Singular clinical infrastructures

Academic Year: (2020 / 2021) **Review date: 11/07/2020 10:21:11**

Department assigned to the subject: Bioengineering and Aeroespace Engineering Department

Coordinating teacher: MENESES ALONSO, JESUS

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

It is recommended to have passed the following subjects of the first quarter of the first year:
- Electronic and optical circuits for clinical engineering
- Electrotechnical systems in clinical engineering
- Mechanical systems in clinical engineering

OBJECTIVES

The concepts covered in this subject will give a global vision on the architectural basis of a hospital and a specific vision of the different infraestructures of the hospital. Overcoming this subject, students will understand, differentiate and choose the correct criteria for the installation, the design and the maintenance for each hospital infrastructure, taking into account the legal and regulatory framework. In addition, different solutions to build and maintain a hospital in terms of energy efficiency and sustainability will be known.

COMPETENCES THAT THE STUDENT ACQUIRES WITH THIS MATTER

CB6 Possess and understand knowledge that provides a base or opportunity to be original in the development and / or application of ideas
CB7 That students 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
CB8 That students are able to integrate knowledge and face the complexity of formulating 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
CB9 That students 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
CB10 That students have the learning skills that allow them to continue studying in a way that will be largely autonomous.
CG1 Ability to learn new methods and technologies, based on the mastery of scientific subjects and specialized techniques of Clinical Engineering, as well as to adapt to new situations.
CG3 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.
CG4 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.
CE1 Ability to evaluate algorithms and data processing techniques in complex multidisciplinary environments, assessing the needs of different clinical users and offering objective measures for decision making.
CE2 Ability to understand and use advanced statistical methods for conducting scientific studies, evaluation of equipment from the point of view of effectiveness, accreditation for medical use or study of comparative effects in patients.
CE3 Ability to apply advanced techniques of health technology management, both in technical and economic aspects, and including the acquisition and maintenance thereof.
CE9 Ability to establish a dialogue with doctors to understand complex medical problems and the

application of quantitative methods and engineering techniques to their solution.
CE12 Ability to install and maintain hospital infrastructures under quality criteria, in safety conditions and in compliance with current regulations.
CE13 Ability to plan, manage and supervise hospital infrastructures under quality criteria, in safety conditions and complying with current regulations.

LEARNING RESULTS THAT THE STUDENT ACQUIRES

- Understand the basis of the architectural design of a hospital, throughout its evolution.
- Study the different infrastructures found in a hospital, taking into account the design, the maintenance and the regulatory framework.
- Acquire notions about energy efficiency and sustainability and its application in the hospital environment.

DESCRIPTION OF CONTENTS: PROGRAMME

In this course, the different types of hospital facilities will be analysed, which must meet a series of design and operating requirements. Hospital architecture will be studied on the basis that a hospital is a building with great complexity, which requires special techniques. In order to understand the whole, we must know the basic characteristics of each of the systems that make it up.

Hospital facilities are a fundamental part of the correct functioning of the hospital. From the technical, regulatory and efficiency point of view, the electrical installations, air conditioning, medical gases, sterilization, elevator systems, sanitary water, communication networks, electromedical equipment and/or protection will be studied individually.

The subject content is:
- Hospital architecture
- Energy efficiency
- Hospital infrastructures

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES
- Theorical class
- Theoretical-practical class
- Practical seminars
- Tutorials
- Individual and team work

TEACHING METHODOLOGIES
- 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.
- Resolution of practical cases, problems, etc. raised by the teacher individually or in groups.
- Exhibition and discussion in class, under the teacher's moderation of topics related to the content of the subject, as well as practical cases.
- Preparation of papers and reports individually or in groups.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	30
% of continuous assessment (assigments, laboratory, practicals…):	70

Continuous assessment: 70%
- Carrying out work, problems and/or practical activities.
- Student participation: It includes contribution to seminars, forum in Aula Global, attitude, classwork (quizzes or exercises to be solved in groups or individually), or other activities.

Final exam: 30%
- The final exam will cover the whole subject and will count 30% of the final score. The minimum score in the final exam to pass the subject is 4.0 over 10, notwithstanding the mark obtained in continuous evaluation.

Extraordinary exam:

% end-of-term-examination/test:	30
% of continuous assessment (assigments, laboratory, practicals…):	70

- The final score for students who attend the extraordinary exam will be 30% of the extraordinary exam and 70% of the continuous assessment, if available. In case of not presenting continuous assessment, the final score will be 100% the extraordinary exam.

BASIC BIBLIOGRAPHY

- Ernst Neufert Arte de proyectar en arquitectura, Gustavo Gili, 2013

ADDITIONAL BIBLIOGRAPHY

- J. J. Martínez Requena y J. C. Toledano Puesta a tierra en edificios y en instalaciones eléctricas, Paraninfo, 2000

- Jaques Thuring Funcionamiento y empleo de las máquinas eléctricas, Paraninfo, 1975

- null Guía de aplicación para el mantenimiento de instalaciones eléctrica de Quirófanos, ASINEL, 1980

- Jesús Fraile Mora Problemas de máquinas eléctricas, McGraw-Hill, 2004

- José Carlos Toledano y José Luís Sanz Instalaciones de enlace y centros de transformación, Paraninfo, 1998

- Martín Riera Guasp Tecnología Eléctrica, Síntesis, 2000

- Ministerio de Industria Reglamento Electrotécnico para Baja Tensión, Ministerio de Industria, 2002

- Ministerio de Industria Reglamento de Líneas Aéreas de Alta Tensión, Ministerio de Industria, 2008

- S. J. Chapman Máquinas Eléctric, McGraw-Hill, 2005