COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Mechanical Engineering		
LEVEL OF STUDIES	*Undergraduate (towards 5-year Diploma Degree)*		
COURSE CODE	ΟΠ0904	**SEMESTER**	9th
COURSE TITLE	Game Theory		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	3
Practice Exercises / Laboratory Exercises	1	3
	5	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://www.mie.uth.gr/?page_id=18513&lang=en

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area.*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B.*
- *Guidelines for writing Learning Outcomes.*

The aim of the course is to familiarize students with the fundamental principles of Game Theory and to develop strategic thinking through the tools it offers. In this course, students will learn to recognize and model game situations, with applications ranging from economics to everyday issues.

Upon successful completion of the course, students are expected to:

- Understand the basic concepts and techniques of Game Theory.
- Identify and model different types of games.
- Determine game solutions through the identification of equilibrium points.
- Use Game Theory as a tool for understanding and modelling real-world scenarios.
- Think strategically.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive

Working in an interdisciplinary environment *Production of new research ideas*	*……* *Others…* *……*

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Decision-making.
- Working independently.
- Project planning and management.
- Criticism and self-criticism.
- Production of free, creative and inductive.

(3) SYLLABUS

- Introduction to Game Theory,
- The Concept of Strict and Weak Dominance Strategies,
- Nash Equilibrium,
- The Cournot Model,
- Collusion / Cartels,
- The Tragedy of the Commons,
- Mixed Strategies,
- Extensive Form Games,
- Subgame Perfect Nash Equilibrium,
- Finitely Repeated Games,
- Infinitely Repeated Games,
- Games of Incomplete Information (Bayesian Games),
- Mechanism Design,
- Ascending and Descending Bid Auctions (English and Dutch Auctions),
- First-Price Sealed-Bid Auctions,
- Second-Price Sealed-Bid Auctions.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face teaching in a classroom and in a computer lab (if necessary)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students.*	Use of ICT in teaching (delivery of lectures with slides, web-based learning process support), research activities (searching bibliographic sources on the internet), and communication with students (option of electronic homework submission).
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	Semester Workload
Lectures	70
Practice Exercises	30
Independent Study	50
Course Total (25 hours of workload per credit)	***150***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open- ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Writing final exam (70%) II. Assignment with presentation (30%) Specifically-defined evaluation criteria are given at the beginning of the semester.

(5) ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Amit, R. K. (2024). Game Theory with Applications in Operations Management. Springer Nature Singapore. https://doi.org/10.1007/978-981-99-4833-8
- Carpenter, J., & Andrea, R. (2025). ΘΕΩΡΙΑ ΠΑΙΓΝΙΩΝ ΚΑΙ ΣΥΜΠΕΡΙΦΟΡΕΣ. Εκδότης: ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ. ISBN: 9789606456770.
- Fudenberg, D., & Tirole, J. (1991). Game Theory. MIT Press.
- Gibbons, R. (2009). Εισαγωγή στη θεωρία παιγνίων. Εκδότης: Γ. ΔΑΡΔΑΝΟΣ - Κ. ΔΑΡΔΑΝΟΣ κ ΣΙΑ ΕΕ. ISBN: 9789600113075.
- McCain, R. A. (2019). Θεωρία Παιγνίων. Εκδότης: BROKEN HILL PUBLISHERS LTD. ISBN: 9789925575404.
- Munoz-Garcia, F., & Toro-Gonzalez, D. (2019). Strategy and Game Theory. Springer International Publishing. https://doi.org/10.1007/978-3-030-11902-7
- Osborne, M. J. (2010). ΕΙΣΑΓΩΓΗ ΣΤΗ ΘΕΩΡΙΑ ΠΑΙΓΝΙΩΝ. Εκδότης: ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ. ISBN: 9789604613939.
- Βαρουφάκης, Γ. (2007). Θεωρία παιγνίων. Εκδότης: Γ. ΔΑΡΔΑΝΟΣ - Κ. ΔΑΡΔΑΝΟΣ κ ΣΙΑ ΕΕ. ISBN: 9789600111347.
- ΜΗΛΟΛΙΔΑΚΗΣ, Κ. (2009). ΘΕΩΡΙΑ ΠΑΙΓΝΙΩΝ. Εκδότης: “σοφία” Ανώνυμη Εκδοτική & Εμπορική Εταιρεία. ISBN: 9789606706301.

Related academic journals:

- Annals of Operations Research, Springer
- Artificial Intelligence, Elsevier
- Autonomous Agents and Multi-Agent Systems, Springer
- European Journal of Operations Research, Elsevier
- Expert Systems with Applications, Elsevier
- Games and Economic Behavior, Elsevier
- International Journal of Game Theory, Springer
- International Journal of Production Economics, Elsevier
- Management Science, INFORMS
- Manufacturing & Service Operations Management, INFORMS
- Operations Research, INFORMS