

Academic Year: (2023 / 2024)

Review date: 26-04-2023

Department assigned to the subject: Mathematics Department

Coordinating teacher: TORRENTE ORIHUELA, ESTER AURORA

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Linear algebra.
Multivariable calculus.
Statistics.

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 Collect and interpret data of a mathematical nature which can be applied to other domains of scientific knowledge.

CG2 Apply acquired knowledge and possess the ability to solve novel problems related with Mathematics.

CG3 Being able to develop new scientific/technological approaches in a corporate environment.

CG6 Being able to autonomously study and do research.

Specific competences:

CE12 Being able to know the peculiarities of data acquisition and information management.

CE13 Ability to design and implement automatic learning systems for supervised and unsupervised problem solving.

CE14 Acquire an innovative attitude and approach.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to machine learning.
2. Linear methods: regression and classification.
3. Kernel methods: GPs and SVMs.
4. Clustering: k-means and spectral clustering.
5. Dimensionality reduction: PCA, PLS, feature selection.

LEARNING ACTIVITIES AND METHODOLOGY

AF3 Theoretical-practical classes
AF4 Laboratory practices
AF5 Attendance to office hours

AF6 Team work
AF7 Student individual work
AF8 Partial and final exams

Activity code - Total number of hours - Number of in-person hours - % Student Attendance

AF3	100	100	100%
AF4	32	32	100%
AF5	18	0	0%
AF6	90	0	0%
AF7	186	0	0%
AF8	12	12	100%

ASSESSMENT SYSTEM

The assessment of the students' performance will be done continuously over the semester. The assessment will be based on individual and group practical projects.

SE1 (Participation in class) and SE2 (Individual or group projects made over the semester): 90%
SE3 (Final exam): 10%

% end-of-term-examination:	10
% of continuous assessment (assignments, laboratory, practicals...):	90

BASIC BIBLIOGRAPHY

- C. E. Rasmussen Gaussian Processes for Machine Learning, MIT Press, 2006
- C. M. Bishop Pattern Recognition and Machine Learning, Springer, 2006
- R. O. Duda, P. E. Hart, D. G. Stork Pattern Classification (2nd ed.), Wiley Interscience, 2001
- T. Hastie, R. Tibshirani, J. Friedman The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2009