

SUBJECT TEACHING GUIDE

G681 - Formal Languages

Degree in Computer Systems Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	Optional. Year 3
Faculty	Faculty of Sciences				
Discipline	Subject Area: Computing Mention in Computing				
Course unit title and code	G681 - Formal Languages				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web	https://moodle.unican.es/course/view.php?id=12150				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION				
Name of lecturer	DOMINGO GOMEZ PEREZ				
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Other lecturers					

3.1 LEARNING OUTCOMES

- After the course, the student will have the knowledge associated to formal languages which include but are not limited to: hands-on experience with regular expressions and patterns in text.

4. OBJECTIVES

Understand regular expressions and their use in real world applications.

Apply the available results for different formal grammars, their recognition automata and the implications in Chomsky hierarchy.

Knowledge of equivalence between determinism, automata and minimal automata.

As a summary, the student will be capable of explore the rich theory of formal languages and apply it to transducer constructions.

6. SUBJECT PROGRAM

CONTENTS

1	Part 1: Theoretical background
1.1	Formal languages and applications
1.2	Indeterminism and determinism
1.3	Minimal automata
1.4	Equivalence between finite automata and regular grammars
1.5	Linear systems and regular expressions
1.6	Equivalence between regular grammars and regular expressions
1.7	Modeling of regular expressions using finite automata
1.8	Pumping lemma
1.9	Context-free grammar
1.10	Reduction of grammars
1.11	Word problem in context-free grammars
1.12	Pumping lemma in context-free grammars
1.13	Push down automata
2	Part 2: Tools
2.1	Python

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Final exam	Written exam	Yes	Yes	50,00
Group assignments	Laboratory evaluation	No	Yes	25,00
Classroom problems	Activity evaluation with Virtual Media	No	Yes	25,00
TOTAL				100,00
Observations				
<p>Students can substitute continuous evaluation by a practical exam if:</p> <ul style="list-style-type: none"> - they are registered as a part-time student, - they fail any of the task in the continuous evaluation or want to improve their grades. <p>The value equals to 50% of the final grade.</p> <p>The exam will last for approximately 2 hours and it will be required that the student presents all assignments to apply to this condition.</p> <p>In the case that socio-sanitary conditions advise the end of in-person teaching, the final exam will be replaced by a practical exam and a written exam. The availability of resources will determine how the exams are performed, attempting to implement a asynchronous and telematic method.</p>				
Observations for part-time students				
<p>Any students who are registered as partial-time students are allowed to choose between continuous evaluation or two final exams. The percentage of the exams in the final grade will be 50% and 50%, respectively.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Ding-Zhu and Ker-I Ko. Problem Solving in Automata, Languages and Complexity. John Wiley and Sons, INC, 2001.
J.E. Hopcroft, R. Motwani, J.D. Ullman. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley, 2001 (2a ed.).