EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

Mathematisch-Naturwissenschaftliche Fakultät

Fachbereich Mathematik

AB Geometrische Analysis, Differentialgeometrie und Relativitätstheorie

Wintersemester 2024/25

Vorlesung

Introduction to Partial Differential Equations

Lecturer: Dr. Rodrigo Avalos

Start: Wednesday, 16th October 2024

Time: Mondays, 16:00-18:00 hrs. and Wednesdays, 14:00-16:00 hrs.

Place: C4H33 (C-Bau Mathematik/Physik)

Tutorial: 2 hours/week **Tutor:** Ariadna Leon Quiros **Start:** Friday, 25th October 2024.
Time: Fridays, 12:00-14:00 **Place:** C5H10 Seminarraum S07 (C-Bau [Mathe/Physik])

Study programs: Master in Mathematics and in Mathematical Physics

Modul number: MAT-55-21; 9 ECTS points
Study areas: Analysis and differential geometry; mathematical physics

Language: English

Description:

The objective of the course is to provide an introduction to the theory of linear partial differential equations of second order, with a special focus on elliptic equations. Specific topics include:

- Examples of important linear PDEs and their motivation;
- Harmonic functions and Green's function;
- Maximum and comparison principles;
- Sobolev spaces and L2-theory of weak solutions to elliptic equations;
- Eigenvalue problems;
- Heat kernel and basic properties of the heat equation

Prerequisites:
Bachelor degree in mathematics or equivalent.

Literature:

1. David Gilbarg and Neil S. Trudinger, Elliptic partial differential equations of second order, Springer Grundlehren, (2001).
2. Michael E.Taylor, Partial Differential Equations I, Appl. Math. Sciences 115, Springer 1996.
3. Lawrence C. Evans, Partial Differential Equations, American Mathematical Society (1998).

Exam: The final examination will be oral and, to be admitted to it, students will need to get 50% of all points on the exercise sheets.