

M006	Obligatory – Semester 1	Elementary Mathematics I	L+P+S 2+2+0	ECTS 6
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Course objectives. To refresh and broaden students' knowledge of elementary mathematics, which is necessary as a strong base of the fundamental mathematical knowledge for further study.

Course prerequisites. High school knowledge.

Syllabus.

1. Sets. Notion of a set (subset, equality of sets, power set). Operations on sets (union, intersection, difference, complementary set). Cartesian product of sets. Finite and infinite set.
2. Numbers - properties. Set of natural numbers (the method of mathematical induction). Set of integers and set of rational numbers. Set of real numbers. Complex numbers.
3. Functions. Notion of a function. Domain, codomain, range of a function. Preimage. Graph of a function. Equality of functions. Restriction and extension of a function. Injective function. Surjective function. Bijective function. Composite function. Inverse function. Elementary functions (polynomials, rational functions and irrational functions, exponential and logarithmic functions, trigonometric and inverse trigonometric functions).
4. Elements of mathematical logic. Notion of proposition. Operations on propositions. Basic mathematical propositions. Types of theorem proofs.
5. Relations. Notion of a relation. Relations of equivalence. Classes of equivalence. Relations of ordering.
6. Polynomials. Divisibility of polynomial. Horner's scheme. Euclid's algorithm. Zeros of polynomials. The fundamental theorem of algebra. Algebraic equations. Integral and rational roots of algebraic equations. Complex roots of algebraic equations.

Expected learning outcomes.

After completing the course, students are expected to:

- understand and apply the notion of proposition, operations on propositions and basic mathematical propositions;
- understand and apply the notion of a set, operations on sets and Cartesian product of sets;
- understand difference relations of equivalence and relations of ordering;
- draw a graph of elementary functions and use their property;
- use Horner's scheme and Euclid's algorithm;
- solve algebraic equations;
- solve complicated problems by using concepts and methods from the course contents.

Teaching methods and student assessment. Lectures and exercises are obligatory. The final examination consisting of a written and an oral part takes place upon completion of lectures and exercises. During the semester, knowledge of students is assessed by mid-term exams, which, if done successfully, can replace the written part of the final examination.

Can the course be taught in English: Yes.

Basic literature:

1. D. Jukić, R. Scitovski, Matematika I, Odjel za matematiku, Osijek, 2000.
2. B. Pavković, D. Veljan, Elementarna matematika I, Školska knjiga, Zagreb, 2003.

Recommended literature :

1. B. Pavković, B. Dakić, Polinomi, Školska knjiga, Zagreb, 1991.
2. S. Kurepa, Uvod u matematiku, Tehnička knjiga, Zagreb, 1984.
3. S. Lipschutz, Schaum's Outline of Set Theory and Related Topics, McGraw-Hill, New York, 1998.