COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**DESIGN OF COMPUTER ALGORITHMS**	
Department	**Physics**		
Domain	**Physics**	**Course category** (FC/SC/CC[1]): SC	**Term** (1-4): 1
Level	**Postgraduate (MA)**	**Course type** (Co/El/F[2]): Co	

I. Course structure

Number of hours/week				Credits	Total class hours/ semester	Total hours of individual activity	Examination type (C/Ex/CE[3])	Teaching language
Course	Seminar	Lab.	Project	**6**	**56**	**124**	**Ex**	**English**
2	**-**	**2**	**-**					

II. Instructors

	Academic degree[4]	Scientific degree	Name and surname	Faculty position (tenure/ associate - organization)
Course	Associate prof.	Dr.	Vasile TURA	tenure
Seminar				
Laboratory	Associate prof.	Dr.	Vasile TURA	tenure

III. Prerequisites

Basic knowledge in C++ programming. Introductory courses in algebra and calculus.

IV. Course objectives

The course offers students an introduction to design and analysis of algorithms. Students will learn the basic principles of algorithms design and will compare the methods of analyzing these algorithms. Besides, students will learn about the data structures that optimize the operation of each type of algorithm. The knowledge gained will be used by students to design and analyze basic algorithms used to solve typical search and sorting problems.

V. Course content

Course	Introductory mathematics: growth of functions, summations, recurrences, sets, graphs, trees, probabilistic analysis. Analysis of algorithm efficiency. Algorithm design paradigms: Divide-and-Conquer, Dynamic Programming, The Greedy Method, Backtracking, Branch-and-bound. Computational complexity. Sorting and searching algorithms.
Seminar	
Laboratory	Sequential search. Binary search. Matrix operations optimization. Recursive Algorithms. Recursive merge-sort. Merge-sort in-place. Computation of Fibonacci numbers. Quicksort. Optimal search-trees. Kruskal and Dijkstra algorithms. Selection; probabilistic selection. Traveling Salesman Problem. The knapsack problem. Parallel algorithms: finding a maximum. Parallel merge-sort.

VI. Minimal required references

1. T. H. Cormen, C.E. Leiserson, R.L. Rivest: Introducere în algoritmi, Libris Agora, 2000.
2. D. Lucanu, Structuri de date si algoritmi, Editura Universităţii "Al. I. Cuza" Iaşi, 2004.
3. R. Neapolitan, K. Naimipour, Foundations of Algorithms Using C++ Pseudocode, 3d ed., Jones and Bartlett Publishers, 2004.
4. A. Drozdek, Data structures and algorithms in C++, 2nd ed., Brooks/Cole, 2001.

VII. Didactic methods

Dialog-based lectures, problems solving, individual study, homework.

VIII. Assessment

Pre-conditions	All laboratory exercises should be passed obtaining the minimal grade 5.	
Exam dates	**1st Assessment**	**November**

[1] FC – fundamental course, SC – specialty course, CC – complementary course
[2] Co – compulsory, El – elective, F – facultative
[3] C – colloquium, Ex – exam, CE – colloquium AND exam
[4] Professor / Associate professor / Lecturer / Assistant professor / Teaching assistant

	2nd Assessment	**February**

	Assessment means and methods	**Percentage of the final grade**
Exam/Colloquium	Oral examination.	50%
Seminar		
Laboratory	Laboratory exercises.	50%