COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Department of Digital Industry Technologies		
LEVEL OF STUDIES	Postgraduate (MSc on Robotics and Industrial Control)		
COURSE CODE	**011**	**SEMESTER**	3rd
COURSE TITLE	Inter-Industry Systems		
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	3		7
Total	3		7
COURSE TYPE *special background, specialised general knowledge, skills development*	Specialization Course		
PREREQUISITE COURSES:	---		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek and/or English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes, under conditions		
COURSE WEBSITE (URL)	https://ric-en.dind.uoa.gr/el/studies/curriculum/3rd_semester/interindustry_systems/		

(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*

Aim of the course is to familiarize students: with the dynamic inter-industry descriptions (analyzed in productive sectors), with the development of dynamic balance/equilibrium descriptions (using Leontief models), with the development of Leontief models (including dynamic or static constraints on the inventory). Moreover, the course aims to familiarize students with Nash equilibrium in industrial systems, and with the design of tools for estimating unmeasurable outcomes. Upon successful completion of the course, students will be able to:

- Describe complex inter-industrial problems, using dynamic Leontief models,
- Use analytical dynamic models to optimize industrial production,
- Determine optimal production options, based on the dynamics of inter-industry systems
- Estimate and predict potential undesirable situations that inter-industry systems may encounter.

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 Working in an interdisciplinary environment Production of new research ideas
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 thinking
……

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

(3) SYLLABUS

Inter-industrial structures and production sectors. Product and Raw Material Supply Network Analysis for multi sector systems. Equilibrium/Balance Modeling and the impact of production development strategies. Leontief models and system analysis. Dynamic growth development models. Production Optimization. Growth rate control. Leontief models with environmental constraints. Leontief models with natural resources constraints. Optimal control with static and dynamic constraints. Centralized Control. Distributed Control and Competition. Nash approach in industrial cyber-physical systems. Identification of production factors and Estimation of production outputs through Observer Design. Multi-Sector and Multi-Region Inter-Industry Production Systems. Applications in single sector factories in different regions.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face, Synchronous and Asynchronous distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Supporting the learning process through • use of an electronic platform for interactive two-way communication and participation, • use of an electronic classroom platform for providing educational material, discussions, announcements, assignments, • e-mail communication, • use of projectors during lectures • use of software packages for simulation development • use of software packages for the implementation of optimization techniques, optimal controllers, observers, etc.
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	39
Literature study & analysis	60
Project / Essay writing	76
Course Total	175

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.*	The evaluation of postgraduate students and their performance in the course takes place at the end of each semester with written or oral examinations or assignments throughout the semester or can be based on intermediate progress exams, written assignments, laboratory exercises or a combination of all the above. The method of evaluation is defined by the instructor of the course and announced to the students. The language for written and oral examinations is the same with that used for teaching. The assignments essays may be written in Greek and/or English language. When conducting written or oral examinations as assessment methods, the integrity of the procedure must be ensured. Scoring is done on a scale of 0-10. The results of the examinations are

	announced by the instructor and sent to the Secretariat of the Postgraduate Program within four weeks at the latest from the examination of the course. The participation rate of exercises, assignments, etc. The final grade of the course is determined by the course instructor and announced to students at the beginning of the semester. Alternative assessment methods may be applied, such as the conduct of written or oral examinations using electronic means, provided that the integrity of the evaluation process is ensured and the provisions of the relevant regulations of the MSc are met. Alternative methods may also be applied for the assessment of students with disabilities and special educational needs following a decision of the Board of Directors and the recommendation of the head of the Department for Disabled Persons and taking into account the relevant instructions of the Accessibility Unit for Students with Disabilities.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Γ. Σταματόπουλος, Θεωρία παιγνίων, Κάλλιπος, Ανοικτές Ακαδημαϊκές Εκδόσεις, 2015.
2. Β. Μουστάκης, Πρακτικός Οδηγός Οικονομικής Ανάλυσης, Εκδόσεις Τζιόλα, 2012.
3. Κ. Αραβώσης, Α. Καρμπέρης, Α. Σωτήρχος, Τεχνικοοικονομική Αξιολόγηση Επενδύσεων,
4. Μ. Νικολαΐδης, Εγχειρίδιο Εκπόνησης Οικονομοτεχνικών Μελετών, Εκδόσεις ΔΙΣΙΓΜΑ, 2019.
5. Suh, Sangwon, ed. *Handbook of input-output economics in industrial ecology*. Vol. 23. Springer Science & Business Media, 2009.
6. Juhász, Réka, Nathan Lane, and Dani Rodrik. "The new economics of industrial policy." Annual Review of Economics 16 (2023).
7. De Giovanni, Pietro, and Pierroberto Folgiero. *Strategies for the circular economy: circular districts and networks*. Taylor & Francis, 2023.

- Relative academic journals:

1. IEEE Transactions on Systems, Man, and Cybernetics: Systems
2. IEEE Communications Magazine
3. Journal of the Franklin Institute
4. Information Sciences
5. Econometrica
6. Journal of Economic Dynamics and Control