## uc3m | Universidad Carlos III de Madrid

## Educational data analytics

**Academic Year:** ( 2023 / 2024 )                                             **Review date: 23-04-2023**

**Department assigned to the subject: Telematic Engineering Department**

**Coordinating teacher: MUÑOZ MERINO, PEDRO JOSE**

**Type: Electives  ECTS Credits : 6.0**

**Year : 4 Semester :**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)
- Statistical basic knowledge
- Knowledge about basic programming

## OBJECTIVES
- Introduction to learning analytics and educational data mining
- Introduction to collection of educational data
- Introduction to student skill modelling
- Introduction to behaviour and meta-cognitive detectors
- Introduction to learning visual analytics
- Introduction to actuators and interventions of the learning process

## DESCRIPTION OF CONTENTS: PROGRAMME
1 - Introduction to learning analytics and educational data mining
1.1 Definitions and purpose
1.2 Educational platforms and services
1.3 Reference architectures and frameworks
1.4 Learning analytics life cycle
2 - Collection of educational data
2.1 Types of data
2.2 Storage formats
2.3 Interoperability. CAM, xAPI, IMS Calliper specifications
2.4 Combination of data from different sources in distributed services
3 - Detection of student skills
3.1 Item Response Theory
3.2 Bayesian models
3.3 Knowledge spaces
4 - Detection of student behaviors
4.1 Preferences
4.2 Help-seeking
4.3 Gaming the system
4.4. Others
5 - Visual analytics for the learning process
5.1 Existing tools
5.2 Video and exercise visualizations
5.3 Social interaction visualizations
5.4 Other high-level visualizations
5.5 Analysis and interpreation of visualizations from different situations
5.6 Interventions in the learning process
6 - Prediction of learning outcomes
6.1 Prediction of dropout
6.2 Prediction of learning gains
6.3 Prediction of interactions in services

## LEARNING ACTIVITIES AND METHODOLOGY
AF1: THEORETICAL-PRACTICAL CLASSES. They will present the knowledge that students must acquire. They will receive the class notes and will have basic reference texts to facilitate the follow-up of the classes and the development of subsequent work. Exercises, practical problems will be solved by the student and workshops and evaluation tests will be carried out to acquire the necessary skills.

AF3: INDIVIDUAL OR GROUP WORK BY THE STUDENT.
AF8: WORKSHOPS AND LABORATORIES.
AF9: FINAL EXAM. In which the knowledge, skills and abilities acquired throughout the course will be assessed globally.
MD1: THEORETICAL CLASS. Presentations in class by the teacher with the support of computer and audiovisual media, in which the main concepts of the subject are developed and the materials and bibliography are provided to complement the learning of the students.
MD2: PRACTICES. Resolution of practical cases, problems, etc. raised by the teacher individually or in groups.
MD3: OFFICE HOURS. Individualized assistance (individual office hours) or in groups (collective office hours) to students by the teacher.
MD6: LABORATORY PRACTICES. Applied/experimental teaching in workshops and laboratories under the supervision of a tutor.

## ASSESSMENT SYSTEM

SE1: FINAL EXAM. In which the knowledge, skills and abilities acquired throughout the course will be assessed globally.
SE2: CONTINUOUS ASSESSMENT. In it, the works, presentations, performance in debates, class presentations, exercises, practices and work in workshops throughout the course will be valued.

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| **% end-of-term-examination:** | 60 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 40 |

## BASIC BIBLIOGRAPHY

- Lang, C., Siemens, G., Wise, A., & Gasevic, D. (Eds.).  Handbook of learning analytics, New York: SOLAR, Society for Learning Analytics and Research., 2017