

Course Syllabus

Title of the course	Economic Theory				
Title of the Academic Programme	Bachelor's Program 'Sociology and Social Informatics'				
Type of the course	Core				
Prerequisites	Linear Algebra and Calculus, Probability Theory, Economic Theory (2 nd year course).				
ECTS workload	3				
Total indicative study hours	Directed Study	Self-directed study	Total		
	32	82	114		
Course Overview	<p>The aim of this course is to familiarize students with the theoretical apparatus and practical methods of application of game theory in economics and social sciences. The theoretical grounds of game theoretical models will be also discussed, such as the idea of rational agent and the idea of connection between micro- and macro-behavior. Also the strategic behavior in the conditions of incomplete information will be studied, as well as evolutionary models and their applications in biology, economy and social sciences.</p>				
Intended Learning Outcomes (ILO)	<p>As a result of successful mastery of the discipline, students will know:</p> <ul style="list-style-type: none"> • conceptual apparatus of game theory and decision theory; • different classes of games (games in normal and extensive form, multistage games, games with imperfect information); • how to find Nash equilibrium in normal form games and evolutionary stable equilibrium in games in extensive form. <p>Students will be able:</p> <ul style="list-style-type: none"> • solve game-theoretical problems; • construct simple game-theoretical models and to apply these models in economics and social sciences. 				
Teaching and Learning Methods	<p>The course consists of theoretical lectures and seminars. The aim of seminars is to teach students to solve simple problems in game theory and to apply game theoretical models to different social and economic situations.</p>				
Content and Structure of the Course					
№	Topic / Course Chapter	Total	Directed Study		Self-directed Study
			Lectures	Tutorials	
	Introduction	4			20
	Games in Normal Form. Nash Equilibrium	4	8		20
	Dynamic Games	2	8		12
	Games with Imperfect Information, Evolutionary Game Theory, Behavioral Game Theory	6			30

Total study hours	114	16	16	82
Indicative Assessment Methods and Strategy	<p>Student evaluation is based on</p> <ul style="list-style-type: none"> • participation and activity in class (20% of grade); • in-class test (includes problems for games in normal and strategic form) (40% of grade); • written exam (the task is to explain theoretical notion in game theory and to solve a simple problem). (40% of grade) <p>Students who will fail to attend test or exam due to medical problems have the right to ask for additional opportunity to pass test and exam in another time.</p>			
Readings / Indicative Learning Resources	<p>Mandatory</p> <ol style="list-style-type: none"> 1) Stephen Schecter and Herbert Gintis, <i>Game Theory in Action: An Introduction to Classical and Evolutionary Models</i> (Princeton University Press, 2016) 2) Ken Binmore, <i>Game Theory: A Very Short Introduction</i> (Oxford University Press, 2007). 3) Fernando Vega-Redondo, <i>Economics and the Theory of Games</i> (Cambridge University Press, 2003). <p>Optional</p> <ol style="list-style-type: none"> 1) Ken Binmore and Christopher Ansell, <i>Does Game Theory Work? The Bargaining Challenge</i> (MIT Press, 2007) 2) William D. Ferguson, <i>Collective Action and Exchange: A Game-Theoretic Approach to Contemporary Political Economy</i> (Stanford University Press, 2013) 3) Ignacio Palacios-Huerta, <i>Beautiful Game Theory: How Soccer Can Help Economics</i> (Princeton University Press, 2014) 4) Steven J. Brams, <i>Game Theory and the Humanities: Bridging Two Worlds</i> (MIT Press, 2012) 5) Scott Gates and Brian D. Humes, <i>Games, Information, and Politics: Applying Game Theoretic Models to Political Science</i> (The University of Michigan Press, 2007) 			
Indicative Self- Study Strategies	Type	+/-	Hours	
	Reading for seminars / tutorials (lecture materials, mandatory and optional resources)	+	32	
	Assignments for seminars / tutorials / labs	+	32	
	E-learning / distance learning (MOOC / LMS)	-		
	Fieldwork	-		
	Project work	-		
	Other (please specify)	-		
	Preparation for the exam	+	18	
Academic Support for the Course	Academic support for the course is provided via LMS, where students can find: guidelines and recommendations for doing the course; guidelines			

	and recommendations for self-study; samples of assessment materials
Facilities, Equipment and Software	Computer and Projector
Course Instructor	Vladimir Ryzhkov, PhD

Intended Learning Outcomes (ILO) Delivering

Programme ILO(s)	Course ILO(s)	Teaching and Learning Methods for delivering ILO(s)	Indicative Assessment Methods of Delivered ILO(s)
Ability to undertake research, including problem analysis, setting tasks and objectives, identification of the research object and subject, of research methods as well as assess the quality of the conducted research	Demonstrate an in-depth knowledge and critical understanding of main concepts of game theory and methods of its applications in social and behavioral sciences	Lectures	Written exam
Ability to analyze socially significant problems and processes with impartiality and scientific objectivity	Apply knowledge of game theoretical methods for constructing game theoretical models for social phenomena and social processes	Lectures and Seminars	Test and Written exam, constructing models and solving problems in class
Ability to use basic laws of the humanitarian and socio-economic sciences to solve professional tasks	Solve simple problems for games in normal and extensive form, such as finding Nash equilibria and using backward induction	Seminars	Test

Course Content

Lecture 1. *Introduction. Classification of games. How Game Theory can be used in different social sciences, economics, and behavioral sciences.*

Lecture 2. *Normal form games - examples, applications, and experiments.*

Lecture 3. *The notion of dominated strategies. Iterative elimination of dominated strategies. The notion of best response.*

Seminar 1. *Problem solving using iterative elimination of dominated strategies.*

Lecture 4. *Nash equilibrium in pure and mixed strategies. Examples. Applications.*

Seminar 2. *Problem solving. Finding Nash equilibrium.*

Lecture 5. *Games in extensive form. The notion of subgame perfect equilibrium. Backward induction.*

Seminar 3. *Problem solving for extensive games using backward induction. Problem solving using the table of strategies.*

Lecture 6. *Games with infinite repetitions.*

Seminar 4. *Solving problems for games with infinite repetitions.*

Lecture 7. *Evolutionary game theory.*

Seminar 5. *Test preparation. Games in normal form.*

Seminar 6. *Test preparation. Games in extensive form.*

Seminar 7. *Test for games in normal and extensive form.*

Lecture 8. *Behavioral game theory.*

Seminar 8. *Problem solving for evolutionary games.*

(Please provide a description of the content of each lesson)

Assessment Methods and Criteria

Assessment Methods

Types of Assessment	Forms of Assessment	Modules			
		1	2	3	4
Formative Assessment	Test	*			
	Essay				
	Report/Presentation				
	Project				
	In-class Participation	*			
Interim Assessment (if required)	Other (write appropriate control forms for the course)				
	Assignment (e.g. written assignment)				
Summative Assessment	Exam	*			

Assessment Criteria

In-class Participation

Grades	Assessment Criteria
«Excellent» (8-10)	A critical analysis which demonstrates original thinking and shows strong evidence of preparatory research and broad background knowledge.
«Good» (6-7)	Shows strong evidence of preparatory research and broad background knowledge. Excellent oral expression.
«Satisfactory» (4-5)	Satisfactory overall, showing a fair knowledge of the topic, a reasonable standard of expression. Some hesitation in answering follow-up questions and/or gives incomplete or partly irrelevant answers.
«Fail» (0-2)	Limited evidence of relevant knowledge and an attempt to address the topic. Unable to offer relevant information or opinion in answer to follow-up questions.

Written Assignments (Essay, Test/Quiz, Written Exam, etc.)

Grades	Assessment Criteria
«Excellent» (8-10)	Has a clear argument, which addresses the topic and responds effectively to all aspects of the task. Fully satisfies all the requirements of the task; rare minor errors occur;

«Good» (6-7)	Responds to most aspects of the topic with a clear, explicit argument. Covers the requirements of the task; may produce occasional errors.
«Satisfactory» (4-5)	Generally addresses the task; the format may be inappropriate in places; display little evidence of (depending on the assignment): independent thought and critical judgement include a partial superficial coverage of the key issues, lack critical analysis, may make frequent errors.
«Fail» (0-2)	Fails to demonstrate any appropriate knowledge.

Recommendations for students about organization of self-study

Self-study is organized in order to:

- Systemize theoretical knowledge received at lectures;
- Extending theoretical knowledge;
- Learn how to use professional literature;
- Development of cognitive and soft skills: creativity and self-sufficiency;
- Enhancing critical thinking and personal development skills;
- Development of research skills;
- Obtaining skills of efficient independent professional activities.

Self-study, which is not included into a course syllabus, but aimed at extending knowledge about the subject, is up to the student's own initiative. A teacher recommends relevant resources for self-study, defines relevant methods for self-study and demonstrates students' past experiences. Tasks for self-study and its content can vary depending on individual characteristics of a student. Self-study can be arranged individually or in groups both offline and online depending on the objectives, topics and difficulty degree. Assessment of self-study is made in the framework of teaching load for seminars or tests.

Special conditions for organization of learning process for students with special needs

The following types of comprehension of learning information (including e-learning and distance learning) can be offered to students with disabilities (by their written request) in accordance with their individual psychophysical characteristics:

1. *for persons with vision disorders*: a printed text in enlarged font; an electronic document; audios (transferring of learning materials into the audio); an individual advising with an assistance of a sign language interpreter; individual assignments and advising.
2. *for persons with hearing disorders*: a printed text; an electronic document; video materials with subtitles; an individual advising with an assistance of a sign language interpreter; individual assignments and advising.
3. *for persons with muscle-skeleton disorders*: a printed text; an electronic document; audios; individual assignments and advising.

Annex 2

An Example of Problem for a Test:

Juice: Bozoni is a Swiss maker of fruit and vegetable juice, whose products are sold at specialty stores throughout Western Europe. Bozoni is considering whether to add cherimoya juice to its line of products. "It would be one of our more difficult varieties to produce and distribute," observes Johann Ziffenboeffel, Bozoni's CEO. "The cherimoya would be flown in from New Zealand in firm, unripe form, and it would need its own dedicated ripening facility here in Europe." Three successful steps are absolutely necessary for the new cherimoya variety to be worth producing. The industrial ripening process must be shown to allow the delicate flavors of the cherimoya to be preserved; the testing of the ripening process requires the building of a small-scale ripening facility. Market research in selected limited regions around Europe must show that there is sufficient demand among consumers for cherimoya juice. And cherimoya juice

must be shown able to withstand the existing tiny gaps in the cold chain (the temperature-controlled supply chain) between the Bozoni plant and the end consumers (these gaps would be prohibitively expensive to fix). Once these three steps have been completed, there would be about €2,500,000 worth of expenses in launching the new variety of juice. A successful new variety will then yield profits, in expected present-value terms, of €42.5 million.

The three necessary steps can be done in parallel or sequentially, and in any order. Data about these three steps are given in the following table:

Step	Probability of success	Cost
Ripening process	0.7	€1,000,000
Market research	0.3	5,000,000
Cold chain	0.6	500,000

“Probability of success” refers to how likely it is that the step will be successful. If it is not successful, then that means that cherimoya juice cannot be sold at a profit. All probabilities are independent of each other (i.e., whether a given step is successful or not does not affect the probabilities that the other steps will be successful). “Cost” refers to the cost of undertaking the step (regardless of whether it is successful or not).

- a. Suppose Mr. Ziffenboeffel calls you and asks your advice about the project. In particular he wants to know (i) should he undertake the three necessary steps in parallel (i.e., all at once) or should he undertake them sequentially, and (ii) if sequentially, what’s the correct order in which the steps should be done? What answers do you give him?
- b. Mr. Ziffenboeffel calls you back. Since the table was produced, Bozoni has found a small research firm that can perform the necessary tests for the ripening process at a lower cost than Bozoni’s in-house research department. At the same time, the European Union (EU) has tightened the criteria for getting approval for new food-producing facilities, which raises the costs of these tests. Mr. Ziffenboeffel would like to know how your answer to (a) changes as a function of the cost of the ripening test. What do you tell him?
- c. Mr. Ziffenboeffel calls you back yet again. The good news is that the cost of adhering to the EU regulations and the savings from outsourcing the ripening tests balance each other out, so the cost of the test remains €1,000,000. Now the problem is that his marketing department is suggesting that the probability that the market research will result in good news about demand for the juice could be different in light of recent data on the sales of other subtropical fruit products. He would like to know how your answer to (a) changes as a function of the probability of a positive result from the market research. What do you tell him?

Examples of Questions for the Exam

- How to draw a graphic solution of Nash equilibrium in mixed strategies in a game in normal form 2x2.
- Explain the sequential exclusion of strongly dominated strategies. Provide an example.
- When the advantage of the second move takes place? Provide an example.