



Masaryk University in Brno
Faculty of Science
Department of Mathematics and Statistics

Course syllabus

Course name:

Mathematical methods in Economics (Spring 2014).

Schedule

Lectures: Tuesday, 1000 – 1300. Office hours: Tuesday, 1300 – 1400. Midterm and final exams: TBA.

Instructor

Dmytro Vikhrov (CERGE-EI).

Email: dmytro.vikhrov@cerge-ei.cz

Course objective and structure

The purpose of the course is to familiarize students with the basic concepts of the modern Economics and show their application on the examples of individual labor supply, taxation, social security systems and auctions. Students are expected to have elementary knowledge of calculus and the basics of Microeconomics.

The course starts with the revision of consumer theory, its application to the model of labor supply and the human capital accumulation model. We will later show the distortive role of taxation and generalize the consumer problem to the infinite setup. This generalization will allow consideration of the overlapping generations model and discussion of its predictions for funded and unfunded social security systems.

After the midterm examination we will go over the basics of the producer theory. Next, using illustrative examples we will see how two consumers, consumers and producers, consumers and the government interact and the endogenous price vector is determined. On the last two lectures we will look into the mathematical apparatus for the auction theory.

Grading

Midterm exam – 30%, final exam – 40%, two homeworks – 10%, class participation – 20%.

Principal textbooks:

1. Doepke, M., Lehnert, A. and Sellgren, A. (1999). *Macroeconomics*.
2. Jehle, G. and Reny, P. (2011). *Advanced Microeconomic Theory*, 3rd ed.
3. Nicholson, W. and Snyder, C. (2008). *Microeconomic Theory. Basic Principles and Extensions*, 10th edition.
4. Larsen, R.J. and Marx, M.L. (2012). *An Introduction to Mathematical Statistics and its Applications*.

Additional textbooks:

1. Acemoglu, D. (2008). *Introduction to Modern Economic Growth*.
2. Borjas, G. (2009). *Labor economics*.
3. Krishna, V. (2009). *Auction Theory*.

Journal articles will be provided in due course.

Course outline

Lectures 1 - 2.

Setup of the consumer's maximization problem (one good, two good and n good cases). Properties of consumer demand. Estimation of demand equation on food data.

Nicholson: Chapters 3 – 6, Jehle: Chapters 1.3 – 2.3.

Lecture 3

The model of labor supply. Taxation of labor. Elasticities of labor supply. Income inequality and Gini index.

Nicholson: Chapter 16, Welfare programs and labor supply (HPE, Ch. 34), Taxes and labor supply (HPE, Ch. 4).

Lectures 4-5

Primer on likelihood estimation. Heckman selection and Tobit. Random-utility choice models. Estimation of extensive and intensive margins of labor supply and its elasticities.

Larsen: Chapter 5.

Lecture 6

Welfare economics. Edgeworth box. Determination of endogenous price vector.

Nicholson: Chapter 19, Jehle: Chapter 5

Midterm examination

Lecture 7

Illustrative examples of the general equilibrium: government budget constraint, the Laffer curve. Firm's maximization problem, demand for labor.

Nicholson: Chapter 15, Jehle: Chapter 5, Doepke, Chapter 6.

Lecture 8 - 9

Generalization of the consumer problem to a two-period, finite and infinite setup. Overlapping generations model. Social security systems.

Doepke: Chapter 12, Acemoglu: Chapter 9.

Lectures 10 - 11

Two models of trade in production factors and final goods

Lectures 12 - 13

First and second price sealed-bid auctions. Revenue equivalence theorem.

Jehle: Chapter 9, Krishna: Chapter 1.

Final examination

List of case studies

Case study 1: How effectiveness are welfare programs?

Case study 2: How effective are government regulations?

Case study 3: Is diploma really a signal of skills? What field would you rather go to study?

Case study 4: Does the auction design really work?