Level: bachelor

Course title: Topology (M4-20)

Status: obligatory

ECTS: 7

Requirements: none

Learning objectives

Consolidation of the knowledge concerning metric and topological spaces (obtained in courses in mathematical analysis) on a more general level. Getting new knowledge necessary for understanding several subjects (e.g. Functional analysis, Theory of measure and integration).

Learning outcomes

Minimal

Understanding the corresponding parts of the theory of cardinal numbers, general topology and the theory of metric spaces, performing the ability to prove the main theorems and analyze a given topological space.

Desirable

Deeper understanding of the corresponding parts of the theory of cardinal numbers, general topology and the theory of metric spaces, performing the ability to prove the main theorems, analyze and investigate a given topological space, to understand the standard examples and counterexamples, and to apply the knowledge in other areas of mathematics.

Syllabus

Theoretical instruction

Cardinal number. Theorems of Schroeder-Bernstein and Cantor. Infinite and countable sets. Continuum. Operations with cardinal numbers. Topological space. Base and sub-base. The second countable spaces. Lindelof's theorem. Neighbourhoods. Local base. First countable spaces. The interior, exterior, boundary and closure of a set. Derived set. Density. Separability. Separation axioms. The normality of metric spaces. Continuous functions. Completely regular spaces. Open and closed mappings and homeomorphisms. Invariants and topological properties. Subspace. Hereditary properties. Restriction. Embedding. Connectedness. Components. Pathwise connected spaces. Compactness. Mappings of compact spaces. Sequential and countable compactness. Compactness in metric spaces. Tychonov product. Multiplicative properties. Tychonov's theorem. The diagonal mapping theorem. Universal spaces. Metric spaces. Metric invariants. Completeness and completion of metric spaces. Metrizability. Urysohn metrization theorem.

Practical instruction

Analysis of several topological spaces through exercises.

Weekly teaching load				Other: 0
Lectures: 3	Exercises: 3	Other forms of teaching: 0	Student research: 0	