

## SUBJECT TEACHING GUIDE

G1484 - Fundamentals of Biomedical Engineering

Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Speciality Optional Subjects				
Course unit title and code	G1484 - Fundamentals of Biomedical Engineering				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA
Name of lecturer	FELIX FANJUL VELEZ
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Other lecturers	JOSE LUIS ARCE DIEGO JOSE RAMON LLATA GARCIA JESUS ANTONIO ARCE HERNANDO

### 3.1 LEARNING OUTCOMES

- Knowledge of the field of biomedical engineering and its main applications
- Knowledge of the major ethical issues involved in biomedical applications
- Knowledge of basic biomedical signals that can be used in medical device applications
- Ability to design basic medical instrumentation systems
- Knowledge of most relevant instrumentation systems.  
Knowledge of the fundamentals of robotics applied in biomedicine.
- Knowledge of the principles of current medical imaging
- Knowledge of advanced principles of medical imaging
- Ability to select a priori the appropriate technique for a specific application
- Knowledge of optical sources applications in treatment and diagnosis of diseases
- Ability to select a priori the appropriate optical source for an application.
- Knowledge of ICT applications in the medical field
- Ability to design basic telemedicine systems

### 4. OBJECTIVES

- To know the applications of biomedical engineering
- To consider ethical issues in biomedical applications
- To know the most significant biosignals
- To design basic biomedical instrumentation systems
- To know the fundamentals of robotics applied in biomedicine .
- To know the principles of current medical imaging
- To understand the benefits and limitations of medical imaging equipment
- To know the applications of optical and medical diagnosis to treatment
- To know how to choose the basic features of a medical imaging or optical equipment
- To know the main applications of telemedicine
- To design basic systems telemedicine

### 6. COURSE ORGANIZATION

CONTENTS	
1	THEMATIC AREA 1: Introduction 1. Biomedical Engineering: general and ethical issues.
2	THEMATIC AREA 2: Bioinstrumentation 2. Biomedical Signals 3. Biomedical instrumentation systems. Applications of robotics to biomedicine.
3	THEMATIC AREA 3: Diagnosis and Treatment Techniques 4. Medical imaging 5. Lasers for medical applications
4	THEMATIC AREA 4: ICTs in the clinical setting 6. Telecommunications in the clinical setting

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Reports of laboratory works.	Work	No	Yes	30,00
Written final test.	Written exam	Yes	Yes	30,00
Classroom work in groups.	Work	No	Yes	40,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>Attendance at lab is mandatory, as well as delivery of reports of laboratory works. Non-attendance or non-delivery will lead to fail the subject. Failure to deliver the proposed classroom work will lead to a score of 0 on that part. In order to pass the course, the sum of scores should be at least 5 points.</p> <p>Remote evaluation is considered, including reports, exercises, laboratory work and written tests, in case a new COVID-19 emergency alert makes it impossible to be implemented in person.</p>				
<b>Observations for part-time students</b>				
<p>Part-time students who are not eligible for the continuous assessment will get their final mark by the laboratory works, with a weight of 50% and compulsory attendance, and the final written exam, with a weight of 50%.</p>				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

J.D. Enderle, S.M. Blanchard, J.D. Bronzino, Introduction to Biomedical Engineering, Ed. Academic Press, 2005.  
 A.A. Bharath, Introductory Medical Imaging, Ed. Morgan&Claypool, 2009.  
 Ronald W. Waynant, Lasers in Medicine, Ed. CRC Press, 2002.