COURSE PRESENTATION FORM

COURSE NAME	Theory of Computing
COURSE CODE	70101
LECTURER	Diego Calvanese
TEACHING ASSISTANT	None
TEACHING LANGUAGE	English
CREDIT POINTS	8
LECTURE HOURS	48
EXERCISE HOURS	24
PREREQUISITES	There are no prerequisites in terms of courses to attend. Students should be familiar with notions of mathematics and set theory, and with basic proof techniques, as taught in the mathematics courses of a bachelor in computer science.
OBJECTIVES	The objective of the Theory of Computing course is to introduce and study abstract, mathematical models of computation (such as finite state machines, push down machines, and Turing machines), and to use the abstract machine models to study the ability to solve computational problems, by identifying both the intrinsic limitations of computing devices, and the practical limitations due to limited availability of resources (time and space). A second objective is to show how to reason and prove properties about computing in a precise, formal, abstract way.
SYLLABUS	Regular languages (finite automata and regular expressions), context-free languages (context-free grammars, pushdown automata), Turing Machines, undecidability, computational complexity, NP-completeness, polynomial hierarchy
TEACHING FORMAT	Frontal lectures; exercises in class
ASSESSMENT	Midterm or final examination on the first half of the syllabus (50%) + final examination on the second half of the syllabus (50%). The two parts of the examination can be taken independently of each other within the three exam sessions of an academic year. Each part of the examination may be either written or oral.
READING LIST	Textbook: • *Introduction to Automata Theory, Languages, and Computation (2nd edition)*. J.E. Hopcroft, R. Motwani, J.D. Ullman. Addison Wesley, 2003. Further reading material: • *Elements of the Theory of Computation (2nd edition)*. H.R Lewis, C.H. Papadimitriou. Prentice Hall. 1998. • *Introduction to the Theory of Computation*. M. Sipser. PWS Publishing Company. 1997. • *Computational Complexity*. C.H. Papadimitriou. Addison Wesley. 1995.
SOFTWARE USED	None
LEARNING OUTCOME	After the course, students will know the fundamental models of computation, and the intrinsic and practical limitations of computing devices. They will also be familiar with formal techniques of computer science, and will be able to formally proof properties about computing.