

RONALD WENDNER

Office hours: TUE 10:00 – 11:00 a.m.

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## 320.501 ANALYTICAL METHODS (VU, 2h)

MON 18:00 – 20:00, Online

**First class: March 1, 2021; Last class: May 31, 2021**

### 1. INFORMATION REGARDING COVID-19

Due to the ongoing Corona crisis and its associated uncertainties, this course is held **online only**. For attending the course, a computer/notebook with camera and microphone is needed. All (technical) details, such as the software tools we will use for this course, are found below (see Point 8). If the situation allows, the final exam will take place in the classroom (in presence).

### 2. COURSE DESCRIPTION

This is a course in game theory, and the economics of (asymmetric) information and incentives. Specifically, game theory is employed to study problems arising under incomplete or asymmetric information. The course is held in English.

### 3. PREREQUISITES

I assume familiarity with basic concepts in statistics (probability theory, conditional probability, Bayes theorem, cumulated distribution functions, probability density functions, conditional expectations), mathematics (optimization theory, **nonlinear programming – Kuhn-Tucker conditions**), and microeconomics (marginal rate of substitution, marginal rate of transformation, utility maximization, profit maximization, oligopolies).

### 4. LITERATURE

- Game theory:

Gibbons, R. (1992), *Game Theory for Applied Economists*, Princeton (NJ): Princeton University Press.

- Economics of Information and Incentives

Macho-Stadler, I., J.D. Pérez-Castrillo (2001), *An Introduction to the Economics of Information. Incentives and Contracts*, Oxford et al.: Oxford University Press.

*The course follows the textbooks closely. Access to these textbooks is essential.*

## RECOMMENDED READING

At some points you might want to consult auxiliary textbooks, and I recommend:

- Sydsaeter, K., P. Hammond, A. Strom, A. Carvajal (2016, 5<sup>th</sup> ed.), *Essential Mathematics for Economic Analysis*, Harlow: Pearson Education.
- Sydsaeter, K., P. Hammond, A. Seierstad, A. Strom (2008, 2<sup>nd</sup> ed.), *Further Mathematics for Economic Analysis*, Harlow: Pearson Education Ltd.
- Wasserman, L. (2004), *All of Statistics. A Concise Course in Statistical Inference*, New York, Springer.

## 5. TOPICS

- Strategic decisions, static games of complete information, Nash equilibrium
- Dynamic games of complete information, subgame perfect Nash equilibrium
- Incomplete information, Bayesian Nash equilibrium
- Sequential equilibrium (time permitting)
- Incomplete information and market efficiency
- Adverse selection (hidden information)
- Moral hazard (hidden action)
- Signalling games (time permitting)

## 6. REQUIREMENTS & GRADING

- **Active class participation**                      **15%**
- **Exam 1**                                      **April 19**                      **40%**
- **Exam 2**                                      **May 31**                      **45%**

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

There is no possibility to earn additional marks after the final exam.

## 7. WHAT TO CONSIDER FOR MASTERING THE COURSE WELL

(1) Our course is scheduled for your Ph.D. program. There are prerequisites in terms of statistics, mathematics, and microeconomic theory. Please take these seriously, work through the materials if you do not remember precisely, and don't hesitate to ask any questions in class.

It is *not* sufficient just to attend the classes. Instead, during the semester, you are required to carefully read the textbook chapters we are dealing with and to work through examples and exercises related to the materials we discuss in class.

(2) ECTS requirement: 6 ECTS = 6 x 25h = 150 h = 10 h work per week = 8h work/week in addition to our weekly class. So, as a rule of thumb, if you invest 1 day/week to study the material we learn,

and to do exercises on yourself, you can expect to pass the course well. Please, don't forget to take this time requirement into account when planning your semester.

(3) On our course website I am offering the presentations used as well as supplementary materials. These materials are written *for you*. You are supposed to carefully study them.

(4) Every question, both in class and in my office hours, is welcome. The more you ask, the more you will get out of the course, and the more you learn for your professional career. Feel free to check in during my office hours.

(5) I advise you to join a learning-/discussion group with your colleagues – or create one yourself. Meet once a week to discuss the materials you learn in this class.

## 8. INFORMATION ON HOW WE RUN OUR *ONLINE* COURSE

**General format (Skype for Business).** Our classes take place on Skype for Business (Skype4B). I will schedule Skype4B meetings for all of our classes. You will receive an email with a link. You just need to click on that link. Next, you will be transferred to the Skype4B page. If you do not yet have a Skype4B client, you can download it. Next, you need to enter your Uni Graz user name and password. Finally, just choose the meeting, which you will see in the client. That's it (I hope). Please also see the info about Skype that I deposited in your Moodle.

In our Skype for Business meetings, you will hear and see each other, so we will be able to interact. Please **always turn on your camera**, but turn on your micro **only in case you are going to speak**. Otherwise, we'll have too much noise with many participants.

During classes, I will mirror my computer screen on which you will see: (i) the presentation of each class (transparencies); (ii) a whiteboard on which I will constantly write and clarify things, like in a real classroom; (iii) a chat section (Skype4B) in which we all can interact by typing questions, comments, etc.

**Office hours.** I will invite all of you to attend my office hours in order to clarify any questions you have. I will set up all office hours on Skype4B, and you will receive an email with a link. Please click this link, whenever you like to attend office hours and want to ask questions yourself.

**Moodle.** You find our course in your Moodle. There, I deposit: (i) Skype4B information, (ii) ongoing information regarding our course; (iii) a copy of our whiteboard notes; (iv) auxiliary material that is copy-righted; (v) handle our exams, etc.

**My Uni Graz Website.** Please find auxiliary materials (transparencies, notes) at: <https://homepage.uni-graz.at/de/ronald.wendner/teaching/analytical-methods-games-incentives/>

**For any questions, please feel free to email me.**