



**Sommersemester 2024**

**Lecture series**

## **Non-linear elliptic and parabolic partial differential equations**

**Lecturer:** Prof. Dr. Gerhard Huisken

**Start:** Friday, 19th April 2024

**Time:** Fridays, 10:00-12:00

**Place:** C4H33 (C-Building Mathematik/Physik)

**Tutorial:** 2 hours/week **Tutor:** Andoni Royo Abrego **Start:** Thursday, 25th April 2024

**Time:** Thursdays, 10:00-12:00 **Place:** C5H10 / S07 (C-Building Mathematik/Physik)

**Study programs:** Master in Mathematics and in Mathematical Physics

**Modul number:** MAT- 60-35; 6 ECTS points

**Study areas:** Analysis und Differentialgeometrie, Mathematische Physik

**Language:** English

### **Description:**

The course studies non-linear elliptic equations such as the equation for minimal surfaces and surfaces of prescribed mean curvature and develops the necessary analytical techniques such as the Hölder continuity estimates of De Giorgi and Nash for solutions. It will also be discussed how these methods carry over to parabolic equations such as mean curvature flow.

### **Prerequisites:**

Bachelor degree or equivalent

### **Literature:**

- Klaus Ecker, Regularity theory of mean curvature flow, Birkhäuser Basel (2004).
- Lawrence C. Evans, Partial Differential Equations, American Mathematical Society (1998).
- David Gilbarg and Neil S. Trudinger, Elliptic partial differential equations of second order, Springer Grundlehren, (2001).
- Fritz John, Introduction for Partial Differential Equations, Springer (1982).
- Jürgen Jost, Partielle Differentialgleichungen, Springer (1998).
- David Kinderlehrer, Guido Stampacchia, An introduction to variational inequalities and their applications, Pure and Applied Mathematics, Vol 88, Academic Press 1980.
- Gary Lieberman, Second order parabolic differential equations, World Scientific (1996).
- Michael E. Taylor, Partial Differential Equations I, Appl. Math. Sciences 115, Springer 1996.

**Exam:** Participation in tutorials; written or oral exam depending on course size.