Biosignals & Bioimages

Academic Year: (2022 / 2023) **Review date: 31/05/2022 10:06:26**

Department assigned to the subject: Bioengineering Department

Coordinating teacher: VAQUERO LOPEZ, JUAN JOSE

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Signals and systems
- Fundamentals of bioengineering
- Differential equations
- Image processing

OBJECTIVES

Basic competences

CB6 Having and understanding the knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
CB7 Students know how to apply their acquired knowledge and problem-solving skills in new or unfamiliar settings within broader (or multidisciplinary) contexts related to their field of study.
CB9 Students know how to communicate their conclusions and the knowledge and ultimate reasons behind them to specialised and non-specialised audiences in a clear and unambiguous way.

General competences

CG1 Ability to maintain continuous education after his/her graduation, enabling him/her to cope with new technologies.
CG2 Ability to apply the knowledge of skills and research methods related to engineering.
CG3 Ability to apply the knowledge of research skills and methods related to Life Sciences.
CG4 Ability to contribute to the widening of the frontiers of knowledge through an original research, part of which merits publication referenced at an international level.

Specific competences
CE1 Ability to know the peculiarities of data acquisition and information processing in the field of biomedical signals and images.
CE2 Ability to design and implement automatic learning systems for supervised and unsupervised problem solving.
CE3 Ability to design estimation and decision procedures from signals and images using statistical modeling.

DESCRIPTION OF CONTENTS: PROGRAMME

Biosignals:
Sources of physiological signals and images: acquisition, clinical use
Information extraction, advanced processing, diagnostic aids
Applications: ECG, EEG, others
Modeling

Bioimages:
2d, 3D and nD image
Identification of biomarkers

Molecular and multimodal imaging concept
Image quantification: dynamic data, parametric images, kinetic analysis.

LEARNING ACTIVITIES AND METHODOLOGY

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

Activity code	total hours number	presencial hours number	% Student Presence
AF3	100	100	100%
AF4	32	32	100%
AF5	18	0	0%
AF6	90	0	0%
AF7	186	0	0%
AF8	12	12	100%
TOTAL SUBJECT	450	138	30,6%

ASSESSMENT SYSTEM

% end-of-term-examination/test: 35

% of continuous assessment (assigments, laboratory, practicals…): 65

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

Evaluation systems (%)	Minimum weighting (%)	Maximum Weighting
SE1	5	20
SE2	35	100
SE3	30	60

BASIC BIBLIOGRAPHY

- Sörnmo, Laguna Biolectrical Signal Processing in Cardiac and Neurological Applications, Elsevier, 2005

- Toenies Guide to Medical Image Analysis, Springer, 2017

- van Drongelen Signal Processing for Neuroscientists, Academic Press, 2018

ADDITIONAL BIBLIOGRAPHY

- Hendee, Ritenour Medical Imging Physics, Wiley, 2002