

## Course guide

# 820029 - SHB - Safety in Hospitals

Last modified: 14/06/2023

**Unit in charge:** Barcelona East School of Engineering  
**Teaching unit:** 710 - EEL - Department of Electronic Engineering.  
460 - INTE - Institute of Energy Technologies.

**Degree:** BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** Catalan, Spanish

### LECTURER

**Coordinating lecturer:** PERE JOAN RIU COSTA

**Others:** Segon quadrimestre:  
MARIA AMOR DUCH GUILLEN - M11, M12, M13, M14, M15  
LEXA DIGNA NESCOLARDE SELVA - M11, M13, M15  
PERE JOAN RIU COSTA - M11, M12, M13, M14, M15

### REQUIREMENTS

EQUIPS DE MONITORATGE, DIAGNÒSTIC I TERÀPIA i ENGINYERIA CLÍNICA - Irequisits

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Specific:**

2. Manage health and safety in hospitals.

**Transversal:**

1. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

### TEACHING METHODOLOGY

Expositive Classes, cooperative learning and project based learning

### LEARNING OBJECTIVES OF THE SUBJECT

Understand the concept of risk and acquire knowledge of the methodologies used to assess risk. Understand the origin of dangers in hospital environments. Understand the relationship between safety and functionality in a medical device. Apply the concept of safety to medical devices and facilities. Identify the applicable standards and legislation. Understand the responsibility of the manufacturer, the installer and the end user with respect to safety in a hospital environment.

### STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	10.00
Hours large group	45,0	30.00
Self study	90,0	60.00

**Total learning time:** 150 h

## CONTENTS

### Risk Assessment

**Description:**

Risk identification. Assessment of potential damage. Risk assessment. risk analysis and evaluation.

**Specific objectives:**

Understand the concept of risk and the methodologies used to assess it.

**Full-or-part-time:** 10h

Theory classes: 4h

Self study : 6h

### Sources of risk in hospital environments

**Description:**

Electric shock. Effects of DC, AC and pulsed electrical discharges. Mechanical and thermal risks. Chemical and biological risks. Esterilization. Explosive atmospheres. Non-ionizing radiation effects and exposure guidelines. Ionizing radiation fundamentals, biological effects and measurement techniques.

**Specific objectives:**

Understand the relationship between safety and functionality in medical devices. Gain knowledge of the biological basis associated to dangers in hospitals and the different sources of risk.

**Full-or-part-time:** 28h

Theory classes: 12h

Self study : 16h

### Safety of medical devices

**Description:**

Electromedical equipment. Classification of equipment with respect to risk. Diagnostic and therapeutic equipment. Case studies (ECG, EEG, Ultrasound, etc.). Medical devices based on ionizing radiation and risks associated to external irradiation. Safety standards. Case studies (X-Ray, cobalt therapy. electron accelerator). Medical Systems. Equipment interconnection. Electromagnetic Compatibility as a risk factor.

**Specific objectives:**

Apply the risk concepts to different medical devices

**Full-or-part-time:** 26h

Theory classes: 8h

Laboratory classes: 6h

Self study : 12h



### Safety of installations

**Description:**

Electrical installations. Power supply. Isolation transformers. Extra low voltage for medical device safety. Equipotentiality. Applicable standards. Ionizing radiation facilities. Standards, design and zone identification

**Specific objectives:**

Apply the concept of risk to different medical facilities

**Full-or-part-time:** 30h

Theory classes: 10h

Laboratory classes: 4h

Self study : 16h

### Safety Standards

**Description:**

European Directives. Medical devices. Active implantable medical devices. In-vitro diagnostic devices. Standards for medical device safety. Medical device certification.

**Specific objectives:**

Be able to identify the relevant standards related to safety of medical devices and facilities.

**Full-or-part-time:** 10h

Theory classes: 4h

Self study : 6h

### Project on risk analysis and safety design of a medical device/facility

**Description:**

Project based learning activity on the analysis of the risk associated with a particular medical device or facility, the design of the safety aspects and the identification of the applicable safety standards

**Specific objectives:**

To be able to synthesize all the aspects related to safety of a medical device or facility

**Related activities:**

Public presentation of the work performed

**Full-or-part-time:** 46h

Theory classes: 7h

Laboratory classes: 5h

Self study : 34h

## GRADING SYSTEM

Individual and group work will be assessed by means of tests, assignments and work presentations.

Final exam: 35%

Project: 25%

Lab activities/reports: 20%

Half-term test: 20%

There is NO re-testing in this subject



## BIBLIOGRAPHY

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### Basic:

- Charney, William (ed.). Handbook of modern hospital safety. 2nd ed. Boca Raton [etc.]: CRC Press, cop. 2010. ISBN 9781420047851.
- Ortega Aramburu, X.; Jorba, J. Las radiaciones ionizantes : utilización y riesgos [on line]. 2a ed. Barcelona: Edicions UPC, 1996-2001 [Consultation: 11/06/2020]. Available on: <http://hdl.handle.net/2099.3/36551>. ISBN 8483011700.