

M100	Obligatory Semester 1	<b>Elementary Mathematics</b>	L	S	E	ECTS 6
			2	0	2	

**The aim of the course.** The objective of this course is to refresh and broaden students' knowledge of elementary mathematics, which is necessary as a strong base of the fundamental mathematical knowledge for further study.

**Prerequisites.** High school knowledge.

**Course content.**

1. Elements of mathematical logic. Notion of proposition. Operations on propositions. Basic mathematical propositions. Types of theorem proofs.
2. 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.
3. Relations. Notion of a relation. Relations of equivalence. Classes of equivalence. Relations of ordering.
4. 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.
5. 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.
6. Polynomials. Polynomial rings in one variable. 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. Polynomial rings in two variables. Symmetric equations.

**Learning outcomes**

No.	Learning outcomes
1.	Define the fundamental concepts of mathematical logic and analyze basic methods of mathematical proof.
2.	Use operations on sets and Cartesian product of sets.
3.	Analyze the properties of relations.
4.	Differentiate and give examples of relations of equivalence and ordering.
5.	Define the basic terms of functions and give examples.
6.	Analyze the properties of sets of natural numbers, integers, rational, real and complex numbers.
7.	Use Horner's scheme and Euclid's algorithm.
8.	Use methods for solving algebraic and symmetric equations applying the properties of polynomials.
9.	Understand and reproduce the correct mathematical proof of claim applying basic forms of mathematical and logical inference.

## Relating the learning outcomes, organization of the educational process and estimation of the learning outcomes

Organization of the educational process	ECTS	Learning outcomes **	Student activities*	The method of estimate	Points	
					Min	Max
Lecture attendance	1	1-9	Lecture attendance, discussion, team work and independent work on given tasks.	Attendance sheets, tracking activities	0	4
Written exam. (colloquium)	2	1-9	Preparing for written exam.	Evaluation.	25	48
Final exam.	3	1-9	Repetition of the subject matter.	Oral exam.	25	48
Total	6				50	100

**Teaching and evaluation of knowledge.** Attendance at lectures and exercises is required. The exam consists of written and oral part, and can be taken after completion of lectures and exercises. During the semester students can take colloquiums that replace the written 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.