334.510 Analytical Methods

Fall 2018

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http://www.uni-graz.at/organisation

Office Hours: see UGO

King Solomon's Wisdom (Mechanism Design)
And the king said, Bring me a sword. Any they brought a sword before the king.
And the king said, Divide the living child in two, and give half to the one, and half to the other.
Then spake the woman whose the living child was, unto the king, for her bowels yearned upon her son, and she said, O my lord, give her the living child, and in no wise slay it. But the other said, Let it be neither mine nor thine, but divide it.
Then the king answered and said, give her [the first woman] the child, and in no wise slay it; she is the mother thereof.
And all Israel heard of the judgment which the king had judged; and they feared the king: for they saw that the wisdom of God was in him, to do judgment.

Course description

This is a Doctoral-level course in *Game Theory and Economics of Information*. The course draws heavily on insights from Transaction Cost Economics, Property Rights Theory, Principal-Agent Theory, and Industrial Organization.

In this course we will address the following key topics: Static and Dynamic Games; Complete and Incomplete Information; Equilibrium Concepts; Moral Hazard; Adverse Selection; Signalling.

Previous knowledge expected (Prerequisites)

It is expected that you have mastered the concepts and analytical methods in advanced courses on Microeconomics, Game Theory, and Mathematical Optimization Techniques.

Objective

After this course, students should be able to
- recognize open research questions;
- build their own game-theoretic models;
- solve game-theoretic models.

Language of instruction:

This course will be held in English.

Teaching and learning method

The course consists of a mix of lectures, discussions, reading assignments, problem sets and examples.

Exam information

Assessment is based on (i) active involvement and participation in class (please note that class attendance is mandatory!), (ii) written exams. In-class performance accounts for 20% of the grade. The written exams account for 80% of the grade.

ECTS

This course has 6 ECTS = 150 hours. Since you will spend about 8 x 3 = 24 hours in class, you should spend approx. 126 hours outside of class for reviewing material, solving the exercises, preparing for the exams, and so on.
Therefore, you are urged to reserve at least 16 hours outside class for each in-class lecture!

Required readings

We will mainly rely on the following textbooks:

1. R. Gibbons (1992), Game Theory for Applied Economists, Princeton University Press.
2. I. Macho-Stadler and J.D. Pérez-Castrillo (2001), An Introduction to the Economics of Information, Oxford University Press.

Topics in detail

Game Theory

- Gibbons Chapter 1: Static Games/Complete Information - Nash Equilibrium
  READ THIS CHAPTER BEFORE CLASS STARTS!
  (You might also want to take a look at http://www.gametheory101.com/ or http://oyc.yale.edu/economics/econ-159 for videos)
  Problems: 1.2, 1.3, 1.4, 1.5 (assume just two quantities: $q_m/2$ and q_C), 1.6, 1.7, 1.10(*), 1.11(*), 1.12, 1.13
- Gibbons Chapter 2: Dynamic Games/Complete Information: Subgame-Perfect Equilibrium
  Problems: 2.6, 2.7, 2.10, 2.11, 2.13, 2.15
- Gibbons Chapter 3: Static Games/Incomplete Information: Bayesian Nash Equilibrium
  Problems: 3.2, 3.3(*)
- Gibbons Chapter 4: Dynamic Games/Incomplete Information: Perfect Bayesian Equilibrium
  Problems: 4.1, 4.3, 4.4, 4.5, 4.6

Information Economics

- Macho-Stadler Pérez-Castrillo Chapter 3: Moral Hazard
  (Two-effort-levels model, First-order approach, Continuous-effort models, Limited liability)
  Problems (starting p. 79): 2, 3, 6, 7, 9, 11, 12, 14, 15
- Introduction into Organizational Economics
  (LEN model, Strategic incentives model, Multi-tasking models, Relational contracts, Subjective performance management, Asset ownership)
  http://techtv.mit.edu/videos/15880-organizational-economics-and-management-education (recommended!)
  http://organizationsandmarkets.com/category/theory-of-the-firm/ (blog on OE)
- Macho-Stadler Pérez-Castrillo Chapter 4: Adverse Selection
  (Adverse selection with two types, Adverse selection with a continuum of types, Principals compete for agents, Moral Hazard with private information)
  Problems (starting p. 160): 1, 2, 4, 6
- Macho-Stadler Pérez-Castrillo Chapter 5: Signalling
  (Agents signal their characteristics, Informational power of contracts)

Additional readings on Game Theory

1. D. Fudenberg and J. Tirole (1991), Game Theory, MIT Press.
2. R.B. Myerson (1991), Game Theory, Harvard University Press.
3. Rasmusen, E. (2007), Games and Information – An Introduction to Game Theory, 4th ed., Blackwell Publishing.
4. Gibbons, R. (1997), An Introduction to Applicable Game Theory. Journal of Economic Perspectives, 11(1), 127-149.
5. Fudenberg, D. and J. Tirole (1989), Noncoperative Game Theory for Industrial Organization: An Introduction and Overview, Handbook of Industrial Organization, Vol. I, Ch. 5, ed. R. Schmalensee and R.D. Willig, Elsevier, 259-327.
6. Cachon, G.P. and S. Netessine (2005), Game Theory in Supply Chain Analysis, Operations Research, 1-34.
7. Saloner, G. (1991), Modeling, Game Theory, and Strategic Management, Strategic Management Journal, 12, 119-136.
8. Camerer, C.F. (1991), Does Strategy Research Need Game Theory, 12, 137-152.
9. McAfee, R.P. and J. McMillan (1996), Competition and Game Theory, Journal of Marketing Research, 32, 263-267.
10. Moorthy, K.S. (1985), Using Game Theory to Model Competition, Journal of Marketing Research, 22, 262-282.

Additional readings on Economics of Information and Organizational Economics

1. J.-J. Laffont and D. Martimort (2002), The Theory of Incentives, Princeton University Press.
2. J.-J. Laffont (1989), The Economics of Uncertainty and Information, MIT Press.
3. Hendrickse, G. (2003), Economics and Management of Organizations – Coordination, Motivation and Strategy, McGraw-Hill.

Schedule (room SR 15.49, RESOWI E4)

Oct.: 3., 10., 17., 24., 31.		15-18	
Nov.: 7.	Midterm Exam (Game Theory)	15-16.30	Class 16.30-18
Nov.: 14., 21., 28.		15-18	
Dec.: 5., 12.		15-18	
Jan. 17. or 18, 2019: Final Exam (Information Econ.)		??	