GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Decision Making in Competitive Environments, PG_00064255		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group Specialty subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Computer Communications -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jerzy Konorski	
	Teachers	dr hab. inż. Jerzy Konorski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	6.0	24.0	75

Subject objectives

Presentation of the basics of rational decision making by autonomous agents in a competitive environment Rusing noncooperative game theory.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W10] knows and understands, to an increased extent, the basic processes occurring in the life cycle of equipment, objects and technical systems, as well as methods of supporting processes and functions, specific to the field of study	Student knows the principles of rational decision making adopted by rational agents interacting with other rational agents.	[SW1] Assessment of factual knowledge
[K7_W02] knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	Student knows selected notions and methods of noncooperative game theory and understands their implications for multi-agent systems.	[SW1] Assessment of factual knowledge

Subject contents

Introduction to the course, competitive situation, decision making under uncertainty. Rationality, decision problems versus games. Cooperative and noncooperative games. Payoffs and social utility functions. One-shot games in normal form. Examples of zero- and nonzero-sum noncooperative games. Solution concepts, their compelling power and precision, common knowledge. Best-reply, dominant and overwhelming strategies. Iterative elimination of dominated strategies. The Nash equilibrium concept. Multiple Nash equilibria, payoff and risk dominance, focal points. The price of anarchy, prisoners' dilemma and the tragedy of commons, duopoly and oligopoly. Pure and mixed strategies, the principle of indifference, civic duty paradox, Nash's theorem. The Stackelberg and correlated equilibria. Dynamic game scenarios, the importance of move order, games in extensive form, sequential games with terminal payoffs.

Prerequisites and co-requisites

mathematics, random processes

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>final exam</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>E. Rasmusen: Games and information, Blackwell 2001</td></tr>
<tr><td>Supplementary literature</td><td>D. Fudenberg, J. Tirole: Game Theory, MIT Press 2002</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2"></td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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