

Study programmes: PhD studies - Informatics				
Course name: R444 - Design and implementation of functional programming languages				
Lecturers: >Nenad Mitić and other lecturers at Department of computer Science				
Status: Optional				
ECTS: 9				
Attendance prerequisites: -				
Course aims: Mastering general and specific knowledge about design, semantics, and implementation of functional programming languages.				
Course outcome: After completion of the course, the students have adopted the concepts and techniques of design, semantics and different abstract machines that can be used in functional programming languages implementations. During course, as the project, student will implement some functional programming language.				
Course content: Grammars and BNF. Lambda-calculus. Data types and their values. Type theory, Hindley-Milner algorithm, polymorphic functions. High order functions. Curry functions, abstractions and work with lists. Strict and non-strict functions. Description of operational, denotational and axiomatic semantics. Implementation of functional programming languages. Intermediate languages. Stack oriented machines. SECD machine. Super-combinators, and categorical combinators. Categorical abstract machine. SK reduction machine. Graph reduction machine. Garbage collectors. Code optimization. Program transformation. Functional programming languages and databases.				
Literature:				
1. The Implementation of Functional Programming Languages, Simon L. Peyton Jones, Prentice Hall, 1987				
2. Implementation of Non-Strict Functional Programming Languages, Kenneth R. Traub, The MIT Press, Cambridge, Massachusetts, Pitman Publishing, London, 1991				
3. Implementing Functional Languages, Simon L. Peyton Jones, David R. Lester, Prentice Hall, 1991				
4. D. A. Watt: Programming language design concepts, John Wiley & sons, 2004.				
5. Selected papers				
(The lecturer can choose another relevant current literature)				
Number of hours: 10	Lectures: 4	Tutorials: -	Laboratory: -	Research: 6
Teaching and learning methods: Frontal lectures, group and individual tutorials and exercises.				
Assessment (maximal 100 points)				
Course assignments	points	Final exam		points
Lectures	-	Written exam		-
Exercises / Tutorials	-	Oral exam		70 (одбрана пројекта)
Colloquia	-	Written-oral exam		-
Essay / Project	30			