



RTU Course "Discrete Mathematics"

12501 null

General data

| | |
|---|---|
| Code | DIM204 |
| Course title | Discrete Mathematics |
| Course status in the programme | Compulsory/Courses of Limited Choice |
| Course level | Undergraduate Studies |
| Course type | Academic |
| Field of study | Mathematics and Statistics |
| Responsible instructor | Inta Volodko |
| Academic staff | Aleksandrs Matvejevs Sergejs Smirnovs Irina Eglīte Ilona Dzenīte Jeļena Mihailova Marija Dobkeviča |
| Volume of the course: parts and credits points | 1 part, 2.0 Credit Points, 3.0 ECTS credits |
| Language of instruction | LV, EN |
| Annotation | 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 analyse 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 | 1. I. Strazdiņš. 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. Tipveida uzdevumu krājums diskrētajā matemātikā. Rīga, RTU, 2004, 77 lpp. 4. I. Volodko. Diskrētā matemātika uzdevumos un piemēros. Rīga, RTU, 2004, 126 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 outline

| Theme | Hours |
|---|-------|
| Set theory: Operations on sets. Mappings, types of mappings. Relations, types of relations. | 12 |
| Combinatorics: Permutations and combinations. Mathematical induction. Newton's binomial formula. | 4 |
| Mathematical logic: Expressions, operations on them. Normal form of Boolean functions. Polynomial of Boolean functions. | 12 |
| Discrete circuits, automata. | 1 |
| Predicates and quantifiers. The concept of syntax and semantics. | 3 |

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. |

Study subject structure

| Part | CP | Hours per Week | | | Tests | | |
|------|-----|----------------|-----------|------|-------|------|------|
| | | Lectures | Practical | Lab. | Test | Exam | Work |
| 1. | 2.0 | 1.0 | 1.0 | 0.0 | | * | |