Physics II

Academic Year: (2020 / 2021) **Review date: 10/07/2020 19:31:42**

Department assigned to the subject: Physics Department

Coordinating teacher: GARCIA GONZALO, LUIS

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

OBJECTIVES

CB1. Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
CB2. Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
CB4. Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
CB5. Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
CG1. Analyze and synthesize basic problems related to physics and engineering, solve them and communicate them efficiently.
CG2. Learn new methods and technologies from basic scientific and technical knowledge, and being able to adapt to new situations.
CG3. Solve problems with initiative, decision making, creativity, and communicate and transmit knowledge, skills and abilities, understanding the ethical, social and professional responsibility of the engineering activity. Capacity for leadership, innovation and entrepreneurial spirit.
CG5. Use the theoretical and practical knowledge acquired in the definition, approach and resolution of problems in the framework of the exercise of their profession.
CE5. Understand and handle the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and apply them to the resolution of engineering problems.
CE6. Solve problems of applied thermodynamics, heat transmission and fluid mechanics in the field of engineering.
CE20. Understand and address the general problems of the field of Energy, as well as the scientific and technological foundations of its generation, conversion, transport and storage.
CT1. Work in multidisciplinary and international teams as well as organize and plan work making the right decisions based on available information, gathering and interpreting relevant data to make judgments and critical thinking within the area of study.
RA1. To have acquired sufficient knowledge and proved a sufficiently deep comprehension of the basic principles, both theoretical and practical, and methodology of the more important fields in science and technology as to be able to work successfully in them;
RA2. To be able, using arguments, strategies and procedures developed by themselves, to apply their knowledge and abilities to the successful solution of complex technological problems that require creating and innovative thinking;
RA3. To be able to search for, collect and interpret relevant information and data to back up their conclusions including, whenever needed, the consideration of any social, scientific and ethical aspects relevant in their field of study;
RA6. To be aware of their own shortcomings and formative needs in their field of specialty, and to be able to plan and organize their own training with a high degree of independence.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Thermodynamics. Thermodynamic systems. Thermodynamic variables. Work. Temperature. The ideal gas.
2. First Law of Thermodynamics. Introduction to heat transfer processes: conduction, convection and radiation.
3. Second Law of Thermodynamics. Introduction to thermodynamic cycles: engines, refrigerating and heating cycles. Entropy and reversibility.
4. Electrostatics of vacuum: Coulomb's law. Electric field. Superposition principle. Electric potential. Sources of the electric field. Gauss theorem. Electrostatic energy.
5. Conductors and Capacitors. Conductors in equilibrium. Electrostatic shielding. Capacity. Systems of conductors. Planar, cylindrical and spherical capacitors. Capacitor.
associations: serial and parallel. Dielectrics.
6. Electric current. Ohm¿s law. Electric conductivity and resistance. Joule¿s law. Resistance associations: serial and parallel. Kirchoff's laws. Electromotive force.
7. Magnetostatics of vacuum. Force between currents. Magnetic field. Biot-Savart's law. Magnetic flux. Sources of the magnetic field. Ampere's law. Magnetic energy.
8. Magnetic induction: Faraday's law. Lenz's law. Dynamos and Transformers. Magnetic circuits.
9. Displacement current. Maxwell's equations

LEARNING ACTIVITIES AND METHODOLOGY

AF1. THEORETICAL-PRACTICAL CLASSES. Knowledge and concepts students mustacquire. Receive course notes and will have basic reference texts.Students partake in exercises to resolve practical problems
AF2. TUTORING SESSIONS. Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher.Subjects with 6 credits have 4 hours of tutoring/ 100% on- site attendance.
AF3. STUDENT INDIVIDUAL WORK OR GROUP WORK.Subjects with 6 credits have 98 hours/0% on-site.
AF8. WORKSHOPS AND LABORATORY SESSIONS. Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.
AF9. FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course. It entails 4 hours/100% on-site
AF8. WORKSHOPS AND LABORATORY SESSIONS. Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.
MD1. THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject`s main concepts are developed, while providing material and bibliography to complement student learning
MD2. PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group
MD3. TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with teacher as tutor. Subjects with 6 credits have 4 hours of tutoring/100% on-site.
MD6. LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	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

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

3 out of 10 in the final exam to pass the course.

BASIC BIBLIOGRAPHY

- Paul A. Tipler, Gene Mosca Physics For Scientists and Engineers, W.H. Freeman and Company, 2008

- Raymond A. Serway, John W. Jewett, Jr. Physics For Scientists and Engineers, Brooks/Cole, 2014

ADDITIONAL BIBLIOGRAPHY

- John R Reitz, Frederick J Milford, Robert W Christy Foundations of Electromagnetic Theory, Addison-Wesley, 2008

- Mark W. Zemansky, Richard H. Dittman Heat and Thermodynamics, McGraw-Hill, 1981

- Roald K. Wangsness Electromagnetic Fields, Wiley, 1986