Universidad Carlos III de Madrid
www.uc3m.es

COURSE NAME: DATA STRUCTURES AND ALGORITHMS, GROUP 89M		
DEGREE: SCIENCE AND DATA ENGINEERING	**YEAR: 1**	**SEMESTER: 2**

WEEKLY SCHEDULE

SEMANA	SESIÓN	SESSION CONTENT DESCRIPTION	GROUP (mark with X)		Mark if it is a space different from the classroom	Say YES/NO if the session needs two professors	WEEKLY WORK TO BE DONE BY THE STUDENT		
			BIG	SMALL			DESCRIPTION	CLASS HOURS	WORK HOURS (Max. 7h in a week)
1		Problem about TAD Statistics		x	Computers room		• Problem about TAD Statistics	1,66	2

1		• Presentation and course goals.
		• **Module 1. Introduction to Object Oriented Programming.**
		  • How to specify and implement an abstract data type.
		  • Examples: ADT Date, ADT Complex number
			X				• Work on solved problems about ADTs. Solutions available on Aula Global
							• Individual work on ADT List with arrays
								1,66	7

1		• Define and Implement Polynomial ADT to be performed for the class. • Explain the List ADT to be solved as individual work for		X	Computers room			1,66	

		the week. The implementation should be based on arrays.							
2		• **Module 2: Lesson 2: Linear TADs. Stacks and Queues.** • ADT Linear • Static vs dinamyc.. • SNode class. • Stack ADT. • Queue ADT	x				• Work on stacks and queues. • Solution delivery for List ADT through Aula Global. • Individual Weekly work: printer queue.	1,66	7
		• Design and implementation of linear ADT problems (in particular stacks and queues) • Explain the problem about balanced parenthesis.		X	Computers room			1,66	
3		• **Module 2: Linear TADs: single linked lists**	X				• Solution delivery for balanced parenthesis through Aula Global. • Work on single linked lists • Individual work on the implementation of a circular single list.	1,66	7
		• Work on methods implementations for single linked lists • Explain how to implement a circular single list.		X	Computers room			1,66	
4		• **Module 2: Linear TADs: doubly linked list**	X				• Solution delivery for the circular single list through Aula Global • Work on doubly linked list. • Individual work: extended version of DList.	1,66	7
		• Work on methods implementations for doubly linked lists • Explain the individual work for this week: a sort method for a doubly linked list of integers		X	Computers room			1,66	
5		• **Module 3: Algorithms I. Complexity.** • Temporal and spacial complexity. • Function T(n). • BigO • Complexity orders • **Modulo 4. Algorithms II.**	X				• Solution delivery for the sort method of a doubly linked list class. • Individual work: analysis of linear data structures methods	1,66	7

		Recursion.							
		• Work on and complexity and recursion problems.		x	Computers room			1,66	
6		• **Module 4: Algorithms II. Recursion** • Examples of recursion: factorial, Fibonacci, mcd, russian product, etc.	X				• Work on recursion and for first partial exam.	1,66	7
		• Work on recursion and for first partial exam. • Resolve previous exams		x	Computers room			1,66	
7		• First partial exam: Linear ADTs + recursion + complexity	X				• Work on complexity analysis • Work for first partial exam.	1,66	7
		• Exam resolution. • Lab case introduction		X	Computers room			1,66	
8		• **Module 5: Trees. Basic concepts. Traverses. Definition of BST (Binary search trees)**					• Work for partial exam. • Work on lab case	1,66	7
		• Work on trees • Work on lab case		x	Computers room			1,66	
9		• **Module 5: Binary search trees (BST): insert, remove, find methods.**	X				• Work on exercises about trees • Work on lab case	1,66	7
		• Work on the implementation of BST and lab case		X	Computer room			1,66	
10		• **Module 5: Balanced Trees**	x				• Work on exercises about trees • Work on lab case	1,66	7
		• Work on balanced trees and lab case		x	Computers room		• Work on exercises about trees • Work on lab case	1,66	
11		• **Module 6: Graphs** • Basic concepts	X				• Work on exercises about trees	1,66	7

		• Adyacency matrix. • Adyacency list					• Work on lab case		
		• Work on graphs and lab case		x	Computers room			1,66	
13		• **Module 6: Graphs** • Depth-first and breadth-first search • **Dijkstra's algorithm**	X				• Work on graphs • Work on lab case presentation	1,66	7
		• Work on graphs • Work on lab case.		X	Computers room			1,66	
13		• Lab case presentation		X	Computers room	YES		1,66	5
14		• **Module 7: Algorithms III.** • Divide and conquer: Dichotomic search, quick sort, merge sort. • Algorithmic strategies: an overview	X				• Work on final exam	1,66	5
							Subtotal 1	**44,82**	**96**
		Total 1 *(Face to face and work hours for a student in weeks 1 to 14)*						140,82	
15		Tutored session						2	
16		Evaluation preparation and evaluation						3	20
17									
18									
							Subtotal 2	**3**	**22**
		Total 2 *(Face to face and work hours for a student in weeks 15 to 18)*						25	
TOTAL *(Total 1 + Total 2. 180 hours max.)*								**165,82**	