
09. Waves.

LEARNING ACTIVITIES AND METHODOLOGY

* Lectures where the theoretical concepts are explained. They will be taught in the synchronous and interactive online modality through Blackboard Collaborate.
The lecturer will provide a file with the following information (1 week in advance)
- Lecture notes of main topics to be discussed during the session
- Chapters/sections in each of the text books provided in the bibliography were the student can read about these topics
* Recitation classes to solve problems.
The main skills to be developed in these recitation classes are
- To understand the statement of the problem (for instance drawing an scheme that summarizes the statement)
- To identify the physical phenomenon involved in the statement and the physical laws related to it.
- To develop a strategy to reach the objective (for instance breaking the problem in small sub-problems).
- To be careful in the use of mathematics
- To analyze the reasonability of the result (is the final number reasonable?, are the dimensions consistent?)
* There will be a lecture and a recitation class every week. Students must study the contents of each

lecture and solve assigned problems before the corresponding recitation class.
* Laboratory sessions. Two of the sessions will be in the laboratory (~12 students). In the remaining two, experimental data will be provided to students for analysis in synchronous sessions.
The main skills to be developed in this activity are:
- To understand that physics is an experimental science and they can reproduce the laws that have been theoretically explained in the lectures.
- To use scientific instruments and to be careful in its operation
- To be careful in the acquisition of the experimental data.
- To learn the basis of the management of a scientific data set
- To write a report with the main results of the experiment
- To reason in a critical way these results: have we achieve the goals of the experiment?
* Tutoring sessions.They will be in the synchronous and interactive online modality through Blackboard Collaborate

ASSESSMENT SYSTEM

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

1) Laboratory sessions (15% of final mark). Evaluation based on:

- Attendance to the laboratory sessions, participation and attitude. Activities in groups of two students.
- Laboratory reports quality. Mark is shared by the members of the group.

2) Assessment during the course (25% of final mark). Evaluation based on:

- Midterm exams.

3) Final exam (60% of final mark).

The exam is made at the end of the semester and it is the same for all the students
Contents:
- Problems to be solved covering the topics of the program.

Despite the final mark is obtained with the indicated percentages, attendance to the laboratory sessions is COMPULSORY to pass the course. Additionally, it is OBLIGATORY to obtain at least a score of 3 out of 10 in the final exam to pass the course.

BASIC BIBLIOGRAPHY

- Beer, Johnston, Mazurek, Cornwell and Eisenberg Vector Mechanics for Engineers: Statics and Dynamics, McGraw-Hill, 2009

- R.A. Serway and J.W. Jewett Physics for Scientists and Engineers, Volume 1, Brooks Cole, 2009

- Russell C. Hibbeler Engineering Mechanics: Dynamics in SI Units, Pearson, 2016

ADDITIONAL BIBLIOGRAPHY

- Frank S. Crawford, Jr. Waves, Berkeley Physics Course, Volume 3, McGraw-Hill, 1968

- J. L. Meriam and L. G. Kraige Engineering Mechanics: Dynamics, J. Wiley, 2009

- P.A. Tipler and G. Mosca Physics for Scientists and Engineers, Volume 1, W.H. Freeman, 2007