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Advanced Microeconomics
dr Wojciech Dorabialski / dr Olga Kiuila

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Lecture: 30 + 30 hours

Description:
This course will focus on two main topics: (i) game theory and (ii) general equilibrium. Both topics require knowledge of intermediate microeconomics. The foundations of the theory and the interpretation of the main concepts will be emphasized during lectures, but not formal proofs of propositions. At the same time, we will accompany this analysis with extensive verbal discussion as well as with numerous examples to illustrate key concepts. The class meets twice a week for two hours.

Prerequisites:
Microeconomics at the level of the second-year course of a bachelor-degree program and the standard topics in mathematics for economics, such as linear algebra, calculus of several variables, and probability theory, are presumed during the lecture.

Part I: Game Theory

1. EXPECTED UTILITY THEORY:
Preferences Over Lotteries, Independence, von Neumann-Morgenstern Utility, Expected Utility Theorem, Allais Paradox, Machina's Paradox. (MC, pp. 168-182)

2. MONETARY LOTTERIES AND RISK AVERSION:
Risk Aversion Equivalence Theorems, Coefficient of Absolute Risk Aversion, Comparisons Across Individuals, Coefficient of Relative Risk Aversion. (MC, pp. 183-193)

3. RETURN-RISK COMPARISONS:
1st and 2nd Order Stochastic Dominance, Mean-Preserving Spreads. Exercises. (MC, pp. 193-199)

4. INTRODUCTION AND STRATEGIC FORM GAMES:
TStrategic (Normal) Form Games, Dominant Strategy, Iterated Elimination of Dominated Strategies. (FT, pp. 1-22, 45-47; OR, pp. 1-15, 58-62)

5. STRATEGIC FORM GAMES:
Existence of Nash Equilibrium. Correlated Equilibria. (FT, pp. 29-35, 53-59; OR, pp.19-20, 44-48)

6. STRATEGIC FORM GAMES:
Applications: Co-ordination, Oligopoly, Auctions.

7. BAYESIAN GAMES
Bayesian Nash Equilibrium, First-price Auction, Double Auction. (FT, pp. 207-215; OR, pp. 24-29)

8. MECHANISM DESIGN
Static Mechanism Design Problems. Example: Principal-Agent, Revenue Equivalency Theorem, Inefficiency Theorem (FT, pp. 243-292; OR, pp. 177-191)

9. EXTENSIVE FORM GAMES:
Constructing a Game Tree. Extensive vs. Normal Form. (FT, pp. 67-82, 85-87; OR, pp. 89-97)

10. EXTENSIVE FORM GAMES:
Subgame Perfect Nash Equilibrium. Applications: Entry Deterrence, Pre-Commitment, Non—cooperative Bargaining. Centipede. (FT, pp. 92-10, 107-114; OR, pp. 97-131)

11. REPEATED GAMES:
Finitely repeated games. Infinitely Repeated Games. Application: Tacit Collusion. Folk Theorems. (FT, pp. 145-168; OR, pp. 133-161)

12. REPEATED GAMES:
Pareto Perfection, Renegotiation Proofness, Markov-perfection. (FT, pp.174-182, 501-513)

13. COOPERATIVE GAME THEORY AND GENERAL EQUILIBRIUM THEORY
Core, Shapley Value and Other Solutions, Walrasian Equilibrium Allocation (OR, pp. 255-297, MC, pp. 652-659, 846-848; V, pp.387-392)

14. AXIOMATIC BARGAINING:
Nash Solution, Kalai-Smorodinsky Solution, Egalitarian Solution (OR, pp. 299-310; MC, pp. 838-846)

15. EVOLUTIONARY GAME THEORY:
Replicator Dynamics (FT, pp. 23-29; OR, pp. 48-51)

Part II: General Equilibrium Theory

1. INTRODUCTION
History of general equilibrium theory and modeling, Well-behaved preferences, Important (for general equilibrium analysis) properties of consumer preferences (MC, pp. 40-50; V, pp. 95-98)

2. DUALITY APPROACH TO DEMAND PROPERTIES
Money metric utility function, Roy's identity, Shepard lemma, Walrasian versus Hicksian Demand, Envelope theorem (MC, pp. 50-75; V, pp. 98-113)

3-4. NEO-WALRASIAN THEORY OF PRODUCTION
Alternative models of production, Free disposability in production, Axioms of production, Efficient production (MC, pp. 128-146; V, pp. 23-63)

5. EXERCISES

6. 2x2 PURE EXCHANGE MODEL
Nonwasteful Feasible Allocation, Endowment, Offer Curve, Pareto Set, Contract Curve (V, pp.313-316, 323-329; MC, pp. 515-525, 538-540)

7-8. 1x1x2x1 ROBINSON CRUSOE MODEL. 2X2X2X2 SMALL OPEN ECONOMY
Excess Demand, Intermediate Goods, Production Possibility Set, Interior Equilibrium, Rybczynski Tehorem, Stolper-Samuelson Theorem, Factor Price Equalization Theorem (MC,

pp. 525-538)

9. EXERCISES & GENERAL MODEL
Private Ownership Economy, Walrasian (quasi)equilibrium, (Quasi)equilibrium with transfers, Fundamental Theorems of Welfare Economics, Walras' Law (V, pp.317-322, 329-332; MC, pp. 545-557, 578-583)

10. TATONNEMENT
Existence of Equilibrium, Uniqueness, Calibration, Locally Stable Equilibrium, Near-equilibrium, Size of economy (V, pp. 333-336, 398-403; MC, pp. 620-629; FT, pp.24)

11. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
GAMS software, CGE model for Estonia, i/o table, simple exercises

12. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
Model types, small simple optimization models, exercises

13. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
Simple CGE models, exercises

14. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
Verification of the Stolper-Samuelson and Rybczynski theorems using CGE model

15. Additional topics:
. NORMALIZATION RULES
Homogeneity, Relative Prices, Weak Form of Walras' Law, Fixed Point theorems, Social Welfare Function (MC, pp. 23-24, 584-598, 952-953)

Welfare evaluation

. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
Integrating Bottom-up into Top-down modeling

. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
Mixed Complementarity Formulations versus other formulations

. COMPUTABLE GENERAL EQUILIBRIUM MODELING (in a computer lab.):
Models for international trade

***Background reading*:**
Mas-Colell A., M.D.Whinston, J.R.Green (1995), *Microeconomic Theory*, Oxford Press [MC]
Osborne M.J. and A. Rubinstein (1996), *A Course in Game Theory*, MIT Press [OR]
Varian H.R. (1992), *Microeconomic Analysis*, Norton [V]

***Additional reading*:**
Fundenberg D. and J. Tirole (2000), *Game Theory*, MIT Press, Cambridge Press [FT]
Gibbons, Robert (1992) *Game Theory for Applied Economists,* Princeton

***Exam*:**

Grading will be based on two exams (one for each part) given at the end of the course.