

APPLIED GAME THEORY: MODELLING POLITICS AND BUSINESS

Course code	<i>POL121</i>
Compulsory in the programmes	<i>Compulsory</i>
Level of studies	<i>Undergraduate</i>
Number of credits and	<i>6 ECTS (48 contact hours + 2 midterm hours, 2 final exam hours, 2 consultation hours, 108 individual work hours)</i>
Course coordinator (title and name)	<i>Dr. Pijus Krūminas</i>
Prerequisites	<i>Introduction to Politics</i>
Language of instruction	<i>English</i>

THE AIM OF THE COURSE:

The course aims to strengthen skills in game theory by focusing on its applicability to the problems of politics and business. While at the first glance games often seem too abstract or distinct from the actual political and economic processes, they can be grounded in the empirics. Thus, during the course we will focus on some more advanced game theory models and especially look at how they can help us improve our understanding of politics, economics and business through applications of game theory to specific analysis questions. This will equip students with skills needed to develop and apply game theory models in research and practice.

MAPPING OF COURSE LEVEL LEARNING OUTCOMES (OBJECTIVES) WITH DEGREE LEVEL LEARNING OBJECTIVES, ASSESSMENT AND TEACHING METHODS

Course level learning outcomes (objectives)	Degree level learning objectives (Number of LO)	Assessment methods	Teaching methods
CLO1. Students will understand advanced game theory concepts and the applicability of the method.	ELO1.1.	Research project, progress presentation during seminar workshops, project presentation, final exam	Lectures, seminars
CLO2. Students will learn to identify arguments about causality and use game theory models to provide theoretical reasoning for causal relationships.	ELO1.2.	Research project, progress presentation during seminar workshops, project presentation, final exam	Lectures, seminars
CLO3. Students will learn to identify assumptions behind game theory model development.	ELO1.2.	Research project, progress presentation during seminar workshops, project presentation, final exam	Lectures, seminars
CLO4. Students will engage in model development, which may require considerations of the trade-off behind ethics and payoff	ELO2.1.	Research project, progress presentation	Lectures, seminars

maximization		during seminar workshops, project presentation	
CLO5. Students will repeatedly present and discuss the progress of their model development activities during the course seminars	ELO4.2	Research project, progress presentation during seminar workshops, project presentation	Lectures, seminars
CLO6. Students will develop a written paper presenting their game theory model and its implications	ELO4.3	Research project, progress presentation during seminar workshops	Lectures, seminars

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 Introduction to the course. A brief reminder on game theory (extensive and strategic form games). Workshop on applying game theory to an actual subject – what do we need to know to have a realistic model?	4	Bonnano (2015)
Applications of game theory History of game theory and its applications from the Cold War confrontation to evolutionary economic theory. Criticism of game theory. Workshop on identifying areas for game theoretic analysis.	4	Naveed et al. (2022)
Static and dynamic games Formal descriptions of static games. Applications of static games. Finding Nash equilibria for Cournot and Bertrand oligopoly models. Stackelberg games. Dynamic games with asymmetric information.	4	Bonnano (2015)
Mixed strategy games Mixed strategies. Finding Nash equilibria in mixed-strategy games. Sports examples. Analysis of an applied model of an economic issue. Workshop on project progress	4	Mohammadi Limaiei (2010)
Negotiation and auction games Bargaining and its game-theoretic modelling. Modelling bidder behaviour in auctions.	4	Fearon (1995)
Bounded rationality and games	4	Rubinstein (1991)

Limits of the perfect rationality assumption. Modelling bounded rationality and behavioural biases. Workshop on project progress		
Mechanisms and agency, signaling and Bayesian games Information in games. Signaling games. Bayesian Nash equilibrium.	4	Shapiro & Siegel (2007)
Cooperative game theory Differences between cooperative and non-cooperative game theory. Majority games. Power indices. Applicability of cooperative game theory.	4	Leimaire (1991) Skovsgaarda & Jensen (2018)
Modelling institutional factors Institutions and incentives. Long-term effects of institutional setup. Counterfactuals and game theory. Workshop on project progress	4	Weingast (1997)
Evolutionary game theory in social sciences The basics of evolutionary game theory. Hawk and dove game. Evolutionary game theory approach to global trade cooperation.	4	Krapohl, Ocelik & Walentek (2021)
Student game theory model presentations Presentations of game theory models that students developed in the class	4	–
Final overview Conclusion from the course	4	–
	Total: 48 hours	
CONSULTATIONS	6	
FINAL EXAM	2	

FINAL GRADE COMPOSITION

Type of assignment	%
<i>Group Components 30%</i>	
Research project	35%
<i>Individual Components 70%</i>	
Progress presentation during seminar workshops	15%
Project presentation	20%
Final exam	30%
Total:	100

DESCRIPTION AND GRADING CRITERIA OF EACH ASSIGNMENT

(Provide short descriptions and grading criteria of each assignment)

1. **Research project (35%).** Students will have to use game theory to develop a model applicable to a specific case on political, economic, or business topic of their choice. Projects will be developed in small groups, encouraging cooperation and exchange of ideas. Research project will be graded on the basis of the relevance of the model, its theoretical soundness, and applicability to the selected problem.
2. **Progress presentation during seminar workshops (15%).** Several times during the course, student groups will be asked to present their progress on project development. Students' involvement in these activities will be assessed.
3. **Project presentation (20%).** Project presentation will be held towards the end of the course and student groups will have to present their projects. This will also include Q&A session and feedback from the audience. Students will be allowed to revise their research projects' written outputs based on this feedback. Presentations will be assessed based on content, clarity and responses to questions.
4. **Final exam (30%).** The final exam will ask about game theory concepts. The questions will be multiple choice and open. Each question will be assigned a number of points that will be used to calculate the evaluation mark.
5. **Retake exam (65%).** Students who receive a failing final grade shall have the right to retake the examination, which will comprise 65% of the final grade and cover all topics of the course. Progress presentation, project presentation, and final exam results will be annulled. The task will provide a situation that students will have to describe in game-theoretic terms.

REQUIRED READINGS

- Bonnano, G. (2015). *Game Theory: An open access textbook with 165 solved exercises*. Published by Giacomo Bonnano, University of California, Davis.
- Fearon, D.J. (1995). Rationalist Explanations of War. *International Organisation*, 49(3), 379-414.
- Krapohl, S., Ocelík, V. & Walentek, D.M. (2021). The instability of globalization: applying evolutionary game theory to global trade cooperation. *Public Choice*, 188, 31-51.
- Lemaire, J. (1991). Cooperative game theory and its insurance applications. *ASTIN Bulletin: The Journal of the IAA*, 21(1), 17-40.
- Mohammadi Limaei, S. (2010). Mixed strategy game theory, application in forest industry. *Forest Policy and Economics*, 527-531.
- Naveed, R. T., Hussam Al Halbusi, T. R., AlAbri, S., Fattah, F. A. M. A., & Uzir, M. U. H. (2021). Game Theory: Historical Overview and Synthesizing Critique. *International Journal of Social Sciences and Humanity Studies*, 13(1), 127-151.
- Shapiro, J. N. & Siegel, D.A. (2007). Underfunding in Terrorist Organizations. *International Studies Quarterly*, 51, 405–429.
- Skovsgaarda, L. & Jensen, I.G. (2018). Recent trends in biogas value chains explained using cooperative game theory. *Energy Economics*, 74, 503-522.
- Weingast, B. R. (1997). The political foundations of democracy and the rule of the law. *American political science review*, 91(2), 245-263.

ADDITIONAL READINGS

TBA

ANNEX

DEGREE LEVEL LEARNING OBJECTIVES

Learning objectives for the Bachelor of Social Science

*Programmes:
Economics and Data Analytics,
Economics and Politics*

Learning Goals	Learning Objectives
Students will be critical thinkers	ELO1.1. Students will be able to understand core concepts and methods in the key economics disciplines
	ELO1.2. Students will be able to identify underlying assumptions and logical consistency of causal statements
Students will have skills to employ economic thought for the common good	ELO2.1. Students will have a keen sense of ethical criteria for practical problem-solving
Students will be technology agile	ELO3.1. Students will demonstrate proficiency in common business software packages
	ELO3.2. Students will be able to make decisions using appropriate IT tools
Students will be effective communicators	ELO4.1. Students will be able to communicate reasonably in different settings according to target audience tasks and situations
	ELO4.2. Students will be able to convey their ideas effectively through an oral presentation
	ELO4.3. Students will be able to convey their ideas effectively in a written paper