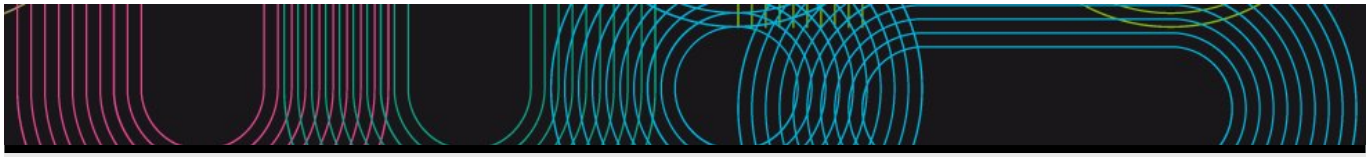

IDENTIFYING DATA				
Physics: Fundamentals of Mechanics and Thermodynamics				
Subject	Physics: Fundamentals of Mechanics and Thermodynamics			
Code	V05G300V01102			
Study programme	Degree in Telecommunications Technologies Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish			
Department	Applied Physics			
Coordinator	Chiussi , Stefano			
Lecturers	Boutinguiza Larosi, Mohamed Chiussi , Stefano Fernández Doval, Ángel Manuel Testa Anta, Martín			
E-mail	schiussi@uvigo.es			
Web	http://faitic.uvigo.es			
General description	Introduction to the basic concepts on the general laws of Mechanics and Thermodynamics as well as to their application to the resolution of problems in engineering.			

Competencies	
Code	
B3	CG3: The knowledge of basic subjects and technologies that enables the student to learn new methods and technologies, as well as to give him great versatility to confront and adapt to new situations
B5	CG5: The knowledge to perform measurements, calculations, assessments, appraisals, technical evaluations, studies, reports, task scheduling and similar work to each specific telecommunication area.
B6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
C3	CE3/FB3: Comprehension and command of basic concepts about the general laws of mechanics, thermodynamics, electromagnetic fields and waves and electromagnetism and their application to solve Engineering problems.
D3	CT3 Awareness of the need for long-life training and continuous quality improvement, showing a flexible, open and ethical attitude toward different opinions and situations, particularly on non-discrimination based on sex, race or religion, as well as respect for fundamental rights, accessibility, etc.

Learning outcomes			
Expected results from this subject	Training and Learning Results		
Understanding and mastering of the basic concepts on the general laws of Mechanics and Thermodynamics.	B3	C3	
Ability to use the basic instrumentation to measure physical quantities.	B3 B5 B6	C3	D3
Ability to evaluate experimental data.	B3 B5	C3	
Ability to solve the elementary technical problems in engineering.	B3	C3	

Contents
Topic
1.- Physical quantities and units. The International System.

2.- Vectorial tools for Mechanics.
3.- Point Kinematics.
4.- Point Kinetics.
5.- Statics.
6.- Oscillations.
7.- Wave motion.
8.- Zero principle of Thermodynamics. Temperature.
9.- First principle of Thermodynamics.
10.- Second principle of Thermodynamics.
Lab 1.- Measurement instruments. Error and uncertainty. Estimation of uncertainties in direct measurements.
Lab 2.- Measurement of the reaction time to a given stimulus. Measurement of the gravitational acceleration by means of a pendulum. Estimation of uncertainty in indirect measurements.
Lab 3.- Verification of Hooke's Law. Linear fit.
Lab 4.- Longitudinal and transversal standing waves. Measurements by linearization of non-linear relations and linear fit. Graphical representation of measurement results.
Lab 5.- Simple harmonic motion. Free standing oscillation of a spring. Measurements by linearization of non-linear relations and linear fit. Graphical representation of measurement results.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	34	62
Problem solving	15.5	46.5	62
Laboratory practices	9	13.5	22.5
Essay questions exam	1	0	1
Problem solving	1.25	0	1.25
Practices report	1.25	0	1.25

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Prior personal work: -Preliminary reading of the proposed bibliography on the subject. During the lectures: -Presentation of theoretical concepts. -Application of the theoretical concepts to simple cases and situations. -Experimental demonstrations. -Audiovisual presentations. Ulterior personal work: -Revision of theoretical concepts. -Solving of questions and exercises from the bibliography. -Consult the bibliography. -Identification of weak points which require tutorial aid. Through this methodology, competencies CG3, CE3, CG5, CG6 are worked out.

Problem solving	(Problem solving) Solving of average-difficulty problems involving one or more theoretical concepts. During the lectures: -Presentation of solving strategies and techniques by solving example-problems. Personal work: -Solving of problems from the bibliography. -Identification of weak points which require tutorial aid. Through this methodology, competencies CG3, CE3, CG5, CG6 are worked out.
Laboratory practices	Prior personal work: -Preparation of the practical session by studying the corresponding guide and reviewing the theory. During the practical session: -Description of the experiment highlighting which theoretical concepts are involved. -Training on material and instrumentation handling. -Execution of the experiment. -Preliminary result processing. Ulterior personal work: -Processing and analysis of the results. -Weak-point identification. -Consult the bibliography. Through this methodology, competencies CG3, CE3, CG5, CG6 and CT3 are worked out.

Personalized attention

Methodologies	Description
Lecturing	Questions will be solved by the lecturers in their respective tutorial-aid time. Tutorial aid will be given: individually or in small groups (typically of two or three students), by appointment to the corresponding lecturer (unless stated otherwise) and, preferably, in the place and timetable of the corresponding lecturer which will be published at the beginning of the semester. The appointment shall be arranged either by e-mail or in person at the beginning or end of a lecture.
Problem solving	Questions will be solved by the lecturers in their respective tutorial-aid time. Tutorial aid will be given: individually or in small groups (typically of two or three students), by appointment to the corresponding lecturer (unless stated otherwise) and, preferably, in the place and timetable of the corresponding lecturer which will be published at the beginning of the semester. The appointment shall be arranged either by e-mail or in person at the beginning or end of a lecture.
Laboratory practices	Questions will be solved by the lecturers in their respective tutorial-aid time. Tutorial aid will be given: individually or in small groups (typically of two or three students), by appointment to the corresponding lecturer (unless stated otherwise) and, preferably, in the place and timetable of the corresponding lecturer which will be published at the beginning of the semester. The appointment shall be arranged either by e-mail or in person at the beginning or end of a lecture.

Assessment

	Description	Qualification	Training and Learning Results	
Essay questions exam	Solving of questions related to the theoretical concepts of the topics in both the classroom and laboratory syllabi.	30	B3 B5 B6	
Problem solving	(Problem solving) Solving of simple exercises related to the theoretical concepts of the topics in the syllabus. Solving of problems involving one or more theoretical topics.	52	B3 B5 B6	C3
Practices report	Execution of real and simulated measurements. Real- and simulated-measurement result processing.	18	B3 B5 B6	D3

Other comments on the Evaluation

(This is a translation, in case of any discrepancy or dispute, the original Spanish version shall prevail.)

Following the particular guidelines of this degree, the students taking this subject will be offered two alternative assessment

systems: continuous assessment and single assessment.

It will be assumed that a student chooses continuous assessment if he or she takes and hands the third assessment exercise in (see §1.1) and that he or she chooses single assessment if he or she does not hand the aforementioned exercise in. Once the results of this exercise are handed in, it will be understood that the student has taken the current term's examination call and he or she will be qualified in the first assessment chance of the regular call according to the criteria that are detailed in §2.1, regardless of whether he or she takes the End of Semester Examination or not.

Proper ethical behaviour is requested from the students. In the event that the lecturers in charge of the assessment notice unethical behaviour (cheating, plagiarism, introduction or use of means not permitted by the rules and instructions for the assessment exercises and tests, etc.), the student will be regarded as not meeting the necessary requirements to pass the subject. In this case, the student will be assigned an overall mark of 0 (zero points) for the current academic year and the fact will be communicated to the head of the Centre to take appropriate measures.

1. ASSESMENT TESTS

1.1. CONTINUOUS ASSESSMENT INTERMEDIATE EXERCISES

The schedule of the exercises will be approved in a "Comisión Académica de Grado" (CAG) and made available by the beginning of each semester. These exercises are not retakeable, i.e., they can be only taken in the scheduled dates. The examinations (§1.2) allow recovering part of the lost marks up to reach the maximum overall mark (see §2.1).

As a general rule, the marks of each exercise will be published before the next one. The marked exercises may be revised, during the tutorial-aid hours of the corresponding lecturer , along the fourteen days following the publication date of the marks.

The marks obtained in the exercises will be only valid for the two assessment chances of the regular call (see §2.1) of the academic term the exercises have been taken.

Three exercises will be scheduled:

LC1 and LC2) Experimental laboratory exercises comprising the execution of actual measurements and the processing of the results, consisting in taking an experimental laboratory class, individually processing (during the last 30 minutes) the assessable results which will be specified in the corresponding experiments guide and handing them in at the end of the class (marks LC1 and LC2 between 0 and 1 point for each of the exercises).

TC) Combined individual test with questions and exercises. Questions about theoretical concepts and solving of elementary cases and situations related to the topics in the classroom syllabus (mark TC between 0 and 1 point). Length: 30 minutes during one of the theory or problem-solving lectures.

The exercises not taken by the student will be marked with 0 (zero points).

1.2. EXAMINATIONS

Combined individual tests with:

Tx) Questions and exercises, (mark Tx between 0 and 5 points distributed among them).

Px) Solving of one or two problems, (mark Px between 0 and 3,4 points distributed between them).

Lx) Solving of a laboratory problem comprising the execution of real or simulated measurements and the processing of the results (mark Lx between 0 and 1,6 points).

The parts of the examination that the student does not hand in will be marked with 0 (zero points).

Length: 2 hours in each of the dates officially assigned for the subject in the examinations schedule of the Centre.

1.2.1. Regular examinations

- First assessment chance: End-of-Semester Examination x = F (marks TF, PF, LF)

- Second assessment chance: Resit Examination x = R (marks TR, PR, LR)

1.2.2. Special examination

- End-of-studies call: End-of-Studies Examination x = E (marks TE, PE, LE)

2. REGULAR ASSESSMENT CALL GRADING

2.1. CONTINUOUS ASSESSMENT option

2.1.1. Combined experimental laboratory mark (LLx)

For each of the assessment chances the combined experimental laboratory mark will be calculated as the sum of marks LC1 and LC2 from continuous assessment (§1.1) and mark Lx from the corresponding examination. If this sum results greater than 2 (two points) its value will be truncated to 2 (two points).

LLx = min {LC1 + LC2 + LLx , 2}

2.1.2. Overall grade

For each of the assessment chances the overall grade will be calculated as the sum of the marks of:

Tx) The questions and exercises part of the corresponding examination (§1.2.1).

TC) The questions and exercises continuous assessment test (§1.1).

Px) The problem solving part of the corresponding examination (§1.2.1).

LLx) The corresponding combined experimental laboratory mark (§2.1.1).

If this sum results greater than 10 (ten points) its value will be truncated to 10 (ten points).

OVERALL_x = min {Tx + TC + Px + LLx , 10}

2.2. SINGLE ASSESSMENT option

For each of the assessment chances the overall grade will be calculated as the sum of the marks of the corresponding examination (§1.2.1).

OVERALL_x = Tx + Px + Lx

3. SPECIAL END-OF-STUDIES CALL GRADING

The overall grade will be calculated as the sum of the marks of the End-of-Studies Examination (§1.2.2).

OVERALL_E = TE + PE + LE

4. CALCULATIONS AND ROUNDING

I) All of the aforesaid calculations to obtain the marks will be performed with a resolution equal to or better than one hundredth of a point (0,01 point).

II) The overall marks will be rounded to the nearest multiple of 0,1 point (one tenth of a point); if the two nearest multiples of 0,1 point are equidistant, the overall mark will be rounded to the higher of them.

III) The mark scale is established on the understanding that the minimum overall mark necessary to pass the subject is 5,0 points.

Sources of information
Basic Bibliography
H.D. Young y R.A. Freedman, **Sears-Zemansky. Física Universitaria**, 9, 11, 12 o 13, Addison-Wesley,
H.D. Young y R.A. Freedman, **University Physics**, 9, 11, 12 or 13, Addison-Wesley,
Profesorado presente y pasado de la asignatura., **Guiones de las prácticas de «Física Fundamentos de Mecánica y Termodinámica»**, 2018-2019, 2018
Present and past lecturers of this subject, **Laboratory Notes for "Physics: Fundamentals of Mechanics and Thermodynamics""**, 2018
Oficina Internacional de Pesas y Medidas (BIPM), **Sistema Internacional de Unidades SI**, 8, Centro Español de Metrología, 2008
Bureau Internationale des Poids et Mesures (BIPM), **SI Brochure: The International System of Units (SI)**, 8, Bureau Internationale des Poids et Mesures (BIPM), 2008
Complementary Bibliography
I.N. Bronshtein, K.A. Semendiaev, **Manual de Matemáticas para Ingenieros y Estudiantes**, (cualquier edición), MIR,
Raymond A. Serway, John W. Jewett, **Física, Tomo 1**, 3, Thomson, 2003
Paul A. Tipler, **Física, Tomo 1**, 5, Reverté, 2005
W. Edward Gettys, et al., **Física Clásica y Moderna**, Mc Graw-Hill, 1991
Douglas C. Giancoli, **Física para universitarios, Tomo 1**, 3, Prentice-Hall, 2002
Marcelo Alonso, Edward J. Finn, **Física**, Addison-Wesley, 1995

Susan M. Lea, John R. Burke, **Física. La naturaleza de las cosas, Tomo 1**, Paraninfo, 2001

Ambler Thompson, Barry N. Taylor, **NIST Special Publication 811, «Guide for the Use of the International System of Units (SI)»**, 2008, Narional Institute of Standards and Technology, 2008

Comité Conjunto para las Guías en Metrología (JCGM), **Vocabulario Internacional de Metrología VIM**, 3, Centro Español de Metrología, 2012

Recommendations

Subjects that continue the syllabus

Fundamentals of Sound and Image/V05G300V01405

Power Electronics/V05G300V01625

Fundamentals of Acoustics Engineering/V05G300V01531

Subjects that are recommended to be taken simultaneously

Mathematics: Linear algebra/V05G300V01104

Mathematics: Calculus 1/V05G300V01105

Other comments

To adequately follow this subject, it is highly advisable to master the contents of high-school subjects on Mathematics and Physics.