UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: AUTOMATA THEORY AND COMPUTATION
Code: 42342
Type: CORE COURSE
ECTS credits: 6
Degree: 346 - DEGREE IN COMPUTER SCIENCE AND ENGINEERING
Academic year: 2019-20
Center: 604 - SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (AB)
Group(s): 15
Year: 3
Duration: C2
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **FERNANDO LOPEZ PELAYO** - Group(s): **15**

Building/Office	Department	Phone number	Email	Office hours
ESII / 1A3	SISTEMAS INFORMÁTICOS	926053121	fernandol.pelayo@uclm.es	Consultar en https://www.esiiab.uclm.es/pers.php?codpers=126&curso=2018-19

2. Pre-Requisites

As this subject is taught in the third year of the degree it is expected that all the necessary requirements are met. Therefore, it is expected that there will be a basic background in:

- Mathematical formalisms: Set theory in Algebra. Basic mathematical background on proof techniques, especially Induction.

- Languages ¿¿and Programming Techniques: Mainly Imperative Style. It is expected that the student would be non-dependant on a specific programming language for final implementation (if required). The stunts are expected to know some programming languages in order to better illustrtate the usefulness of using grammars.

More specifically, the student should:

- Be able to work within a mathematical and formal framework.

- have abstraction capacity that allows they to identify the key ideas and concepts above the details and / or notation used.

3. Justification in the curriculum, relation to other subjects and to the profession

Automata theory and Computation is basic background for on both Science and Technique of Computing, in fact it has always been included in the Curriculum of these studies from its origins. At present, for the sake of a technification of the discipline, the study of this subject has remained part of the Computation itinerary, due to its more scientific nature.

In this subject, where both is justified and stablished the basis of the studies, there can be found most of the basic concepts studied and used in almost all other subjects. What is a programming language, how and why is it defined in the way it is done? What is the mechanism in which it is translated into a formalism understandable by a machine, why is that specifically, and what are the limitations that can be found, among many others.

This subject is strongly linked with others, as are all having mathematical nature, since formerly the subject has this origin, as well as those with a certain theoretical component related to programming, such as Language Processors, Declarative Programming, and all those in which the Artificial Intelligence has a certain weight.

4. Degree competences achieved in this course

Course competences

Code	Description
CM1	Ability to acquire thorough knowledge about fundamental principles and models in computation, and to apply them for the interpretation, selection, assessment, modelling, and creation of new concepts, theories, uses, and development of those technologies in the field of IT.
CM2	Ability to know the theoretical fundamentals of programming languages, and their associated techniques for lexical, syntactic, and semantic processes, along with their application in the creation, design, and language processing.
INS1	Analysis, synthesis, and assessment skills.
INS4	Problem solving skills by the application of engineering techniques.
INS5	Argumentative skills to logically justify and explain decisions and opinions.
SIS1	Critical thinking.
SIS3	Autonomous learning.
UCLM3	Accurate speaking and writing skills.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Understanding and skills in the definition of regular and context-free languages as well as the computers that recognize them.

Understanding of the theoretical foundations of computability and decidability.

Additional outcomes

Knowing the formal languages theory concepts that can be applied to Informatics, e.g., formal language definition, skills and tools for formal language processing, goals for this processing, etc...

Connecting these previous concepts with some others that are widely used throughout the studies of the degree, among which sohuld be included those related to programming languages.

6. Units / Contents

Unit 1: Introduction

Unit 2: Formal Languages

Unit 3: Formal Grammars

Unit 4: Finite Automata / Finite State Machine

Unit 5: Regular expressions

Unit 6: Regular Languages properties

Unit 7: Context Free Grammars

Unit 8: PushDown Automata

Unit 9: Turing Machines

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	R	Description
Class Attendance (theory) [ON-SITE]	Combination of methods	CM1 CM2 INS1	0.64	16	Y	Y	Y	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CM1 CM2 INS1 INS5 SIS1 UCLM3	0.64	16	Y	Y	Y	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CM1 CM2 INS1 SIS1 SIS3 UCLM3	0.96	24	Y	Y	Y	
Progress test [ON-SITE]	Assessment tests	CM1 CM2 INS1 SIS1 UCLM3	0.24	6	Y	Y	Y	
Project or Topic Presentations [ON-SITE]	Group Work	INS1 SIS1 UCLM3	0.64	16	Y	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	CM1 CM2 INS1 SIS1	2.4	60	Y	Y	Y	
In-class Debates and forums [ON-SITE]	Debates	INS1 PER2 SIS1 UCLM3	0.24	6	Y	Y	Y	
Final test [ON-SITE]		CM1 CM2 INS1 SIS1 UCLM3	0.24	6	Y	N	Y	
		Total:	**6**	**150**				
		Total credits of in-class work: 3.6						**Total class time hours: 90**
		Total credits of out of class work: 2.4						**Total hours of out of class work: 60**

As: Assessable training activity
Com: Training activity of compulsory overcoming
R: Rescheduling training activity

8. Evaluation criteria and Grading System

	Grading System		
Evaluation System	**Face-to-Face**	**Self-Study Student**	**Description**
Test	60.00%	0.00%	Partial Test and if required Final Test
Other methods of assessment	20.00%	0.00%	Writing and oral exposing and defending reports over general issues related to this subject
Self Evaluation and Co-evaluation	10.00%	0.00%	LAB work
Oral presentations assessment	10.00%	0.00%	
Total:	**100.00%**	**0.00%**	

Evaluation criteria for the final exam:

Written test: 60%.
Practical work: 20%.
The delivery of the internship work will be mandatory: 10%.
Oral presentations of topics, including work and memory of practices: 10%

Specifications for the resit/retake exam:

Written test to assess theoretical and practical knowledge.
The delivery of the internship is compulsory.

Specifications for the second resit / retake exam:

Written test to assess theoretical and practical knowledge.
The delivery of the internship is compulsory.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
In-class Debates and forums [PRESENCIAL][Debates]	4
Final test [PRESENCIAL][]	6
Unit 1 (de 9): Introduction	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
In-class Debates and forums [PRESENCIAL][Debates]	1
Unit 2 (de 9): Formal Languages	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
In-class Debates and forums [PRESENCIAL][Debates]	1
Unit 3 (de 9): Formal Grammars	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Progress test [PRESENCIAL][Assessment tests]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Unit 4 (de 9): Finite Automata / Finite State Machine	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Progress test [PRESENCIAL][Assessment tests]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 5 (de 9): Regular expressions	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Progress test [PRESENCIAL][Assessment tests]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 6 (de 9): Regular Languages properties	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Progress test [PRESENCIAL][Assessment tests]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 7 (de 9): Context Free Grammars	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Progress test [PRESENCIAL][Assessment tests]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 8 (de 9): PushDown Automata	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Progress test [PRESENCIAL][Assessment tests]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 9 (de 9): Turing Machines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Global activity	
Activities	**hours**
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	16
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	24
Progress test [PRESENCIAL][Assessment tests]	6
Project or Topic Presentations [PRESENCIAL][Group Work]	16

Study and Exam Preparation [AUTÓNOMA][Self-study]	60
Class Attendance (theory) [PRESENCIAL][Combination of methods]	16
In-class Debates and forums [PRESENCIAL][Debates]	6
Final test [PRESENCIAL][]	6
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
F. Sande González	Prácticas de teoría de autómatas y lenguajes formales	Gobierno de Canarias	Tenerife		2001	Texto para prácticas de la asignatura
	http://www.gobiernodecanarias.org/educacion/dgoie/publicace/scripts/detalle.asp?p=477					
Hopcroft, J.E.; Motwani R.;Ullman, J.D.:	Introducción a la teoría de Autómatas, Lenguajes y Computación.	Prentice-Hall			2002	Libro básico de referencia
	http://www.casadellibro.com/libro-introduccion-a-la-teoria-de-automataslenguajes-y-computacion/9789682612220/484262					
Isasi P., Martínez P., Borrajo D	Lenguajes, Gramáticas y Autómatas. Un enfoque práctico	Addison Wesley		9788478290147	1997	Ejemplos interesantes
	http://www.casadellibro.com/libro-lenguajes-gramaticas-y-automatas-un-enfoque-practico/9788478290147/792972					
J Glenn Brookshear	Teoria de la Computación: Lenguajes Formales, Autómatas y Complejidad	Alhambra Mexicana		9789684443846	2000	Muy ameno y didáctico
	https://www.casadellibro.com/libro-teoria-de-la-computacion-lenguajes-formales-automatas-y-complej-idad/9789684443846/730597					