Study programmes: Bachelor studies - Mathematics

Course name: RM11 - Compilation of programming languages

Lecturers: Filip Marić and other teachers of the Departments of Computer science

Status: Compulsory

ECTS: 5

Attendance prerequisites: RM01, RM02, RM04

Course aims: Introducing students to the theory of context-free grammars, pushdown automata, and their application in the compilation of programming languages. Gaining general and specific knowledge about the theoretical and practical aspects of syntax and semantic analysis of programming languages.

Course outcome: After the course, the student has learned the basic concepts related to application of the theory of formal languages in the analysis and synthesis of programming languages, as well as the methods for solving specific problems of translation and their implementation. Student knows how to state and prove the basic results of the theory of context-free grammars and pushdown automata. Student can implement a translator (an interpreter or a compiler) for a simple programming language using an existing tool (e.g. Lex/Yac) within a programming language C++.

Course content:

- Context free grammars (CFG) and languages - basic notions. Priority, associativity, ambiguity.
- Transformations of CFG, left recursion elimination, normal forms (of Chomsky and Greibach).
- Pushdown automata (PA). Acceptance criteria. Equivalence with CFG. Deterministic PA.
- Properties of context-free languages.
- Top-down syntactic analysis. LL grammars. Recursive descent.
- Botton-up syntactic analysis. LR grammars. System Yacc/Bison.
- Syntax directed translation. Semantic analysis. Attribute grammars.
- Optimization. Code generation.

Literature:

1. Д. Витас: Преводиоци и интерпретатори, Математички факултет, Београд, 2006.
2. A. Aho; R. Sethi; J. Ullman: Compilers - Principles Techniques and Tools, Addison-Wesley, 2006.
3. J. R. Levine et al: lex and yacc, O'Reilly Associates, 1992.
(наставник може изабрати другу одговарајућу актуелну литературу)

Number of hours: 4	**Lectures: 2**	**Tutorials: 2**	**Laboratory: -**	**Research: -**

Teaching and learning methods: Frontal, group, individual, and practical.

Assessment (maximal 100 points)

Course assignments	**points**	**Final exam**	**points**
Lectures	20	Written exam	-
Exercises / Tutorials	20	Oral exam	-
Colloquia	-	Written-oral exam	60
Essay / Project	-		