

SUBJECT TEACHING GUIDE

G680 - Models of Computation

Degree in Computer Systems Engineering
Degree in Mathematics

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering Degree in Mathematics			Type and Year	Optional. Year 4 Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Computing Mention in Computing Mention in Computer Science				
Course unit title and code	G680 - Models of Computation				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION				
Name of lecturer	CRISTINA TIRNAUCA				
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Other lecturers					

3.1 LEARNING OUTCOMES

- Become familiar with some particular models of computation in computer science, understand the equivalence between these general purpose models and being able to identify cases of undecidability or inherently high complexity.

4. OBJECTIVES

Knowing the Turing machine model, its scope and limitations.

Become familiar with other models of computation (Register Machines, partial recursive functions) and the equivalence relation between them (the Church Turing Thesis).

Knowing the concepts of partial and primitive recursive functions.

Acquire a set of basic knowledge that will allow the student to know and discern what problems can be solved by an automatic procedure and which cannot.

Knowing the most important complexity classes and the relations between them.

Understanding the NP-completeness. Being able to prove that a given problem is NP-complete.

6. COURSE ORGANIZATION

CONTENTS

1	Lecture classes.
1.1	Models of computation. General and specific purpose. Latex tutorial.
1.2	Recursive functions.
1.3	Register machines.
1.4	Turing machines.
1.5	Recursively enumerable languages.
1.6	Decidability and undecidability.
1.7	Models of bounded resources.
1.8	NP-completeness and its relevance.
2	Individual project.
3	Final exam.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final exam	Written exam	Yes	Yes	50,00
Final project.	Work	No	Yes	20,00
Team work on practical applications.	Work	No	Yes	20,00
Problems.	Activity evaluation with Virtual Media	No	Yes	10,00
TOTAL				100,00

Observations

The grade obtained during the course is taken into consideration only for the ordinary examination session. In the extraordinary examination session, the exam has a 100% weight.

Observations for part-time students

For those students that for a justified reason (part-time students) could not follow the continuous evaluation, the exam has a 100% weight (in both ordinary and extraordinary sessions).

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Computability Theory. S. Barry Cooper.

Editorial: Boca Raton (Florida) [etc.] : Chapman and Hall/CRC, cop. 2004.

Introduction to automata theory, languages, and computation (3rd edition). John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman.

Editorial: Boston, Massachussets : Pearson Edaucation, cop. 2007.