COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Game theory	**LOTE**

Lecturer(s)	Department(s) where the course unit (module) is delivered
lect. Dmitrij Celov	Statistical analysis department, IMI

Study cycle	Type of the course unit (module)
The second cycle	Optional

Mode of delivery	Year of study, semester	Language of instruction
Classroom	The second (spring) semester	English or Lithuanian

Requirements for students	
Prerequisites: Microeconomic analysis	**Additional requirements (if any):**

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	125	42	83

Purpose of the course unit (module): programme competences to be developed

The course aims to:

- Develop students' independence, creativity, and the ability to strictly formalize the game theory problems;
- Educate the ability to apply knowledge and deep understanding of microeconomic concepts creating, analyzing and critically evaluating applied game theory problems.

Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
• Understand key concepts of game theory, types and forms of the games, assumptions • Represent games in static and dynamic form of (in)complete information • Choose the adequate form of a game, equilibrium concept and the solution method	Involved lecture, problem based learning	Computer experiments, the midterm and final written exam
• Understand key concepts of game theory, types and forms of the games, assumptions • Represent games in static and dynamic form of (in)complete information • Choose the adequate form of a game, equilibrium concept and the solution method	Involved lecture, problem based learning	Computer experiments, the midterm and final written exam
• Logically and mathematically formalize game theory problems • Identify various refinements of Nash equilibrium • Deal with the uncertainty, incomplete, asymmetric information • Find the core and nucleolus of the cooperative game, the coalition value • Present the model outcomes both at advanced and intuitive levels.	Active learning methods (case studies, group discussions), research methods (individual problem solving, information retrieval, report preparation, case study), seminar presentation	Individual problem solving and presentation of the solutions, seminar presentation, case study, the midterm and final written exam

Content: breakdown of the topics	Contact hours						Self-study work: time and assignments	
	Lectures	Seminars	Exercises	Laboratory work	Internship/work replacement	Contact hours	Self-study hours	Assignments
1. Theoretical framework: games examples, representation of a game in a strategic, extensive, and coalition forms, mixed and behavioural strategies and their equivalence	4	1				**5**	**8**	[VR] Chapter 1 theory and homework assignments
2. Strategic-from analysis: dominance and iterative dominance , Nash equilibrium in pure and mixed strategies, zero-sum bilateral games, strong and coalition-proof equilibria, correlated equilibrium, rationalizability	6	1	2			**8**	**12**	[VR] Chapter 2 theory and homework assignments [VR] Chapter 3 applications and seminar presentation
3. Refinements of Nash equilibrium: „incredible threats“, extensive form refinements: proper subgames, subgame perfect equilibrium, weak perfect Bayes equilibrium, sequential, perfect (tremble-hand) and proper refinements, strategic form refinements: perfect and proper equilibrium	6	2	2			**10**	**12**	[VR] Chapter 4 theory and homework assignments [VR] Chapter 5 applications and seminar presentation
Midterm exam						**2**	**4**	Preparation to the midterm exam.
4. Incomplete information: Bayesian games, Bayes-Nash equilibrium, direct mechanisms, incentives based behaviour and revaluation principal, signalling games.	6	1	1			**8**	**15**	[VR] Chapter 6 theory and homework assignments [VR] Chapter 7 applications and seminar presentation
5. Repeated interaction: repeated games, reputation and “irrationality”, folk theorems, reinforcement learning, static perception, memory, expectations and foresight.	4	1	1			**6**	**15**	[VR] Chapter 8, Chapter 11 theory and homework assignments [VR] Chapter 9 applications and seminar presentation
6. Cooperative games: bargaining process, bargaining power, form of a coalition function, core, stable sets, Shapley value and Banzhaf index.	2	1	1			**4**	**12**	[PS] Chapter 1-5, 8 theory and homework assignments
Final exam						**2**	**5**	Preparation to the final exam
Total	**28**	**7**	**7**			**42**	**83**	

Assessment strategy	Weight, %	Deadline	
The general assessment framework. 10-point grade system. The final grade is a weighted average of all the parts detailed below. Additional points may be collected for participation in experiments, workshops, organization of debates, presentations, original solutions to the homework assignments.			
Seminar presentation	10 %	During the semester	Presentation of applications and organization of behavioral experiments (public goods, auctions). Seminar topics: efficient

			allocation of public goods, macroeconomic coordination failures, decentralized price, signaling in labor market, insurance market and averse selection, auctions, trade, efficiency wages and unemployment, evolution and reinforcement learning.
Homework assignments	20 %	During the semester	Solutions to homework assignments are presented to the class during recitation hours. Problems are divided into groups according to their complexity (0.5 and 1 points). A student supposed to collect at least 2 points to receive the highest grade for this part. Corrections and crucial assistance from the other students are graded in proportion to the solved part.
Midterm exam	35 %	During the semester	Midterm exam consists of the first 3 topics. The quiz questions are provided in a semi-open form: after the correct answer to a closed form question is provided, a brief explanation of the choice is needed. Questions and problems are similar to solved during classes and homework assignments. The midterm grade is normalized by the value max{8, untransformed midterm grades}.
Final exam	35 %	June	The final exam consists of the topics 4-6. The quiz questions are provided in a semi-open form: after the correct answer to a closed form question is provided, a brief explanation of the choice is needed. Questions and problems are similar to solved during classes and homework assignments. The final exam's grade is normalized by the value max{8, untransformed midterm grades}. The student must score more than 4 after the transformation during the final exam for the final grade to be passed.

Author	**Year of publication**	**Title**	**Issue of a periodical or volume of a publication**	**Publishing place and house or web link**
Compulsory reading				
[VR] Vega-Redondo F.	1992	Economics and the Theory of Games		MIF VU EA department (1)
[PS] Peleg B., Sudhölter P.	2007	Introduction to the Theory of Cooperative Games		MIF VU EA department (1)
Optional reading				
[MWG] Mas-Colell A. et al.	2004	Microeconomic Theory		MIF VU EA department (1) EF VU (1)
Vilkas E.	2003	Sprendimų priėmimo teorija, paskaitų konspektas (in Lith.)		http://uosis.mif.vu.lt/~celov