Introduction to Biosignals and Bioimaging

Academic Year: (2023 / 2024) **Review date: 02-02-2024**

Department assigned to the subject: Bioengineering Department

Coordinating teacher: IZQUIERDO GARCÍA, DAVID

Type: Additional training ECTS Credits : 3.0

Year : Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Signals and systems
- Differential equations
- Image processing

OBJECTIVES

The 'Introduction to BioSignals and BioImages' course initiates the students into a basic understanding of how to detect, obtain, record and analyze the different BioSignal and BioImages that can be later on used in pre-clinical and clinical applications. We will learn about the physical and physiological origin of the different signals and images. During this course we will explore different modalities, such as ECG, EEG, MRI, CT or PET among others. We will study the physical devices, tools and methods that enable the acquisition and recording of their signals and images.

DESCRIPTION OF CONTENTS: PROGRAMME

Origin of biomedical signals.
Recording of Biomedical Signals
Physical principles of biomedical imaging.
Medical imaging modalities
ECG
EEG
X-Rays
CT
PET
SPECT
MRI
Microscopy
Optical Imaging

LEARNING ACTIVITIES AND METHODOLOGY

AF3	Theoretical practical classes
AF4	Laboratory practices
AF5	Tutoring
AF6	Team work
AF7	Student individual work
AF8	Partial and final exams

Activity code	total hours number	presencial hours number	% Student Presence
AF3	33	33	100%
AF4	24	24	100%
AF5	16	0	0%
AF6	35	0	0%
AF7	70	0	0%
AF8	4	4	100%
TOTAL SUBJECT	182	61	33,5%

ASSESSMENT SYSTEM

SE1 Participation in class
SE2 Individual or team works made during the course
SE3 Final exam

Evaluation systems	Minimum weighting (%)	Maximum Weighting (%)
SE1	0	20
SE2	0	100
SE3	0	100

The extraordinary evaluation (june call) will be carried out with a final exam (SE3) that weighs 100% of the grade.

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

BASIC BIBLIOGRAPHY

- Sörnmo, Laguna Biolectrical Signal Processing in Cardiac and Neurological Applications, Elsevier, 2005
- van Drongelen Signal Processing for Neuroscientists, Academic Press, 2018

ADDITIONAL BIBLIOGRAPHY

- Hendee, Ritenour Medical Imaging Physics, Wiley, 2002