Probabilistic Modelling and Inference

Academic Year: (2019/2020)

Review date: 21/05/2019 10:55:05

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: ARTES RODRIGUEZ, ANTONIO

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 1

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.

CB8 Students are able to integrate knowledge and to face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.

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.

CB10 Students have the learning skills that will enable them to continue studying in a way that will be largely selfdirected or autonomous.

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

CE4 Ability to use techniques for processing massive amounts of medical data and images. CE5 Ability to implement medical imaging and data processing methods.

DESCRIPTION OF CONTENTS: PROGRAMME

Probabilistic Modelling and Inference

- 1. Introduction to probability & measure theory
- 2. Models for discrete and continuous data. Exponential families.
- 3. Graphical models. Exact and approximate inference in graphical models.
- 4- Markovian and state-space models.
- 5. Deep generative models

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	134	134	100%
AF4	42	42	100%
AF5	24	0	0%
AF6	120	0	0%
AF7	248	0	0%
AF8	16	16	100%
SUBJECT TO	DTAL 600	184	30,66%

ASSESSMENT SYSTEM

% ene	% end-of-term-examination/test:					
% of (continuous assess	ment (assigments, laboratory, pra	cticals…):	100		
SE1 SE2 SE3	Participation in cla Individual or team Final exam	ass works made during the course				
Evalua (%)	tion systems	Minimum weighting (%)	Maximum	Weighting		
SΕ1		0	20			
SE2		0	100			
SE3		0	60			

BASIC BIBLIOGRAPHY

- Andrew Gelman et al. Bayesian Data Analysis, CRC Press, 2013

- Christopher M Bishop Patter Recognition and Machine Learning, Springer, 2006

- David JC Mackay Information Theroy, Inference and Learning Algorithms, Cambridge University Press, 2003
- Kevin P Murphy Machine Learning. A Probabilistic Perspective, MIT Press, 2012