Instructor: **Ronald Wendner**
TA: **Markus Ruhs**

Office hours: TUE 10:00 – 11:00
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320.313 MATHEMATICS FOR ECONOMICS (VU, 2h)

TUE 8:15 – 9:45, HS 15.02 (C-EG)

The course starts on 5 March 2024.

1. COURSE DESCRIPTION

This course deals with critical mathematical tools needed for economics courses at the bachelor level (and beyond). The course is held in English. We will start with some elements of propositional logic that we will use to discuss major proof strategies. Next, we will recap the most important rules of differentiation. We will continue with optimization theory, which is at the core of all economic models. We will discuss unconstrained optimization. Significant results include the existence of solutions to optimization problems and how these solutions if they exist, change in response to parameter changes (envelope theorem). Next, we will discuss classical programming, followed by nonlinear programming. Toward the end of the course, we will turn to linear algebra and discuss matrices and their use in solving systems of equations (Cramer's rule) or determining the shape (concavity/convexity) of functions.

2. ESSENTIAL PREREQUISITES

Wirtschaftsmathematik; Wirtschaftsmathematik für Volkswirtschaftslehre. Furthermore, I assume familiarity with basic micro- and macroeconomics from which we will draw examples.

3. LITERATURE

- **Sydsaeter, K., P. Hammond, A. Strom, A. Carvajal (2016[5]), Essential Mathematics for Economic Analysis, Harlow: Pearson Education.**

  The book is also available as an eBook at the Uni Graz Library.
- Chiang, A.C., K. Wainwright (2005[4]), Fundamental Methods of Mathematical Economics, New York: McGraw-Hill.
- Novshek, W. (1993), Mathematics for Economists, San Diego, et al.: Academic Press Inc.
- Dixit, A. (1990[2]), Optimization in Economic Theory, New York: Oxford University Press.
- Velleman, D.J. (2006[2]), How to Prove it, Cambridge et al.: Cambridge University Press.

4. TENTATIVE SCHEDULE OF LECTURES AND PROGRAM

Week 1	Organizational issues; Propositional logic
Week 2	Propositional logic, cont.' ed
Week 3	Proof strategies
Week 4	Topics in differentiation
Week 5	Unconstrained optimization
Week 5/6	Practice session: preparation for midterm exam **(16.04.2024, 15:45-17:15, HS 15.06)**
Week 6	Midterm exam
Week 7	Unconstrained optimization, cont.' ed
Week 8	Envelope theorem
Week 9	Classical programming
Week 10	Classical programming cont.' ed
Week 11	Nonlinear programming
Week 12	Matrix algebra
Week 13	Practice session: preparation for final exam **(usual place and time)**
Week 14	Final exam

Midterm Exam: 23 April 2024
Final Exam: 25 June 2024

5. GRADING

My grading is based on your percentage achievement.

In-class participation: max 15%
Midterm exam: max 40%
Final exam: max 45%

The percentage grades correspond to the letter grades as follows.

86-100 %: sehr gut (A), 73-85 %: gut (B), 60-72 %: befriedigend (C), 50-59 %: genügend (D), 1-49 % nicht genügend (F).

6. ABSENCE FROM EXAMS IN CASE OF ILLNESS

If you cannot attend an exam because of illness, you can take the exam later under the following conditions.

1. You give notice to me **before** the exam takes place.

2. Within three days of the exam, you send a **medical certificate that details why you could not participate**.

3. **Your replacement exam might be written or oral.** I will probably pursue an oral rather than a written exam.

7. FURTHER RESOURCES

Office hours. My office hours are for clarifying any questions regarding the materials we discuss you might have.

Moodle. Moodle supports our course. Please see your Moodle for further resources.

My Uni Graz Website. Please find auxiliary materials (transparencies, notes) at: https://homepage.uni-graz.at/de/ronald.wendner/teaching/