VNIVERSITAT DE VALÈNCIA

Course Guide
34671 Automata, formal languages and applications

COURSE DATA

DATA SUBJECT

Code: 34671
Name: Automata, formal languages and applications
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	Escola Tècnica Superior d'Enginyeria	2	Second quarter
1936 - Double Degree Program in Mathematics-Telematics Engineering	Facultat de Ciències Matemàtiques	3	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	Computing and programming	COMPULSORY
1936 - Double Degree Program in Mathematics-Telematics Engineering	Tercer curso	COMPULSORY

COORDINATION

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SUMMARY

Introduction to computing fundamentals from symbol processing and formal languages to computation models and solvability issues

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

none

COMPETENCES / LEARNING OUTCOMES

1400 - Degree in Computer Engineering

C2 - Ability to acquire, obtain, formalise and represent human knowledge in a computable form for solving problems through a computer system in any field, particularly in those related to aspects of computing, perception and action in intelligent environments.

G8 - Knowledge of basic subject areas and technologies that serve as a basis for learning and developing new methods and technologies, and of those which provide versatility to adapt to new situations.

G9 - Ability to solve problems with initiative, decision making, autonomy and creativity. Ability to communicate and transmit the knowledge, skills and abilities of a computer engineer.

R6 - Knowledge and application of basic algorithmic procedures of computer technology to design solutions to problems, by analysing the suitability and complexity of the algorithms proposed.

TI2 - Ability to select, design, implement, integrate, evaluate, build, manage, exploit and maintain hardware, software and network technologies, within adequate cost and quality thresholds.

DESCRIPTION OF CONTENTS

1. Finite automata and regular expressions

Symbols, strings, finite automata and regular expressions

2. Grammars and push-down automata

Chomsky hierarchy, context-free grammars and push-down automata.

3. Grammars and parsing

Specific grammars, processing and parsing algorithms

4. Computability

Turing machines, computational models, unsolvable problems and reducibility.

5. Complexity and tractability

Asymptotic costs, polynomic reducibility, NP-completeness.

6. Algorithmic solutions

Different versions of NP-complete problems. Efficient and practical solutions.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	30,00
Preparation of lessons	30,00
Preparation for assessment activities	10,00
Resolution of case studies	5,00
Total hours	**90,00**

TEACHING METHODOLOGY

- theory and problem teaching with student participation. (G-8,G-9,R-6,TI-2,C-2)
- discussion sessions and problem solving. (G-8,G-9,R-6,TI-2,C-2)
- lab sessions. (G-8,G-9,R-6,TI-2,C-2)
- quiz solving both in class and remotely. (G-8,G-9,R-6,TI-2,C-2)
- monograph writing and bibliographic search both individually and groupwise. (G-8,G-9,R-6,TI-2,C-2)

2)

EVALUATION

Weighted average of the following items (weights for the 2nd round in brackets):

Attendance and participation: 10% (5%) (it cannot be retaken) (G-8,G-9,R-6,TI-2,C-2)
Partial tests: 15% (7.5%) (not compulsory, it cannot be retaken) (G-8,G-9,R-6,TI-2,C-2)
Labs: 25% (12.5%) (compulsory, it cannot be retaken) (G-8,G-9,R-6,TI-2,C-2)
Final test: 50% (75%) (compulsory) (G-8,G-9,R-6,TI-2,C-2)

In case the partial tests are not done, their weights are added to the weight of the final test.

The individual marks must be superior or equal to 5 (out of 10) in order to compute the final mark.

During the tests it is forbidden the use of electronic devices or documents and mobile telephones.

The use of ChatGPT or similar code generation tools is not permitted. Its use will be considered as a copy.

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

In any case, the evaluation of this subject will be done in compliance with the University Regulations in this regard, approved by the Governing Council on 30th May 2017 (ACGUV 108/2017)

REFERENCES

- D. Kelley. Teoría de Automátas y Lenguajes formales. Prentice-Hall, Madrid, 1995
- J. Hopcroft, R. Motwani, J. Ullman. Introducción a la teoría de autómatas, lenguajes y computación. 2a ed. Addison-Wesley, 2005
- E. Alfonseca Cubero, M. Alfonseca Moreno, R. Moriyón Salomón. Teoría de autómatas y lenguajes formales. McGraw-Hill/Interamericana de España, D.L., 2007
- F. Ferri, Teoria d'autòmats i llenguatges formals. Universidad de Valencia. Servicio de Publicaciones, 2004
- K.C. Louden, Construcción de compiladores: Principios y Práctica. Paraninfo, 2004
- P. Isasi, P. Martínez, D. Borrajo. Teoría de lenguajes, gramáticas y autómatas. Adisson-Wesley, 2001