Faculty of Economic Sciences

Microeconomics-3 (Spring term)

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Section 1. General information about the course

The course presents some formal techniques used in economic research as well as critical perspectives and possible alternatives. Topics include theory of the consumer and the firm, uncertainty, general equilibrium theory and welfare economics, a formal treatment of game theory, public goods, externalities, asymmetric information and mechanism design.

Section 2. Course goals, learning objectives, expected learning outcomes

The objectives of the course are:
- to provide students with the knowledge of core concepts and models in the field of microeconomics;
- to develop students' ability to apply the knowledge acquired to the analysis of specific economic cases, recognizing proper framework of analysis and constructing and analyzing adequate economic model within this framework.

Prerequisites: intermediate microeconomics, multivariable calculus, constrained optimization, , probabilities theory, abstract notation, reasoning and proof making.

Section 3. Course Outline

№	Topic/Focus /Activity	Week	Course format			Readings
			lectures	classes	self-study	
9	Consumer choice and demand theory: ▪ preferences and utility, existence of utility function ▪ utility maximization, expenditure minimization and duality in consumer theory ▪ integrability problem ▪ welfare evaluation of price changes ▪ aggregation	1-2	6	3	9	MWG Chs. 2-4 Chipman J. and J. Moore, Compensating variation, consumer's surplus and welfare, AER, 70, 933-948, 1980.
10	Production: ▪ production sets ▪ profit maximization and cost minimization ▪ duality in production ▪ aggregation	2-3	6	3	9	MWG Ch. 4
11	General equilibrium ▪ exchange economy ▪ production economy ▪ existence of general equilibrium ▪ welfare theorems ▪ foundations for competitive equilibrium: core	4-5	8	4	12	MWG Chs. 15-18
12	Choice and general equilibrium under uncertainty ▪ preferences over lotteries, independence axiom and expected utility function ▪ risk aversion and Pratt's theorem ▪ comparative statics of optimal portfolio ▪ contingent commodities ▪ Arrow-Debreu equilibrium ▪ Sequential trade and Radner equilibrium	6-8	10	5	15	MWG Chs. 6, 19 Rothschild M., Stiglitz J., Increasing risk I: A definition, Journal of Economic Theory, 2, 225-243, 1970.

13	Game theory - Static games with complete information: dominance, preferences and utility, budget constraint, consumer choice - Extensive Form Games with Perfect Informationn: subgame perfect Nash equilibrium - Static games with imperfect information: Baysian Nash equilibrium - Extensive Form Games with imperfect/incomplete information: perfect Baysian and sequential equilibria	8-10	10	5	15	MWG Chs. 7-9 Osborn M.J., An Introduction to Game Theory, Oxford University Press, 2009
14	Externalities and Public goods - Market failures - Regulatory responses to market failures - Private provision of public goods - Lindahl equilibrium - Political mechanisms and dilemmas of public goods provision	12-15	16	8	24	MWG Ch. 11
15	Asymmetric information - Market equilibria with adverse selection - Asymmetric information and market signaling - Persistent disequilibrium on labor and credit markets - Market screening	16-19	16	8	24	MWG Chs. 13-14
16	Mechanism Design - Mechanism design problem - Implementation in dominant strategies - Bayesian implementation - Groves-Clarke mechanisms - Auctions and bilateral trade	20-21	8	4	12	MWG Ch. 23

Description of course methodology and forms of assessment to be used

While teaching the course the following teaching methods and forms of study and control are used:
- ⇒ lectures (4 hours a week);
- ⇒ classes (2 hours a week);
- ⇒ written home assignments;
- ⇒ self-study;
- ⇒ teachers' consultations;
- ⇒ written tests

Assessment and grade determination:

- Average mark for home assignments [30%]
- Midterm exam [10%]
- Closed-book exam [60%]

Section 4. Texts, readings and other informational resources

1. Required readings:
   Mas-Colell A., M.D.Whinston, J.R.Green, Microeconomic Theory, New York, Oxford University Press, 1995 [MWG]

2. Additional readings
   Varian H., *Microeconomic Analysis*, 3rd edition, W.W.Norton &Company, New York, London, 1992.
   Osborn M.J., An Introduction to Game Theory, Oxford University Press, 2009.

   Academic papers are recommended by the lecturer during the course.

Section 5. Examination/Evaluation

Sample test and exam problems

1. Consider a perfectly competitive firm with production function $f(z_1,...,z_{N-1})$ increasing in each factor of production. Suppose that due to financial crises this firm faces binding liquidity constraint and as a result its objective is total revenue (rather than profit) maximization subject to fixed budget C. Is it true that firm's total revenue function $TR(p,w,C)$ is:
(a) quasiconvex with respect to factor prices w?
(b) increasing in C?

2. Consider an exchange economy with two agents (A and B). Agent A has a financial asset that can either bring $3 or nothing with equal probabilities. Agent B has another financial asset that brings either $3 with probability 0.5 or nothing. The returns of the two assets are independent. These assets are infinitely divisible and agents can freely trade with each other. Both agents have preferences represented by EUF with elementary utility $u^A(w) = w$ and $u^B(w) = \ln(1+w)$, respectively, where w is wealth in $.

(a) Find interior equilibrium.

(b) Show that by combining their assets the individuals can achieve a Pareto improvement over the equilibrium allocation from part (a).

(c) Explain, why equilibrium in this model is not Pareto efficient. How the conditions of the trade should be modified to guarantee efficiency of equilibrium allocation?

3. Consider continuum of individuals with identical elementary utility functions $u(x)$ such that $u(0) = 0$, $u'(x) > 0, u''(x) < 0$ for all $x > 0$. Each individual has initial wealth w; but it can be lost with probability p, which is distributed across these individuals with distribution function $F(p)$. Each agent knows his probability of accident. Suppose that insurance market is perfectly competitive and insurance companies are risk-neutral and offer only full insurance contracts.

(a) Describe the insurance market equilibrium under symmetric information, i.e. when probability of accident is known by both individuals and insurance companies.

(b) Describe the equilibrium under asymmetric information, when each individual knows his probability but insurance companies have information about distribution function $F(p)$ only. Under what condition this equilibrium will result in Pareto-efficient allocation of risk between individuals and insurance companies?

(c) Let $F(p_L) = \pi, F(p_H) = 1 - \pi$ under some $p_L, p_H \in [0,1], p_L \leq p_H$, $\pi \in [0,1]$. Describe the asymmetric information equilibrium for any possible values of p_L, p_H, π, assuming $u(x) = \sqrt{x}$.

4. Consider a perfectly competitive labour market with workers that differ in productivity θ, where $\theta \in [\underline{\theta}, \overline{\theta}]$ with distribution function $F(\theta)$, $f(\theta) \equiv F'(\theta) > 0, \forall \theta \in [\underline{\theta}, \overline{\theta}]$. Type (productivity) is a private information of the worker. Every agent independently from others with probability $p \in (0,1]$ gets a chance to reveal the type θ to all other market participants.

(a) Characterize the resulting equilibrium. What can you say about its existence and uniqueness?

(b) How does the set of agents that signal their type change with the growth of p?

5. Two risk-neutral entrepreneurs need \$1 loan each to finance his/her investment project. A loan contract specifies an amount $r > 1$, that is supposed to be repaid to the bank (interest payment is included). The first entrepreneur has full loan liability, i.e. in case of low return from the investment project he guarantees the payment from his own wealth. The second entrepreneur has limited liability as he has no own assets, as a result the bank gats the minimum of r and the gross return from investment project. Gross return from investment for each entrepreneur is given by $2\xi\sqrt{e}$, where $e \geq 0$ is the monetary value of entrepreneur's efforts and ξ – random shock with distribution $F(x)$ for $x \in [0, \overline{\xi}]$.

(a) Assuming that loan is given before the resolution of uncertainty but the effort level is chosen after the resolution of uncertainty, what is the level of efforts for each realization of the shock ξ?

(b) Is the probability that gross return from investment will exceed the loan payment higher for the first or second entrepreneur?

(c) Under what values of r the first entrepreneur will take the loan? Under what values of r the second entrepreneur will take the loan? Under what values of r the bank is willing to provide the loan to the first type entrepreneur? second type?

(d) If the effort levels are chosen before the resolution of uncertainty, will the first entrepreneur choose lower or higher level than the second one?

Grading system and how both the course and final test will be graded

Written tests and exam are graded out of 100 points. Then the results for the written test, home assignments/ quizzes are used to calculate the final mark using the weights specified in section 3 and the resulting mark is converted into 10-points scale.

Make-up policies and form of the make-up

If a student didn't attend the mid-term exam in Fall then the weight of the midterm is transferred to the final test so that the formula for the first semester (Fall term) in this case is

- Average mark for home assignments and quizzes   [25%]
- Final test   [75%]

If a student didn't attend any other test he/she gets zero score for such a test.

If the Fall term mark is below 4 out of 10 then the student can sit one written make-up exam in the end of January/beginning of February set in accordance with the HSE's Internal Regulations. This exam covers all the material studied in the Fall term.

If a student fails the Spring term (i.e. final mark in the Spring term is less than 4 out of 10) than the written make-up exam takes place in September. This exam covers the material studied in the Spring term.

Policies on late work

Late home assignments are marked but are not counted for the average mark for home assignments.

Section 6. Academic Integrity

The Higher School of Economics strictly adheres to the principle of academic integrity and honesty. Accordingly, in this course there will be a zero-tolerance policy toward academic dishonesty. This includes, but is not limited to, cheating, plagiarism (including failure to properly cite sources), fabricating citations or information, tampering with other students' work, and presenting a part of or the entirety of another person's work as your own. HSE uses an automated plagiarism-detection system to ensure the originality of students' work. Students who violate university rules on academic honesty will face disciplinary consequences, which, depending on the severity of the offense, may include having points deducted on a specific assignment, receiving a failing grade for the course, being expelled from the university, or other measures specified in HSE's Internal Regulations.