Study programmes: Bachelor studies - Informatics	
Course name: P103 - Data structures and algorithms	
Lecturers: Miodrag Živković, Vesna Marinković and other teachers of the CS department	
Status: Compulsory	
ECTS: 6	
Attendance prerequisites: P100	
Course aims: To acquire basic knowledge of data structures, fundamental algorithms, algorithm analysis and algorithm design techniques.	
Course outcome: Upon completion of the course, the student has basic knowledge of data structures, algorithm design techniques and algorithm analysis. He is able to apply adopted knowledge to solve new problems.	

Course content:
- Introduction to the design and analysis of algorithms.
- Basic data structures: list, stack, queue, rooted tree, heap, binary search tree, hash table, graph.
- Sorting algorithms of complexity $O(N \log N)$; linear complexity sorting, lower bound on the complexity of sorting.
- Analysis of algorithms: asymptotic analysis of the worst or average case; asymptotic notation O, o, Ω, Θ; time and space complexity; calculation of finite sums, solving recurrent relations, master theorem.
- Graphs: basic concepts, depth-first-search, breadth-first-search.
- Algorithmic strategies: brute force algorithms; greedy algorithms; divide-and-conquer strategy; backtracking, branch-and-bound, heuristics.
- Pattern matching..
- Examples of numerical algorithms.
- Implementation of recursion. Reduction of tail recursion to iteration.

Literature:
1. Miodrag Živković, Algoritmi, Matematički fakultet, Beograd, 2000.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, Introduction to Algorithms, The MIT Press, Cambridge, 2009.
(the teacher can choose another relevant current literature)

Number of hours: 5	Lectures: 3	Tutorials: 2	Laboratory: –	Research: –

Teaching and learning methods: Frontal, group and practical.

Assessment (maximal 100 points)				
Course assignments	**points**	**Final exam**	**points**
Lectures	-	Written exam	-
Exercises / Tutorials	-	Oral exam	-
Colloquia	30	Written-oral exam	70
Essay / Project	-		