EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

Mathematisch-Naturwissenschaftliche Fakultät

Fachbereich Mathematik

AB Geometrische Analysis, Differentialgeometrie und Relativitätstheorie

Sommersemester 2023

Vorlesung

Fully non-linear elliptic and parabolic partial differential equations

Lecturer: Prof. Dr. Gerhard Huisken

Start: Friday, 28th April 2023

Time: Fridays 10:15-12:00

Ort / Place: C 4 H 33

Study programs: Master in Mathematics and in Mathematical Physics

Modul number: MAT- 60-36; 3 ECTS points

Studienschwerpunkte: Analysis und Differentialgeometrie, Mathematische Physik

Description:

The course investigates fully non-linear elliptic and parabolic partial differential equations of second order. Classical examples are the Monge-Ampère equation, the equation of prescribed Gaussian curvature or, more general, equations of prescribed other scalar invariants of curvature together with their parabolic analogues. They also arise in problems of stochastic control and optimal transport. The course establishes basic techniques for solving Dirichlet- and Neumann boundary value problems for such equations, in particular techniques for deriving the necessary a priori estimates for solutions.

Prerequisites:

At least one course on partial differential equations, basic concepts of differential geometry.

Literature:

David Gilbarg and Neil S. Trudinger, Elliptic partial differential equations of second order, Springer Grundlehren, (2001).

Lawrence C. Evans, Partial Differential Equations, Chapters on Sobolev Spaces and elliptic PDEs, American Mathematical Society (1998).

Gary Lieberman, Second order parabolic differential equations, World Scientific (1996).

J. Bakel'man, Convex functions and nonlinear geometric elliptic equations, Springer-Verlag, (1994).

Luis Caffarelli and Xavier Cabrè, Fully nonlinear elliptic equations, Amer. Math. Soc., (1995).

Exam:

Written or oral exam depending on course size.