**Study programme(s): Mathematics (M), Integrated Mathematics Studies (M5), Applied Mathematics (MAP)**

**Course title: BOOLEAN ALGEBRAS AND OPTIMIZATION (M131)**

**Lecturer(s): Andreja P. Tepavčević**

**Course status: elective**

**ECTS points: 6**

**Requirements:**

**Learning Objectives**

Introduction to Boolean algebras and functions as a mathematical basis of digital technology and in that sense mastering the techniques of optimization of Boolean terms and functions.

**Learning Outcomes**

*Minimal:* After completing the course, the student should know and understand the notion of final ordered structures, especially Boolean algebras, and be familiar with the appropriate language. Students should have a clear understanding of the role of Boolean terms and functions in digital technology, to understand the reason and meaning of minimization and to know the appropriate algebraic techniques.

*Desirable:* More detailed knowledge of ordered structures - ordered sets, distribution and Boolean lattices and representation theorems. Solid understanding of Boolean terms and identities, and ability to solve more complex minimization problems.

**Syllabus**

*Theoretical instructions*

Ordered sets and lattices, diagrams. Modular, distributive and Boolean lattices and Boolean algebras. Representation of finite Boolean algebras. Boolean rings. Boolean terms and functions. Half-adder and adder. Minimization - concept and analysis. Different minimization techniques. Examples.

*Practical instructions*

Examples and problems in ordered structures. Presentation of diagrams. Analyzing and solving problems and tasks that illustrate the minimization techniques of Boolean terms and functions. Analyzing practical examples.

**Literature**


1. B. Šešelja, A. Tepavčević, **Bulove algebre i funkcije, teorija i zadaci**, Univerzitet u Novom Sadu, PMF, 2005.
2. R. Lidl, G.Pilz, **Applied Abstract Algebra**, 2-nd ed., Springer, 1998.


| **Number of active classes** | **Lectures: 3** | **Exercises: 2** |
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**Teaching methods**

Lectures are conducted using classical teaching methods in combination with computer presentations and interactions with students present at the classroom. Exercises are aimed at practicing and analyzing typical problems and techniques of their solutions. Knowledge and comprehension is checked in two colloquia.

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| The final exam is in written form and students are supposed to demonstrate a general understanding of the presented theoretical material and to solve particular problems. | | | |
| **Grading (maximum number of points 100)** | | | |
| **Pre-exam obligations** | Points | **Final exam** | Points |
| colloquia | **60** | oral exam | **40** |