

Mathematics for Advanced Economics

Ruhr Graduate School in Economics

Syllabus

The aim of this course is to prepare PhD-students to understand and apply mathematical techniques used in any field of modern economic research. Especially, it lays foundations for the mathematical tools used in the first-year courses of the graduate program.

Organizational Information

- schedule: 12.10.-21.10.2019, 10:00 - 15:00 o'clock, including a one-hour lunch break (net time per day: 3.5 hours)
- location: RGS facilities
- lecturer: Dr. Till Massing (till.massing@uni-due.de, please feel free to contact me if you have any questions!)
- there will be exercise sheets for each chapter
- there will be a final exam at the end of the course (it will be scheduled in the first session)
- material: <https://uni-duisburg-essen.sciebo.de/s/auR0Z6G6m6blPpR>

Content Information

- course book: De La Fuente - Mathematical Methods and Models for Economists
- further textbooks
 - Ok - Real Analysis with Economic Applications
 - Simon & Blume - Mathematics for Economists
 - Sydsaeter & Hammond - Further Mathematics for Economic Analysis
 - Sydsaeter & Hammond - Essential Mathematics for Economists (helpful, if you want to brush up your math skills before the course!)
- Content
 1. Set theory
 2. Logic
 3. Relations (functions, sequences, series)
 4. Algebraic structures (groups, fields, rings, isomorphisms)
 5. Topological structures (compactness, boundedness, closedness, metric spaces, convergence, continuity)
 6. Linear algebra (vectors, linear spaces, matrix algebra: linear equations, eigenvalues, decompositions, definiteness)
 7. Calculus (mean value theorem, Taylor's theorem, inverse function theorem, differentiability, C^k functions, integrability)
 8. Convex sets & concave functions (separating hyperplane theorem)