

820024 - ECB - Clinical Engineering

Coordinating unit:	295 - EEBE - Barcelona East School of Engineering
Teaching unit:	707 - ESAIL - Department of Automatic Control
Academic year:	2017
Degree:	BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits:	6
Teaching languages:	Catalan, Spanish

Teaching staff

Coordinator:	BEATRIZ FABIOLA GIRALDO GIRALDO
Others:	PEDRO GOMIS ROMAN SUSANA ADRIANA VELAZQUEZ LERMA

Opening hours

Timetable:	To be determined at the beginning of the semester. It will be made public to all students during the first week.
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Requirements

Simultaneously with:
- EMDTB: Monitoring, Diagnostic and Therapeutic Equipment
- SHB: Safety in Hospitals

Degree competences to which the subject contributes

Specific:

1. Run and plan clinical engineering services in healthcare centres.

CEBIO-28. Organise and carry out the maintenance of equipment and systems related to biomedical engineering.

Transversal:

2. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

Teaching methodology

The methodologies used are (approximately): participative lectures by 20%, self-learning (problems and practices in classroom) by 20%, homework by 30%, teamwork by 25%, and evaluation activities by 5%. Also, uses techniques of cooperative learning and project based learning.

Learning objectives of the subject

At the end of the course the student will be able to

1. Describing the fundamental concepts related to management of medical technologies and structure of hospital facilities.
2. Identifying different types of processes of a health-center: clinical, technical-assistance, catering, and of support.
3. Knowing different aspects of regulation and legislation related to hospital facilities.
4. Acquiring basic skills in the planning, design and supervision of a hospital setting.

820024 - ECB - Clinical Engineering

5. Identifying and describing issues related to ethical topics, safe environment, and sustainable in hospitals.

Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

820024 - ECB - Clinical Engineering

Content

<p>Unit 1. Hospital setting.</p>	<p>Learning time: 15h Theory classes: 3h Laboratory classes: 1h Self study : 11h</p>
<p>Description: The structure of the hospital. Functional areas of general services. Care units and support units. Clinical architecture. General and specific rules related to: facilities, security, maintenance, etc.</p> <p>Related activities: Classroom lessons about hospital setting. Finding information - generic description of a hospital setting - out-of-class. Visit to a hospital environment.</p> <p>Specific objectives: At the end of this subject the student will be able to:</p> <ul style="list-style-type: none"> - Explaining the general structure of a hospital. - Identifying the different functional areas of general services in hospitals. - Identifying and defining health care units and support units of the hospitals. - Identifying the fundamental topics to the clinical architecture. - Identifying and interpreting the general and specific rules related to: facilities, security, maintenance, etc. 	
<p>Unit 2. Acquisition and management of hospital equipment.</p>	<p>Learning time: 30h Theory classes: 8h Laboratory classes: 2h Self study : 20h</p>
<p>Description: Planning of new acquisitions and needs study. Management of equipment procurement: specifications, tender conditions, contract. Receipt, inspection and installation of new equipment. Documentation, organization and methods of use. Training of hospital staff.</p> <p>Related activities: Classroom lessons. Finding information - acquisition and management of hospital equipment - out-of-class.</p> <p>Specific objectives: At the end of this subject the student will be able to:</p> <ul style="list-style-type: none"> - Manage the procurement of equipment: technical specifications, tender, contract documents. - Manage the receipt, inspection and installation of new equipment. - Schedule training in the use of new equipment for hospital staff. 	

820024 - ECB - Clinical Engineering

<p>Unit 3. Hospital facilities and special facilities.</p>	<p>Learning time: 30h Theory classes: 10h Laboratory classes: 3h Self study : 17h</p>
<p>Description: Electrical and sanitary facilities. Facilities of special protection: special protection areas, white and dirty areas. Air Conditioning. Medical gases. Firefighting equipment. Communications: telephone, TV, public-address system. Inter and intra hospital communications: hospital information flow, wireless, etc.. Other specific types of facilities in hospitals.</p> <p>Related activities: Classroom lessons. Finding information - hospital installations - out-of-class. Visit to a hospital environment.</p> <p>Specific objectives: At the end of this subject the student will be able to:</p> <ul style="list-style-type: none"> - Identifying aspects related to installations as: electrical, sanitary, medical gases, fire. - Identifying aspects related to the special protections facilities. - Identifying aspects related to air conditioning systems. - Identifying aspects related to inter and intra hospital communications: flow hospital data, wireless, etc. 	
<p>Unit 4. Hospital services.</p>	<p>Learning time: 30h Theory classes: 8h Laboratory classes: 2h Self study : 20h</p>
<p>Description: Units of: nursing, intensive care, emergency, hospitalization. day hospital. Maternal and newborn service. Surgical units. Diagnostic image units. Laboratories. Catering service. Administration and hospital management.</p> <p>Related activities: Classroom lessons. Homework - proposal a project related to hospital services. Visit to a hospital environment.</p> <p>Specific objectives: At the end of this subject the student will be able to:</p> <ul style="list-style-type: none"> - Identifying and differentiate hospital services of nursing, intensive care units, emergency. - Identifying and differentiate hospital services of hospitalization, day hospital and ambulatory; maternity and newborn service. - Identifying and differentiate surgical units, recovery rooms, diagnostic image units, labs. - Identifying aspects related to the administration and hospital management. 	

820024 - ECB - Clinical Engineering

<p>Unit 5. Hospital maintenance.</p>	<p>Learning time: 30h Theory classes: 10h Laboratory classes: 3h Self study : 17h</p>
<p>Description: General maintenance: basic functions. Types of maintenance: preventive, corrective, on-demand, periodic reviews, etc. Documentation. Maintenance indicators. Recruitment process.</p> <p>Related activities: Classroom lessons. Homework - part of the project related to a hospital maintenance. Visit to maintenance service of a hospital.</p> <p>Specific objectives: At the end of this subject the student will be able to:</p> <ul style="list-style-type: none"> - Describing basics concepts related to the hospital maintenance. - Differentiating and applying different types of maintenance: preventive, corrective, periodic reviews, etc.. - Designing documentation for the control and monitoring of maintenance at the hospital. - Identifying and monitoring maintenance indicators. - Planning and manage maintenance contracts both general and specific. 	
<p>Unit 6. Environmental management and sustainability in hospitals.</p>	<p>Learning time: 15h Theory classes: 5h Laboratory classes: 1h Self study : 9h</p>
<p>Description: Ethical issues in the development of the profession. Sustainability. Biosafety. Environmental management. Renewable energy</p> <p>Related activities: Classroom lessons. Homework - finding information and development of part of the project related to environment. Visit to a hospital.</p> <p>Specific objectives: At the end of this subject the student will be able to:</p> <ul style="list-style-type: none"> - Exhibiting the ethical issues related to the development of the profession. - Identifying sustainability issues in the hospital setting. - Identifying aspects of biosafety. - Identifying areas of possible application of renewable energies. - Implementing actions in accordance with appropriate environmental management and sustainable. 	

820024 - ECB - Clinical Engineering

Qualification system

Partial control: 15%

Last control: 20%

Practices: 10%

Deliverable: 15%

Project definition: 10%

Joint project: 30%

One third of the grade of the project corresponds to the final presentation at the end of the course, another third corresponds to the proceeding paper, and the final third corresponds to documentation of the project.

Generic competition, self-directed learning, represents 15% of the global evaluation.

In this subject will schedule a reassessment.

Regulations for carrying out activities

The written test will be developed within the class time.

Practical tests - visits to hospitals - will be evaluated with a each one report.

The project will be common to all three subjects: ECB, EMCTB i SHB. Whenever possible it should contain topics related to each subjects. The evaluation shall be joint, and based on the oral presentation and documentation.

Bibliography

Basic:

Apunts de l' assignatura.

Jacobson, Bertil; Webster, John G. Medicine and clinical engineering. Englewood Cliffs (New Jersey): Prentice-Hall, 1977.

INSHT. Instituto Nacional de Seguridad e Higiene en el Trabajo [on line]. INSHT, [Consultation: 25/07/2011]. Available on: <<http://www.insht.es/portal/site/Insht>>.

Legislación Española : reglamentación y normativa vigentes.

Complementary:

Brown, B. H. [et al.]. Medical physics and biomedical engineering. Bristol: Institute of Physics, 1999. ISBN 0750303689.

Cook, Albert M.; Webster, John G. Therapeutic medical devices : application and design. Englewood Cliffs, N.J: Prentice-Hall, cop. 1982. ISBN 0139147969.

Reglamentación y normativa específicas.

Cromwell, Leslie; Weibell, Fred J.; Pfeiffer, Erich A. Biomedical instrumentation and measurements. 2nd ed. Englewood Cliffs (New Jersey): Prentice-Hall, cop. 1980. ISBN 0130764485.