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| **Partial Differential Equations** | Mathematics 321 |

This course is an introduction to the theory of partial differential equations. The primary focus is the derivation and solutions of the main examples in the subject rather than on the existence and uniqueness theorems and higher analysis. Topics include hyperbolic and elliptic equations in several variables, Dirichlet problems, the Fourier and Laplace transform, Green's functions.

**Prerequisite**: MAT-332.

Course content

Partial differential equations, initial and boundary value problems, Representation and analysis of solutions by means of Fourier series, difference methods with stability analysis, maximum principles and energy integrals, Fourier integrals.

Learning outcome

To analyse the most important partial differential equations encountered in applied mathematics and to describe and analyse numerical methods for these equations.

**Functional Analysis MAT-???**

Course Description

This is a undergraduate course. It will cover normed spaces, completeness, functionals, Hahn-Banach theorem, duality, operators; Lebesgue measure, measurable functions, integrability, completeness of L-p spaces; Hilbert space; compact, Hilbert-Schmidt and trace class operators; as well as spectral theorem.

**Prerequisite: MAT-???**

Course content

The course gives an introduction to functional analysis, which is a branch of analysis in which one develops analysis in infinite dimensional vector spaces. The central concepts which are studied, are normed spaces with emphasis on Banach and Hilbert spaces, and continuous linear maps (often called operators) between such spaces. Spectral theory for compact operators is studied in detail, and applications are given to integral and differential equations.

Learning outcome

The course will be useful for all students who are aiming at writing a master thesis in mathematics (or applied mathematics) with spesialization in analysis.