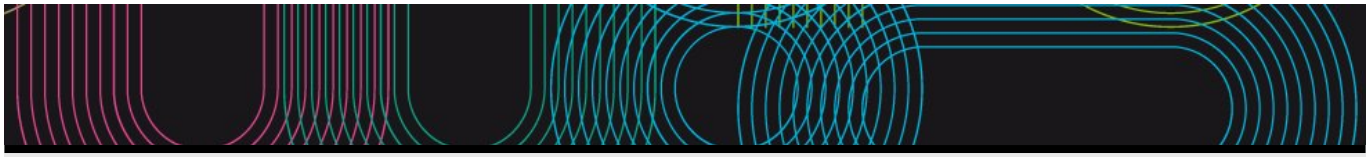
Universidade Vigo

Subject Guide 2020 / 2021



IDENTIFYING DATA				
Physics: Physics II				
Subject	Physics: Physics II			
Code	O07G410V01202			
Study programme	Grado en Ingeniería Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Michinel Álvarez, Humberto Javier			
Lecturers	Michinel Álvarez, Humberto Javier Salgueiro Piñeiro, Jose Ramon			
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General description	The matter of Physics II is fundamentally oriented to provide the training and basic competences on the basic electromagnetism, including its main theoretical practical aspects. English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Competencies	
Code	
A1	That the students demonstrate to possess and understand knowledge in an area of study that is part of the general education (second level), and often found at a level that, although based on advanced textbooks, also includes some aspects that involve knowledge from the avant-garde of the field of study
B2	Planning, documentation, project management, calculation and manufacturing in the field of aeronautical engineering (in accordance with what is established in section 5 of order CIN / 308/2009), aerospace vehicles, propulsion systems, aerospace materials, airport infrastructures, air navigation infrastructures and space management, air traffic and transport management systems.
C2	Understanding and mastery of the basic concepts about the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application to solve problems related to engineering.
D1	Capability of analysis, organization and planification.
D3	Capability of oral and written communication in native lenguage
D4	Capability of autonomous learning and information management
D5	Capability to solve problems and draw decisions
D6	Capabiliity for interpersonal communication
D8	Capabiliity for critical and self-critical reasoning

Learning outcomes				
Expected results from this subject	Training and Learning Results			
Knowledge and understanding of the basic principles of Physics and their application to the analysis and to the resolution of problems in engineering	A1	B2	C2	D1 D3 D4 D5 D6 D8
Knowledge, understanding and application of the principles of electromagnetism, including telectrostatics, magnetostatics and Maxwell's equations.	A1		C2	D5 D8
Knowledge, understanding and application of the general laws of classical Thermodynamics, introducing the concept of thermodynamic equilibrium and the most important thermodynamic magnitudes.	A1		C2	D5 D8

Contents	
Topic	
Presentation of the course and historical introduction	Historical introduction.
Scalar and vector fields	Coordinate systems in two and three dimensions. Vectorial operators. Gradient of a scalar. Circulation of a vector. Flow. Divergence. Theorem of the divergence. Rotational. Stokes theorem.
Electrostatics	Charge and charge density. Coulomb's law. Electrostatic field. Flow of the electrostatic field. Gauss' Law. Electrostatic potential. Equations of Poisson and Laplace. Energy of the electrostatic field. Multipolar expansion of the potential. Dipoles. Conductors and dielectrics. Electrostatics in presence of matter. Capacitors.
Electrical currents and magnetostatics	Current and current density. Continuity equation. Ohm's law. Conductivity and resistivity. Introduction to the magnetic field. Force between currents. Magnetic induction. Lorentz's force. Biot and Savart law. Magnetic flux. Ampère's circuital law. Vector potential. Multipolar expansion of the vector potential. Magnetic dipoles. Magnetic dipolar moment. Magnetism in presence of matter. Magnetic response of the materials. Magnetic field. Hysteresis cycles.
Electrical circuits	Combination of resistors. Electromotive force. Electric generators. Electrical circuits. Electric power and energy. Voltage and current sources. Measure of voltages, currents and resistors. Kirchhoff's laws and circuits analysis. Thévenin and Norton theorems.
Introduction the the Electrodynamics	Faraday's induction law. Inductance. Generators, engines and transformers. Magnetic energy. Displacement current. Maxwell's equations. Systems of units.
Alternating current	Capacitive and inductive reactances. Impedance. Half and effective power. Complex magnitudes. RLC series and parallel circuits. Resonance. Quality factor. Apparent and reactive power. Transitory states.
Introduction to the electromagnetic waves	Types of waves. Energy transported by a wave. Huygens' principle. Superposition of waves of different frequency. Phase and group velocities. Equation of electromagnetic waves. Hertz's experiment. Electromagnetic spectrum. Propagation of electromagnetic waves. Electromagnetic energy. Poynting vector. Polarization. Reflection and refraction. Interference and diffraction.
Introduction to the Thermodynamics	Thermal equilibrium. Temperature. Heat and work. Internal energy. First Principle. Heat capacity. Reversible and irreversible processes. Thermal machines. Second principle. Thermodynamic cycles. Carnot's theorem. Entropy. State equation. Ideal gases.
Laboratory experiences	Measure of basic electromagnetic properties with multimeter and oscilloscope. Measure of the capacity of a capacitor. Measure of Laplace's force. Helmholtz coils. Measure of the terrestrial magnetic field. Magnetic dipole. Electromagnetic induction. Circuits.

Planning	Class hours	Hours outside the classroom	Total hours
Lecturing	20	40	60
Laboratory practical	12	18	30
Problem solving	7	10.5	17.5
Introductory activities	1	0	1
Seminars	10	15	25
Essay questions exam	2.5	0	2.5
Report of practices, practicum and external practices	0	14	14
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	Description
Lecturing	Classes one hour long to exposed the main theoretical concepts of the matter.
Laboratory practical	Development of experiments in laboratory to illustrate the main theoretical concepts previously developed on the lectures.
Problem solving	Resolution of selected exercises similar to those the student will face later in an autonomous way.
Introductory activities	Presentation of the subject and lecturers. Presentation of the laboratory.
Seminars	Approach, discussion and resolution of questions and problems in relation with the theoretical concepts previously developed in lectures.

Personalized assistance	
Methodologies	**Description**
Laboratory practical	The lecturer individually explains the development of the experiments to be carried out at the laboratory.
Lecturing	The lecturer individually supervises the correct assimilation of the theoretical concepts developed in the lectures.
Seminars	The lecturer individually supervises resolution of the problems proposed in the seminar lectures.
Introductory activities	Presentation of the subjects at the beginning of the course.
Problem solving	The lecturer solves problems of similar difficulty to those the student will face later in an autonomous way.

Assessment					
	Description	Qualification	Training and Learning Results		
Essay questions exam	Two partial examinations: problem solving and questions (10% each one). A final exam (60%). In case the student does not attend the partial exams, the final exam will suppose 80% of the total mark.	80	A1	C2	D1 D3 D8
Report of practices, practicum and external practices	Inform and (if necessary) oral presentationabout the activities realized at the laboratory. The students that do not attend the laboratory will be specifically evaluated abut this topic together with the final examination.	20	B2	C2	D1 D3 D4 D5 D6 D8

Other comments on the Evaluation

The marks of the partial examinations and laboratory report will be maintained in June/July.

In case the student does not attend the partial examinations, the final examination will rank 80% of the mark and the students not attending the laboratory sessions will be evaluated about such topics on the day of the final exam.

Evaluation dates: the examinations calendar is published at the website: http://aero.uvigo.es/gl/docencia/exames
=== ADAPTATION OF THE EXCEPTIONAL EVALUATION BY COVID-19 ===
If the assessment can be done in person, the student's final grade will be the sum of the following grades:
Control exam of the first two chapters (electrostatics and magnetostatics). Up to one point.
Control exam of the rest of the subject. Up to one point
Assistance and work on the practices carried out in the laboratory. Up to two points.
Examination of all the contents of the subject. Up to six points
In case the evaluation cannot be done in person, the student's final grade will be the sum of the following grades:
Online examination of control of the first two chapters (electrostatics and magnetostatic). Up to a point.
Online control exam for the rest of the subject. Up to a point
Assistance and work on laboratory practices. Up to two points.
Delivery of questionnaires, work and / or problems solved autonomously. Up to two points.
Online examination of all the contents of the subject. Up to four points.

Sources of information

Basic Bibliography

Griffiths, D.J, **Introduction to electrodynamics**, 3ª edición, Prentice Hall,

Wangsness, R. K., **Campos electromagnéticos**, Limusa, 1983

Burbano de Ercilla, **Física General**, Mira, Zaragoza,

Complementary Bibliography

Nilsson, J, **Circuitos eléctricos**, Addison Wesley Iberoamericana,

Feynman, R.P. Leighton R.B., **Lectures on Physics, Vol II**, Addison Wesley Publishing,

Cheng, D.K., **Fundamentos de electromagnetismo para ingeniería**, Addison Wesley Iberoamericana,

Edminister, J.A., **Circuitos Eléctricos**, McGraw-Hill,

Edminister, J.A., **Electromagnetismo**, McGraw-Hill,

Jackson J.D., **Classical electrodynamics.**, Elsevier, Amsterdam,

Serrano, V, **Electricidad y Magnetismo: Estrategias para la resolución de problemas y aplicaciones**, Prentice Hall,

Feynman, R.P. Leighton R.B., Sands M., **Exercises for the Feynman Lectures on Physics**, Addison Wesley Publishing,

Sabah, N.H., **Electric circuits and signals**, CRC Press,

Cheng, D.K., **Field and wave electromagnetics**, Addison Wesley Publishing,

Varios, **http://wikipedia.org**,

Recommendations

Subjects that are recommended to be taken simultaneously

Mathematics: Calculus II/O07G410V01201

Subjects that it is recommended to have taken before

Physics: Physics I/O07G410V01103
Mathematics: Calculus I/O07G410V01101

Contingency plan

Description

=== PLANNED EXCEPTIONAL MEASURES ===

In view of the uncertain and unpredictable evolution of the health alert caused by the COVID-19, the University of Vigo has established an extraordinary planning that will be activated at the time when the administrations and the institution itself determine it in accordance with safety, health and responsibility criteria, and guaranteeing teaching in a non-presential or partially presential scenario. These measures, already planned, guarantee the development of teaching in a more agile and effective way when they are known beforehand (or well in advance) by students and teachers through the standardized and institutionalized tool of teaching guides.

=== ADAPTATION OF METHODOLOGIES ===

* Teaching methodologies that are maintained

Classes are held in person as long as this is permitted by the regulations in force and it can be guaranteed that the students present maintain the necessary separation distance due to the health situation.

* Teaching methodologies that are modified

Online classes will be given simultaneously with face-to-face teaching to those students who, due to space restrictions, cannot access the face-to-face class.

* Non-attendance mechanism for students (mentoring)

All the mentoring will take place in the "remote campus" enabled by the University of Vigo while the situation of "new normality" lasts. An appointment with the professor will be requested by e-mail. In case the rules of personal distance disappear, the mentoting will be held in the office of the professor of the subject.

* Modifications (if necessary) of the contents to be taught

There are no modifications to the contents, except in the case that the health situation prevents the performance of laboratory practices in a face-to-face manner, in which case the students will be entrusted with tasks to be carried out autonomously in a non-presential manner.

* Additional bibliography to facilitate self-learning

In addition to the existing bibliography in electronic format, the use of wikipedia is recommended for the basic contents of the subject when indicated by the teaching staff.

Some contents of the course can be followed remotely for free on the following websites:

https://www.edx.org/course/subject/physics

https://ocw.mit.edu/courses/physics/

https://www.coursera.org/courses?query=physics

The notes made by the teachers of the subject will be made available to the student in FAITIC.

* Other modifications

=== ADAPTATION OF THE EVALUATION ===
If the evaluation can be done in person, the student's final grade will be the sum of the following grades:

Control exam of the first two chapters (electrostatics and magnetostatics). Up to 1 point.

Control exam of the rest of the course. Up to 1 point

Assistance and work on the practices carried out in the laboratory. Up to 2 points.

Examination of all the contents of the subject. Up to 6 points

If the evaluation cannot be made in person, the student's final grade will be the sum of the following grades:

Online control test of the first two chapters (electrostatics and magnetostatics). Up to 1 point.

Online control test of the rest of the course. Up to 1 point

Assistance and work on the practices carried out in the laboratory. Up to 2 points.

Delivery of bulletins of problems solved in an autonomous way. Up to 2 points.

Online examination of all the contents of the subject. Up to 4 points

*Additional information

The performance of laboratory practices in person at the facilities of the University of Vigo on the campus of Ourense will be subject to the restrictions of space that may come given the evolution of the health situation and existing regulations. If it is not possible to carry out all the practices, they will be replaced by non-presential activities that the student can carry out remotely.

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