COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Mechanical Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΟΠ1600	**SEMESTER**	7th
COURSE TITLE	Simulation in Industrial Production		

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, laboratory exercises	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*	General 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=18385&lang=en

(2) LEARNINGOUTCOMES

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 EducationArea*
- *DescriptorsforLevels6,7&8oftheEuropeanQualificationsFrameworkforLifelongLearningand AppendixB*
- *Guidelines for writing LearningOutcomes*

Learning the capabilities of modern simulation systems, understanding the modeling and simulation methodologies, familiarizing students and future engineers with simulation application development environments, and utilizing the know-how in developing support applications for industrial enterprise production systems.

Upon successful completion of the course the student will be able to:

- Introduce the basic principles of simulation
- Develop simple, but also complex, models of production systems that form the basis of more complex systems
- Verify models using Markovian procedures and basic tail theory results
- Perform statistical analysis of simulation results
- Understand the advantages and disadvantages of specialized simulation software.

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 thenecessarytechnology	*Project planning and management*
newsituations	*Respect for differenceandmulticulturalism Adapting to*
Decision-making	*Respect for the naturalenvironment*
Workingindependently	*Showing social, professional and ethical responsibilityand*
Teamwork	*sensitivity to genderissues*
Working in aninternationalenvironment	*Criticism andself-criticism*
aninterdisciplinaryenvironment	*Production of free, creative andinductivethinking Working in*
Production of newresearchideas	*……*
	Others…
	…….

- Search, analyze and synthesize data and information using the necessary technologies
- Working independently
- Teamwork
- Decision- making
- Project planning and management
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

Basic concepts, the nature of the simulation, the structure of a simulation model, modeling systems, advantages and disadvantages. Elements and organization of a partial simulation model, system specifications and model performance, distributed simulation and combined continuous / partial simulation.
Simulation software and simulation languages, model development approaches, comparisons, validations and tests of the simulation model's validity and effectiveness. Statistical procedures, standard and probability distributions, comparisons of the results of simulation experiments and the initial system specifications.
The objectives of simulation in industrial production, special simulation software for industrial applications, case studies and use of quality simulation applications of industrial production systems, application development, description and analysis of problems and simulation results.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, laboratory education, communication with students

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
Laboratory practice	35
Essay writing	45
Course total (25 hours of workload per ECTS credits)	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. Final exams (70%): II. Exercises (30%)

(5) ATTACHEDBIBLIOGRAPHY

-Suggested bibliography:

- "Simulation Modeling and Arena", Manuel D. Rosseti, John Wiley & Sons, 2015.
- "Simulation with Arena", David W. Kelton, McGraw-Hill Higher Education, 2014.
- "Discrete Event System Simulation", Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol, Prentice Hall, 2010.
- "Simulation Modeling and Analysis with Arena", Tayfur Altiok, and Benjamin Melamed, Academic Press, 2007.
- "Simulation with Arena", David Kelton., Randall Sadowski, Deborah Sadowski, 2nd ed., McGraw-Hill,2002
- "Simulation Modeling & Analysis", Averill M. Law and W. David Kelton., 3rd ed., McGraw-Hill, 2000
- "Discrete-Event System Simulation", J. Banks, J. S. Carson, B. L. Nelson, Prentice-Hall, 1996
- "Modeling and Simulation", HartmutBossel, A. K. Peters Ltd, 1994
- "Discrete Systems Simulation", B. Khoshnevis, McGraw-Hill, 1994
- "Modeling and Analysis of Manufacturing Systems", R.G. Askin and C.R Standridge, John Wiley & Sons, 1993
- "Simulation Modeling & Analysis", Averill M. Law and W. David Kelton., 2nd ed., McGraw-Hill, 1991
- "Computer Modelling for Discrete Simulation", Michael Pidd, John Wiley & Sons, 1989
- "How to write simulations using microcomputers", D. Ellison, J.C. Tunnicliffe Wilson, McGraw-Hill, 1984

- Related academic journals:

- International Journal of Modeling, Simulation, and Scientific Computing
- SimulationModelingPractice and Theory
- Scientific Modeling and Simulation
- International Journal of Simulation and Process Modeling
- International Journal of Engineering Systems Modeling and Simulation