COURSE DESCRIPTION – ACADEMIC YEAR 2019/2020

Course title	**Artificial Intelligence - Methods and Applications**
Course code	73011
Scientific sector	INF/01
Degree	Master in Computational Data Science (LM-18)
Semester	1
Year	1
Credits	6
Modular	No

Total lecturing hours	20
Total lab hours	40
Attendance	The course requires an active participation in the form of timely delivery of assignments, and in-class discussion. These activities constitute a relevant part of the assessment and must be completed within the required time frames.
Prerequisites	The course requires a good programming experience (the language used will be Python) as well as Computer Science BSc background covering: discrete math or logic, basic probability theory, and search based AI techniques (e.g. A*, breath/depth search, local/greedy search).
Course page	https://ole.unibz.it/

Specific educational objectives	The course belongs to the type "caratterizzanti – discipline informatiche" in the curriculum "Data Management". The course will introduce the student to different AI techniques that have been devised to support human decision making in complex domains and to build autonomous systems. The main part of the course will be devoted to the design and development of software using the introduced AI methods to solve proposed challenges. The purpose of this active participation is to gain a better understanding of different approaches to AI, and to focus the course on the more problematic aspects emerging from the application of the taught concepts. The general aim of the course is to provide the student with a toolbox of computational instruments and methodologies enabling the tackling of a variety of practical problems. The hands-on approach will complement the understanding of the main concepts with the necessary know-how to deploy concrete solutions.

Lecturer	Sergio Tessaris, www.inf.unibz.it/~stessaris
Contact	POS building room 2.04, tessaris@inf.unibz.it, +39 0471 016 125
Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	Check the home page of the lecturer for details
Lecturing Assistant (if any)	--
Contact LA	--
Office hours LA	--

List of topics	• AI and data/information processing, historical perspective and state of the art • Overview of main AI techniques: exact and approximate methods, handling imperfect information, use and model domain knowledge. • Tools and systems for AI based programming • Project on AI topics, such as: natural language processing, information extraction, games, automated planning, applications of constraint solving, multiagent systems.
Teaching format	Frontal lectures, interactive lab sessions, and project assignments (partially carried out during lab sessions).

Learning outcomes	Knowledge and understanding: • D1.1 - Knowledge of the key concepts and technologies of data science disciplines • D1.7 - Knowledge of artificial intelligence techniques and methods for the implementation of intelligent systems Applying knowledge and understanding: • D2.2 - Ability to address and solve a problem using scientific methods • D2.11 - Ability to develop intelligent software systems for decision support Making judgments • 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 Communication skills • D4.1 - Ability to use English at an advanced level with particular reference to disciplinary terminology. • D4.3 - Ability to structure and draft scientific and technical documentation • D4.5 - Ability to interact and collaborate in the implementation of a project or research with peers and experts Learning skills • D5.1 - Ability to autonomously extend the knowledge acquired during the study course. • D5.2 - Ability to autonomously keep oneself up to date with the developments of the most important areas of data science. • D5.3 - Ability to deal with problems in a systematic and creative way and to appropriate problem solving techniques.

Assessment	The assessment is based on 1) *lab assignments* and an in depth 2) *final oral presentation* on a specific topic among the ones covered in the course. Lab assignments should be carried out in groups of 2 or 3 students; the member of the groups should be the same for the whole course and be agreed among the participants during the first week of the course. Students joining the course after the first week should

	arrange their membership within one of the existing groups, or create a new group in the case of more late enrolments. For the final presentation, each student should select one of the topics presented during the course and deepen aspects that have not been fully covered (e.g. specific state of the art techniques, or applications). This activity requires independent study, selection of appropriate additional literature and/or material, and the making of a coherent presentation outlining the key aspects with the necessary support material (e.g. slides and/or multimedia).
Assessment language	English
Assessment Typology	Monocratic
Evaluation criteria and criteria for awarding marks	Evaluation of the course is based on 2 parts: 1. *Lab assignments* (70%), *group based assessment* based on: original contribution, technical quality of the deliverables, documentation and presentation, and ability to work in a team. 2. *Oral presentation* (30%), *individual assessment* based on: ability to: independently deepening the knowledge on a specific topic, summarise the relevant information, and establish relationships between different topics; as well as the clarity of the presentation. Each assignment will be separately evaluated and the overall assessment for the labs will be the average among them. If one assignment is not handed in within the required time frame it will count as 0. The evaluation of the lab assignments to be at least 50% of the available marking is a prerequisite for the admission to the oral presentation. The topic for the oral presentation should be agreed with the lecturer and must be coherent with the syllabus of the course.

Required readings	• Stuart Russell, Peter Norvig. Artificial Intelligence: A Modern Approach (3rd edition). Prentice Hall (Dec 2009) Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it
Supplementary readings	• Luger, George F. Artificial Intelligence: Structures and Strategies for Complex Problem Solving. 6th ed. Boston: Pearson Addison-Wesley, 2009. • Additional material covering specific topics could be provided during the course.
Software used	The course will require extensive use of several publicly available software tools. Most of the programming will be done using Python and the domain-specific languages (DSL) required to use the tools.

	The required software will be made available on a Linux based virtual machine, and details will be provided for installing them on your own PC (support will be limited to Linux).