# COURSE DESCRIPTION – ACADEMIC YEAR 2021/2022

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| **Course title** | **Recommender Systems** |
| **Course code** | 73034 |
| **Scientific sector** | INF/01 |
| **Degree** | Master in Computational Data Science (LM-18) |
| **Semester** | 2 |
| **Year** | 1 |
| **Credits** | 6 |
| **Modular** | No |

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| **Total lecturing hours** | 40 |
| **Total lab hours** | 20 |
| **Attendance** | Attending lectures is not compulsory. Final marks will be awarded on the base of the outcome of the final exam and assignments (project and seminar) that will be given during lectures period. Who is not attending the lectures must contact the lecturer to receive their mandatory assignments. |
| **Prerequisites** | Linear algebra, probability, basic machine learning concepts (example, attribute, instance-based learning, cross validation and hyperparameter selection, evaluating predictions), basic information retrieval concepts (tf-idf, vector model, evaluating retrieval). Good to have knowledge of basic HCI principles |
| **Course page** | https://ole.unibz.it/ |

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| **Specific educational objectives** | The course belongs to the type "caratterizzanti – discipline informatiche" in the curricula "Data Analytics".<br><br>The main objective of the course is to understand: a) the usage and development scenario of recommender systems (RSs); b) the multiple stakeholders' objectives of these systems; c) and the scientific principles of the most important technologies used nowadays to implement and maintain RSs in various application domains (e.g., tourism and media markets).<br><br>Hence, the student will learn how to design, implement and evaluate RSs in concrete application scenarios. System design will take into account the specific requirements of the users in an application domain. Therefore, the study will not only focus on the core data mining and information retrieval techniques that are used to implement RSs but also on the human computer interaction and decision support methods that can be leveraged in an advisory system based on recommendation techniques. |

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| **Lecturer** | Francesco Ricci, https://www.inf.unibz.it/~ricci/ |
| **Contact** | POS 2.17, fricci@unibz.it, +39 0471 016971 |
| **Scientific sector of lecturer** | INF/01 |
| **Teaching language** | English |
| **Office hours** | During the lecture time span, Tuesday 16:00 - 18:00, arrange beforehand by email. |
| **Lecturing Assistant (if any)** | David Massimo |
| **Contact LA** | damassimo@inf.unibz.it, +39 0471 016144 |

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| **Office hours LA** | -- |
| **List of topics** | • Collaborative Filtering<br>• Content-Based Filtering<br>• Group Recommender Systems<br>• Context-aware systems<br>• Conversational Systems<br>• Decision Making |
| **Teaching format** | Frontal lectures, exercises, labs, projects, seminars. |

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| **Learning outcomes** | Applying knowledge and understanding:<br>• D1.2 - Understanding of the skills, tools and techniques required for an effective use of data science<br>• D1.7 - Knowledge of artificial intelligence techniques and methods for the implementation of intelligent systems<br>Applying knowledge and understanding:<br>• D2.1 - Practical application and evaluation of tools and techniques in the field of data science<br>• D2.2 - Ability to address and solve a problem using scientific methods<br>• D2.6 - Ability to apply innovative techniques of data mining and machine learning to extract knowledge from complex and heterogeneous data<br>Making judgments<br>• D3.2 - Ability to autonomously select the documentation (in the form of books, web, magazines, etc.) needed to keep up to date in a given sector<br>Communication skills<br>• D4.1 - Ability to use English at an advanced level with particular reference to disciplinary terminology<br>• D4.3 - Ability to structure and draft scientific and technical documentation<br>Learning skills<br>• D5.2 - Ability to autonomously keep oneself up to date with the developments of the most important areas of data science<br>• D5.3 - Ability to deal with problems in a systematic and creative way and to appropriate problem solving techniques. |

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| **Assessment** | • Final exam, written, 40 % of mark<br>• Project in a small team (2 students), 40%<br>• Seminars, 20%<br><br>The project will consist of the design of a recommender system in a specific application domain selected by the students. The project domain, the attacked problem, the techniques and the obtained results must be described in a report (~ 5.000 words). System prototype implementation is optional but recommended (especially the GUI). The project results will be presented at the end of the course.<br><br>The project is aimed at assessing to what extent the student has achieved the above-mentioned learning outcomes related to: applying |

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| | knowledge and understanding, making judgments, communication skills.<br><br>The student will be required, during the lecture period, to give one seminar to present a scientific paper on RSs or to illustrate a tool/technique useful for implementing RSs. The seminar is aimed at assessing to what extent the student has achieved the above-mentioned learning outcomes related to: applying knowledge and understanding, making judgments, communication and learning skills.<br><br>The written exam is based on verification questions and exercises, and it will assess to what extent the student has achieved the above-mentioned learning outcomes related to: knowledge and understanding, applying knowledge and understanding, and learning skills. |
| **Assessment language** | English |
| **Assessment Typology** | Monocratic |
| **Evaluation criteria and criteria for awarding marks** | The project and seminar will be evaluated at the end of the semester and it is a prerequisite for attending the written exam. The student must pass each single component of the exam (project, seminar and written exam), by obtaining at least 50% of the mark.<br><br>Project evaluation criteria: clarity of the presentation, novelty of the problem and the solution, appropriateness of the methods, significance of the solution and capability to refer to the methods and techniques discussed in the course.<br><br>Seminar evaluation: clarity of the presentation and capability to reply to clarification questions of the teacher.<br><br>Written exam: correctness and clarity of the replies to the posed questions. |

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| **Required readings** | The suggested book for recommender systems topics is:<br><br>• Ricci, F.; Rokach, L.; Shapira, B. (Eds.). Recommender Systems Handbook. Berlin: Springer, 2015.<br><br>All the required reading material will be provided during the course and will be available in electronic format. Copy of the slides will be available as well.<br><br>Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it |
| **Supplementary readings** | Scientific papers and additional books will be specified on each course topic during lectures. |
| **Software used** | Pyton and Java. |