

Academic Year: ( 2019 / 2020 )

Review date: 10-05-2018

Department assigned to the subject: Department of Bioengineering and Aerospace Engineering

Coordinating teacher: VAQUERO LOPEZ, JUAN JOSE

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

**STUDENTS ARE EXPECTED TO HAVE COMPLETED**

Module "Technologies for Clinical Engineering", 1st semester, 1st year.

**COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.**

- Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas
- The students will know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
- That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
- The students will know how to communicate their conclusions and the knowledge and ultimate reasons that sustain them to specialized and non-specialized audiences in a clear and unambiguous way.
- The students will have the learning skills that allow them to continue studying in a way that will be largely autonomous.
- Ability to learn new methods and technologies, from the mastery of scientific subjects and specialized techniques of Clinical Engineering, as well as to adapt to new situations.
- Ability to apply knowledge about the human being and the life sciences to the resolution of problems specific to Clinical Engineering. In particular, ability to identify medical problems that can be treated using techniques encompassed in Clinical Engineering.
- Ability to design and carry out technological projects in the field of the application of engineering to medicine, as well as to analyze and interpret their results.
- Ability to evaluate medical equipment and instrumentation in complex multidisciplinary environments, assessing the needs of different clinical users and offering objective measures for decision making.

The students would be able to:

- Classify, categorize and explain the operating principles of electromedical equipment.
- Differentiate biomedical imaging techniques and their functioning.
- Select the right equipment for image-guided treatments.
- Develop advanced diagnosis and treatment solutions that integrate medical imaging.
- Examine medical images for quantification and analysis with the most appropriate techniques depending on the application or the specific clinical problem.
- Recognize, define and describe sensors with biomedical applications and know how to make measurements of physiological physical variables in both the clinical and biomedical environment.
- Know how to choose the appropriate electromedical equipment with regard to the needs, technical requirements, standards and safety of a specific clinical application.
- Decide correctly the equipment and the appropriate image technique depending on the clinical needs.
- Define the tasks of the clinical engineer in the hospital environment.
- Characterize the facilities, systems and equipment, identifying their functionality and their technical characteristics.
- Receive the equipment and elements of the system to be installed, verifying that they are those indicated in the established assembly plan.
- Verify the physical space and the infrastructure where the installation, system or equipment will be assembled, interpreting and applying procedures established in the assembly plan.
- Implement, prior to its clinical use, facilities, systems and equipment, applying the maintenance plan of the health center, the recommendations of the manufacturer and current regulations.
- Diagnose faults or malfunctions in facilities, systems and equipment, identifying the type of cause of the incident and the possibility of resolution by own or other means.
- Repair faults in installations, systems and equipment, applying specific techniques and procedures and checking the restoration of operation.

## DESCRIPTION OF CONTENTS: PROGRAMME

This subject is key for the study of the electromedical equipment of a health center from the point of view of the installation and maintenance of it. By chapters, the equipment to be treated will be: laboratory, rehabilitation and hemodialysis and water treatment.

This subject will allow the student to know the main diagnostic and therapeutic solutions existing in the health field. Once the subject is completed, the student will know the classification of the electromedical systems according to their technical and functional characteristics. The necessary details for a correct interpretation of the technical documentation will be studied. In addition, relying on the documentation of the installation and maintenance and once verified the physical spaces and infrastructures, the knowledge for the reception and the assembly and disassembly, start-up, diagnosis and repair of faults, maintenance and functional verification of the electromedical systems and their associated facilities, complying with regulations, safety and the environment.

## LEARNING ACTIVITIES AND METHODOLOGY

941/5000

AF1 Theoretical class

AF2 Practical classes

AF3 Theoretical practical classes

AF4 Laboratory practices

AF5 Tutorials

AF6 Group work

AF7 Individual student work

AF9 Face-to-face evaluation tests

## TEACHING METHODOLOGIES THAT WILL BE USED IN THIS MATTER

MD1 Exhibitions in the teacher's class with support of computer and audiovisual media, in which the main concepts of the subject are developed and the bibliography is provided to complement the students' learning.

MD2 Critical reading of texts recommended by the teacher of the subject:

Press articles, reports, manuals and / or academic articles, either for further discussion in class, or to expand and consolidate the knowledge of the subject.

MD3 Resolution of practical cases, problems, etc. raised by the teacher individually or in groups.

MD5 Preparation of papers and reports individually or in groups.

## ASSESSMENT SYSTEM

Classroom participation 10%

Individual or group work carried out during the course 40%

Final exam 50%

**% end-of-term-examination:** 50

**% of continuous assessment (assignments, laboratory, practicals...):** 50

## BASIC BIBLIOGRAPHY

- UNE 20611 Aspectos básicos del concepto de seguridad del equipo eléctrico utilizado en la práctica médica., UNE, 1979

- UNE-EN 60601-1:2008/A11:2012 Equipos electromédicos. Parte 1: Requisitos generales para la seguridad básica y funcionamiento esencial., UNE, 2008-2012