ISM UNIVERSITY OF MANAGEMENT AND ECONOMICS

GAME THEORY AND ECONOMIC SHOCKS

Course code	*GRAE036*
Compulsory in the programmes	*Financial Economics*
Level of studies	*Graduate*
Number of credits	*6 ECTS (36 contact hours + 2 consultation hours, 124 individual work hours)*
Course coordinator (title and name)	*Assoc. Prof. Dr. Pijus Krūminas pijkru@faculty.ism.lt*
Prerequisites	*None*
Language of instruction	*English*

THE AIM OF THE COURSE:

The course aims to provide students an understanding of the concepts of game theory and its application in the context of economics, especially, when analysing the effects of external factors on the economic systems. Students will acquire skills needed to address fundamental issues as well as to solve practical challenges in economics through a combination of lectures, seminars and hands-on use of game theory in their project work. The work will focus on first laying and understanding the foundations on game theory and then looking at specific studies to understand how game theory is applied by researchers and how it can be used in practice.

MAPPING OF COURSE LEVEL LEARNING OUTCOMES (OBJECTIVES) WITH DEGREE LEVEL LEARNING OBJECTIVES (See Annex), ASSESMENT AND TEACHING METHODS

Course level learning outcomes (objectives)	Degree level learning objectives (Number of LO)	Assessment methods	Teaching methods
CLO1. Students will learn to understand game theory research in the field of economics, how game theory can help to better understand economic processes, including reaction to shocks.	LO1.1. LO1.2.	Written project, final exam	Lectures, seminars
CLO2. Students will learn to apply game theory tools for addressing economic issues whether theoretical or practical through a combination of small problems discussed in class and their own work.	LO1.2.	Written project, final exam	Seminars, project development
CLO3. Students will develop and deliver a presentation of their project work, providing the skills needed to present results and implications game theory based research in practice.	LO3.1.	Project presentation	Seminars, project development
CLO4. Students will learn to prepare a research paper based on the application of game theory tools. The research paper will have to address an economic problem selected by students, thus, making it closer to the practical problems that students may face, including those outside academia.	LO 3.2.	Written project	Lectures, seminars, project development

ACADEMIC HONESTY AND INTEGRITY

The ISM University of Management and Economics Code of Ethics, including cheating and plagiarism are fully applicable and will be strictly enforced in the course. Academic dishonesty, and cheating can and will lead to a report to the ISM Committee of Ethics. With regard to remote learning, ISM remind students that they are expected to adhere and maintain the same academic honesty and integrity that they would in a classroom setting.

COURSE OUTLINE

Topic	In-class hours	Readings
Introduction to the course Introduction to game theory Extensive form games and backwards induction Strategic form games	4	Bonnano (2015) Gibbons (1997) Gintis (2007)
Applications of game theory Development of game theory from military strategy to evolution Discussion on game theory assumptions and applicability based on selected examples A game example run in the classroom	4	Sethi (2018) Samuelson (2016) Leeson (2007)
The 'classical' games: Prisoners' Dilemma, auctions, etc. The main concepts: Nash Equilibrium, strategies, mixed strategies, etc. Workshop on solving different games	4	Bonnano (2015) Mengel (2017)
Technological change Response to technology and technology adoption from the game theoretic perspective Presentations and discussions on project ideas	4	Allen & Leeson (2015) Baniak & Dubina (2012) Zhu & Weyant (2003)
Political factors Exit, Voice, and Loyalty Game Implications for economic agents Workshop on game theory in politics	4	Clark, Golder & Golder (2013) Weingast (1997)
Policy and game theory Policy analysis from game theoretic perspective Monetary and fiscal policy Discussion on policy and interests	4	Hermans, Cunningham & Slinger (2014) Nordhaus (1994)
Crisis and responses Evolutionary games to understand behaviour under crisis conditions Workshop on project progress	4	Hanauske et al. (2010) Alam, Kabir & Tanimoto (2020)
Learning from history Applications of economic history Using the past to inform research Workshop on past examples to inform projects	4	Blum & Colvin (2018)
Project presentations Course wrap up	4	None
	Total: 36 hours	

CONSULTATIONS	2	
FINAL EXAM	2	

FINAL GRADE COMPOSITION

Type of assignment	%
Group Components 20%	
Project presentation	20%
Individual Components 80%	
Written project	50%
Final exam	30%
Total:	**100**

DESCRIPTION AND GRADING CRITERIA OF EACH ASSIGNMENT
(Provide short descriptions and grading criteria of each assignment)

Students will work in small groups of 3-4 to develop a project, where they apply game theoretic tools to study an economic problem of their choice. However, the written part of the project will be evaluated individually (50%), where a template will be provided to students groups to identify individual contributions of the students to ensure that all students have contributed to the project and their contribution can be clearly identified. The written part of the project will be evaluated on the basis of the analysis of the topic chosen and the application of game theory to study the selected problem. The other part of the individual component will consist of the final exam (30%), which will have a selection of multiple choice and open questions, testing students' knowledge on the game theory concepts and requiring their application to the small tasks given as open questions.

The group component covers the presentation of the project that students will develop (20% of the final mark). The presentation will be evaluated based on how clearly the main points are presented in an accessible manner to fellow students.

RETAKE POLICY

Retake covers the final exam (30%) and the written project (50%) parts. The retake will be an open question take-home exam more extensive than the final exam, requiring to demonstrate not only understanding of game theory, but also its application as should be done in the written project. Group work cannot be rewritten / retaken but its evaluation (if positive) is not annulled.

ADDITIONAL REMARKS

None

REQUIRED READINGS

Alam, M., Kabir, K. A., & Tanimoto, J. (2020). Based on mathematical epidemiology and evolutionary game theory, which is more effective: quarantine or isolation policy?. *Journal of Statistical Mechanics: Theory and Experiment*, *2020*(3), 033502.
Baniak, A., & Dubina, I. (2011). Innovation analysis and game theory: A review. *Innovation: Management Policy and Practice*, *14*(2), 178-191.
Bonnano, G. (2015). *Game Theory: An open access textbook with 165 solved exercises*. Published by Giacomo Bonnano, University of California, Davis.
Clark, W.R., Golder, M. & Golder, S.N. (2013). *Power and Politics: Insights from an Exit, Voice, and Loyalty Game.*
Gibbons, R. (1997). An Introduction to Applicable Game Theory. *Journal of Economic Perspectives*, 11(1), p. 127-149.
Hermans, L., Cunningham, S., & Slinger, J. (2014). The usefulness of game theory as a method for policy evaluation. *Evaluation*, *20*(1), 10-25.
Samuelson, L. (2016). Game Theory in Economics and Beyond. *Journal of Economic Perspectives*, 30(4), p. 107-130.
Weingast, B. R. (1997). The political foundations of democracy and the rule of law. *American political science review*, 245-263.

ADDITIONAL READINGS

Allen, D.W., & Leeson, P.T. (2015). Institutionally constrained technology adoption: Resolving the longbow puzzle. *The Journal of Law and Economics*, *58*(3), 683-715.

Blum, M., & Colvin, C. L. (Eds.). (2018). *An Economist's Guide to Economic History*. Palgrave Macmillan.

Carfì, D., & Musolino, F. (2013). Game theory application of Monti's proposal for European government bonds stabilization. *Applied Sciences*, *15*.

Gintis, H. (2007). A framework for the unification of the behavioral science. *Behavioral and Brain Sciences*, 30, p. 1-61.

Hanauske, M., Kunz, J., Bernius, S., & König, W. (2010). Doves and hawks in economics revisited: An evolutionary quantum game theory based analysis of financial crises. *Physica A: Statistical Mechanics and its Applications*, *389*(21), 5084-5102.

Leeson, P.T. (2010). Pirational Choice: The Economics of Infamous Pirate Practices. *Journal of Economic Behaviour & Organisation*, 76(3), p. 497-510.

Mengel, F. (2017). Risk and Temptation: A Meta-Study on Prisoner's Dilemma Games. *The Economic Journal*, 128, p. 3182-3209.

Nordhaus, W. D., Schultze, C. L., & Fischer, S. (1994). Policy games: Coordination and independence in monetary and fiscal policies. *Brookings Papers on Economic Activity*, *1994*(2), 139-216.

Sethi, R. (2018). Rationalizing Choice: A Review Essay on Peter Leeson's WTF?!: An Economic Tour of the Weird. *Journal of Economic Literature*, 57, p. 988-1000.

Zhu, K., & Weyant, J. P. (2003). Strategic decisions of new technology adoption under asymmetric information: a game-theoretic model. *Decision sciences*, *34*(4), 643-675.

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APPROVED BY
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ANNEX

DEGREE LEVEL LEARNING OBJECTIVES

Learning objectives for <u>Master of Social Science</u>
Programme:
Financial Economics

Learning Goals	Learning Objectives
Students will be critical thinkers	LO1.1. Students will be able to identify underlying assumptions, limitations of previous research; evaluate managerial solution alternatives.
	LO1.2. Students will become **independent learners** and develop their own comprehension of scientific theories, models, and concepts.
Students will be socially responsible leaders	LO2.1. Students will be able to evaluate past and current practices in their discipline from an **ethical perspective**.
Students will be effective communicators	LO3.1. Students will develop and deliver a **coherent oral presentation**.
	LO3.2. Students will develop and deliver a **coherent written research paper**.