COURSE DESCRIPTION CARD - SYLLABUS

Course name
Elements of general topology [S1MwT1>E-ETO]

Course

Field of study
Mathematics in Technology

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in domain of calculus, mathematical ligic and set theory on the level of studies of the first-cycle. Ability to use use the predicate calculus and quantifiers, language of the set theory, notions of convergence of sequences.

Course objective

In-depth knowledge of topology from scratch. Gaining the ability to apply the acquired knowledge to theoretical as well as practical issues in other fields of mathematics and physics.

Course-related learning outcomes

Knowledge:
use the topology to other fields of mathematics with particular emphasis on mathematical analysis.

Skills:
Ability to use notions of topological spaces, open sets, operation of closure, metric spaces, cathegory method, separation axioms, metrizability of topological spaces. Ability to use these concepts for proving of various properties of topological spaces. Explanation of the meaning of geometric interpretation of

these notions and and using other tools of topology.

Social competences:
Ability to precise formulation of mathematical problems and trying of solving them. Ability to search for information single-handedly in literature, also in English.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture
Valuation of knowledge and skills during written test.
Practical Lessons
Two large tests concerning an application of knowledge from the lectures in exercises (student can use his own notes)
Systematic control of theoretical knowledge in form of short quizes.
Valuation of student answers during lessons.
Valuation of activity during lessons.

Programme content

Metric spaces and examples of them. The notion of topology. Methods of Metody of Topological constructions. the quotient topology. Induced topologies. Separation axioms and relationships between them. Continuity of functions in topological spaces. Conditions equivalent to continuity. The notion of compact set and connected set. Properties of compact sets. Properties of real functions defined on compact sets. Complete metric spaces. Banach fixed point theorem and its application to numerical solving of differential and integral equations. Cantor theorem. Baire theorem and its applications. Baire category methods.

Course topics

Metric spaces and examples of them. The notion of topology. Methods of Metody of Topological constructions. the quotient topology. Induced topologies. Separation axioms and relationships between them. Continuity of functions in topological spaces. Conditions equivalent to continuity. The notion of compact set and connected set. Properties of compact sets. Properties of real functions defined on compact sets. Complete metric spaces. Banach fixed point theorem and its application to numerical solving of differential and integral equations. Cantor theorem. Baire theorem and its applications. Baire category methods.

Teaching methods

Lecture:
1. The lecture conducted in an interactive way with formulating questions for a group of students or for selected students.
2. The theory presented in relation to the current knowledge of students.
3. Student activity during classes is taken into account when the final grade is considered.
Tutorials:
1.Solving sample tasks on the board.
2. Detailed reviewing of task solutions and discussions with comments.
3.Initiating discussions on solutions.

Bibliography

Basic
1. R. Engelking, Topologia ogólna, Wydawnictwo Naukowe PWN Warszawa 2012.
2. K. Jänich, Topologia, PWN Warszawa 1996.
Additional
1. K. Kuratowski, Wstęp do teorii mnogości i topologii, Wydawnictwo Naukowe PWN Warszawa 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00