



Subject card

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|---|--|--|--|-------------------------------------|---|------------|-----|
| Subject name and code | Discrete mathematics, PG_00047546 | | | | | | |
| Field of study | Automatic Control, Cybernetics and Robotics | | | | | | |
| Date of commencement of studies | October 2024 | | Academic year of realisation of subject | | 2024/2025 | | |
| Education level | first-cycle studies | | Subject group | | Obligatory subject group in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 1 | | Language of instruction | | Polish | | |
| Semester of study | 2 | | ECTS credits | | 4.0 | | |
| Learning profile | general academic profile | | Assessment form | | assessment | | |
| Conducting unit | Department of Decision Systems and Robotics -> Faculty of Electronics, Telecommunications and Informatics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr inż. Mariusz Domżałski | | | | |
| | Teachers | | dr inż. Sebastian Dziedziewicz | | | | |
| | | | dr inż. Mariusz Domżałski | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 15.0 | 0.0 | 0.0 | 0.0 | 30 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 30 | | 4.0 | | 66.0 | 100 |
| Subject objectives | <ul style="list-style-type: none">Assimilation of knowledge of set theory, mathematical logic, data structures (trees) and graph theory.Learning algorithms of graph coloring and searching for the shortest path in the graph. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | [K6_W01] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study | | Student got knowledge on set theory, mathematical logic, data structures (trees) and graph theory. Student learned basic algorithms for searching in data structures (trees), graph coloring and searching for the shortest path in graphs. Student got prepared for analysing simple algorithms and implementation of the presented algorithms in practice. | | [SK2] Assessment of progress of work [SU1] Assessment of task fulfilment | | |
| | [K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn | | Student is able to use knowledge of discrete mathematics including set theory, logic and basic graph algorithms. Student is able to use appropriate external sources to solve discrete mathematics problems. | | [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment | | |

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| Subject contents | <ol style="list-style-type: none">1. Set theory. Set operations. Venn diagrams.2. Mathematical induction.3. Logic and propositional calculus. Basic logical operations and truth tables. Quantifiers.4. Relations. Types of relations – reflexive, symmetric, antisymmetric, transitive.5. Equivalence relations, ordering relations.6. Functions. Injective, surjective and bijective functions. Invertible function. Function composition.7. Introduction to graph theory. Subgraphs, isomorphic and homeomorphic graphs. Planar graphs.8. Trees. Binary trees. Traversing binary trees. Binary search trees9. Introduction to Computational Complexity..10. Graph coloring.11. Discrete optimization methods for searching the cheapest path in the flow graph.12. Discrete optimization methods for searching the maximum flow.13. Eulerian path problems.14. Hamiltonian circuit problem. | | |
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Tests | 50.0% | 90.0% |
| | Homework | 50.0% | 10.0% |
| Recommended reading | Basic literature | <ul style="list-style-type: none">• A.Szepietowski, <i>Matematyka Dyskretna</i>, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2006.• S.S. Epp, <i>Discrete Mathematics with Applications</i>, Brooks Cole, 2003.• K.A. Ross, C.R.B. Wright, <i>Discrete Mathematics</i>, Pearson, 2002. | |
| | Supplementary literature | <ul style="list-style-type: none">• Resources available in the internet. | |
| | eResources addresses | Adresy na platformie eNauczanie: | |
| Example issues/ example questions/ tasks being completed | <ul style="list-style-type: none">• Find the truth table of a given logic function.• Use mathematical induction to show that 5 divides $7^n - 2^n$, for any natural number n.• What properties has the relation "x is greater than y" for real numbers x and y.• Decide whether a given graph is planar.• Find the shortest path in a given graph. | | |
| Work placement | Not applicable | | |