MODELLO D (inglese)			
General Information			
Academic subject	Artificial Intelligence		
Degree course	Computer Science L.M.		
Curriculum			
ECTS credits	9		
Compulsory attendance	No		
Language	English		
Subject teacher	Name Surname	Mail address	SSD
	Stefano Ferilli	stefano.ferilli@uniba.it	INF/01
ECTS credits details			
Basic teaching activities			
Class schedule			
Period	2nd semester		
Year	1st		
Type of class	Lecture- workshops		
Time management			
Hours	154+71 = 225 (9 CFU)		
Hours of lectures	56		
Tutorials and lab	15		
Academic calendar			
Class begins	March 1st, 2021		
Class ends	June 24h, 2021		
Syllabus			
Prerequisites/requirements	None. Students having attended Knowledge Engineering and Expert Systems classes in I level degree may have an advantage.		
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in the Didactic Regulation and Prospectus a.a. 2017-2018)	*Knowledge and understanding* The students will know the foundations, the main tasks and the main approaches to Artificial Intelligence, with particular focus on the symbolic perspective. They will also know in detail outstanding algorithms from the literature. *Applying knowledge and understanding* The students will be able to apply Artificial Intelligence techniques to specific problems, to properly set up the techniques for fruitful application, and to set up evaluation experiments. *Making informed judgements and choices* The students will be able to compare the features, pros and cons of different Artificial Intelligence techniques, and to choose those that are appropriate to tackle specific problems. They will also be able evaluate the experimental outcomes and to trace them to the features of the evaluated technique. *Communicating knowledge and understanding* The students will be able to work in team, bringing to bear their knowledge of Artificial Intelligence in order to carry out		

	fruitful cooperation with other kinds of expertise from other members of the team. *Capacities to continue learning* The students will be provided with all the historical and methodological foundations that will allow them to understand the latest developments of Artificial Intelligence and to stay up-to-date with advances in Artificial Intelligence.
Contents	• Artificial Intelligence Introduction to the course: aims, objectives, structure, organization, expected results. Introduction to Artificial Intelligence: relationships to Computer Science, history, objectives, branches, applications. Intelligent Agents: features, structure, types. Applications of Artificial Intelligence. • Logic Programming and Prolog Recall of the basics of propositional and first-order logic: history, operators, proofs, properties. Clausal logic: definition, relation to full first-order logic, resolution, unification and pattern matching. Logic Programming: procedural interpretation of Horn Clauses, SLD resolution. Prolog: syntax, use for knowledge bases, use as a programming lanugage. • Heuristic Search and Problem Solving Problem solving approaches: cases in which an algorithm is not known. Search in a space of states: operators, strategies, heuristic functions: non-informed search, informed search; A* algorithm. Problem solving in games: min-max algorithm, alpha-beta pruning • Engineering of Knowledge-based Systems Methodologies for developing knowledge based systems: analysis, conceptualization, design, implementation. Pattern Directed Inference Systems. Expert systems: structure, development, implementation in Prolog. Inference strategies: deduction, abstraction, abduction, induction, probabilistic reasoning, argumentation, analogy. The ReLay system. • Schemes for Knowledge Representation Logic for knowledge representation: traditional logic, modal logic. Ontologies: philosophical background, definitions, representation formalisms, description logics. Semantic nets, Conceptual Graphs, Frames and Scripts. • Automatic Knowledge Acquisition The “knowledge acquisition bottleneck”. Machine Learning and Data Mining. Taxonomy of Machine Learning Approaches, Techniques and Systems. Version Space and Candidate Elimination Algorithm. Set-up procedure for running experiments in Machine Learning. Suites of Machine Learning systems. • Machine Learning and Declarative Knowledge Acquisition Logic-based approaches to Machine Learning: applications, advantages, issues. Relationships between Decision Trees and Rules. Inductive Logic Programming: generalization and specialization operators, systems. The InTheLEx system. Similarity approaches for First Order Logic descriptions.

	• Process Mining Process Mining: aims and objectives, history, applications. Formalisms for representing process models. Strategies for automatic learning process models. Declarative process mining. The WoMan system.
Course program	
Bibliography	S. Russell, P. Norvig "Artificial Intelligence: A Modern Approach" (3rd ed), Prentice Hall, 2009 P. Flach "Machine Learning" Cambridge University Press, 2012 W.F. Clocksin, C.S. Mellish "Programming in Prolog" (5th ed.) Springer, Berlin, 2003 Suggested: N.J. Nilsson, "Problem-solving Methods in Artificial Intelligence" McGraw-Hill, 1971 J.W. Lloyd: "Foundations of Logic Programming" 2nd ed., Springer, 1982 T. M. Mitchell "Machine Learning", McGraw Hill, 1997 N. J. Nilsson "Artificial Intelligence: A New Synthesis" Morgan Kaufmann, 1998 J. F. Sowa "Knowledge Representation", Brooks/Cole, 2000. G. F. Luger "Artificial Intelligence", Addison Wesley, 5th ed. 2005 N.J. Nilsson, "The Quest for Artificial Intelligence: A History of Ideas and Achievements" Cambridge University Press, 2011
Notes	
Teaching methods	Lectures + Workshops
Assessment methods (indicate at least the type written, oral, other)	Oral test, requiring previous submission (no later than a week before) of two case studies
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are).	- Knowledge of the history, approaches, techniques and algorithms of Artificial Intelligence - Ability to identify the appropriate approaches, techniques and algorithms of Artificial Intelligence to be applied to given problems - Ability to properly set up components based on Artificial Intelligence and to embed them in larger systems - Ability to evaluate the performance of components based on Artificial Intelligence
Further information	