

## RTU Course "Discrete Mathematics"

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**General data**

Code	DIM707
Course title	Discrete Mathematics
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Inta Volodko
Academic staff	Aleksandrs Matvejevs Sergejs Smirnovs Irina Eglīte Ilona Dzenīte Jeļena Mihailova Marija Dobkeviča Vaira Buža
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV, EN
Annotation	Topics covered by the course include: sets, mappings, relations; combinatorics; boolean algebra; discrete circuits, automata.
Goals and objectives of the course in terms of competences and skills	To develop students' understanding of basic discrete mathematical concepts that are necessary to comprehend processes and algorithms in professional study courses. To develop students' logical thinking and skills necessary to analyze solutions of problems when performing more complicated tasks within the framework of study courses of professional specialization.
Structure and tasks of independent studies	Three homework assignments are given during the study course. The topics of these assignments are as follows: set theory, combinatorics, Boolean algebra. Students can replace homework assignments with 8 tests, available at RTU portal ORTUS. The grades for homework assignments are taken into account for the calculation of the final grade for the study course.
Recommended literature	Obligātā literatūra: 1. I. Straziņš. Diskrētā matemātika. Rīga, Zvaigzne ABC, 2001, 148 lpp. 2. J. Čirulis. Matemātiskā loģika un kopu teorija. Rīga, Zvaigzne ABC, 2007, 278 lpp. 3. I. Volodko. Diskrētā matemātika uzdevumos un piemēros. Rīga, RTU, 2004, 126 lpp. Papildus literatūra: 4. I. Volodko. Tipveida uzdevumu krājums diskrētajā matemātikā. Rīga, RTU, 2004, 77 lpp. 5. S.B. Maurer, A. Ralston. Discrete algorithmic mathematics. Peters: Natick, Ma., 1990, 1998. 6. Кузнецов О.П., Адельсон-Вельский. Дискретная математика для инженера. Москва, Энергоавтоиздат, 1988. 7. Г. И. Москинова. Дискретная математика для менеджера. Москва, Логос, 2004, 238 lpp.
Course prerequisites	The study course is based on the knowledge of mathematics acquired at the secondary school.

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Set theory: Operations on sets. Mappings, types of mappings. Relations, types of relations.	18	20	0	0
Combinatorics: Permutations and combinations. Mathematical induction. Newton's binomial formula.	6	8	0	0
Mathematical logic: Expressions, operations on them. Normal form of Boolean functions. Polynomial of Boolean functions.	20	26	0	0
Discrete circuits, automata.	1	0	0	0
Predicates and quantifiers. The concept of syntax and semantics.	3	6	0	0
Consultations	10	0	0	0
Exam	2	0	0	0
<b>Total:</b>	<b>60</b>	<b>60</b>	<b>0</b>	<b>0</b>

**Learning outcomes and assessment**

Learning outcomes	Assessment methods
After successful completion of the study course a student is able to perform operations on sets, to determine the form of mappings and relations, to perform operations on relations of sets.	Evaluation of students' knowledge and skills is based on the results of homework assignments, tests and final examination.
Able to calculate the number of permutations and combinations; to prove a mathematical statement by mathematical induction method; to expand a binomial by Newton's binomial formula.	Students' knowledge is tested based on the homework assignment and the assignment at the final examination.
Able to construct the truth table for a Boolean function; to find normal forms and polynomial of Boolean functions.	Students' knowledge and abilities are assessed based on homework assignments, tests and final examination.

Able to plot the Boolean function geometrically and to minimize it; to determine whether the system of a Boolean function is full.	Test, homework assignment and several assignments at the final exam are used to assess students' knowledge on these topics.
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***Evaluation criteria of study results***

Criterion	%
Homework	10
Tests	30
Theory tests	10
Exam	50
Total:	100

***Study subject structure***

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	4.5	1.0	2.0	0.0		*	