COURSE OUTLINE

(1) GENERAL

SCHOOL	Polytechnic School		
ACADEMIC UNIT	Department of Financial and Management Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΕ0125	SEMESTER	7th
COURSE TITLE	Simulation		

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
	3	5
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, specialised 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)	http://www.fme.aegean.gr/el/c/prosomoiose

(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 objective of the course is twofold. On one hand, to introduce student to Simulation underlying principles and on the other hand the deep understanding of its meanings and how they are applied in solving theoretical and practical problems. In addition, it is sought the acquisition of the prerequisite background for understanding subsequent courses of the study cycle, but also the linkage of the field of knowledge with acquired knowledge and concepts that have been encountered earlier in the study cycle.

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

- ✓ identify the components of a simulation model
- ✓ generate random numbers from specific discrete and continuous distributions, construct empirical distributions and analyze the random samples
- ✓ calculate the appropriate performance metrics of a system

- ✓ perform a statistical analysis of simulation results
- ✓ design system models with the required degree of detail that serves the problem under consideration
- ✓ develop simple simulation models that are the basis of more complex systems
- ✓ develop end to end simulation programs in general purpose language (R is indicated as an example) for the study and evaluation of the behavior of simpler systems
- ✓ use software packages (simulators) to study and evaluate the behavior of complex queuing networks and stock systems, as well

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
- ✓ Production of free, creative and inductive thinking

(3) SYLLABUS

Random numbers: Pseudorandom number generation, using random numbers to evaluate integrals; Generating discrete random variables: The inverse transform method, generating a Poisson random variable, generating a Binomial random variable, the acceptance-rejection technique, generating random vectors; Generating continues random variables: The inverse transform algorithm, the rejection method, the polar method for generating normal random variables, generating a Poisson Process; The discrete event simulation approach: A single-server queuing system, a queuing system with two servers in series, a queuing system with two parallel servers, an inventory model; Statistical analysis of simulated data; Variance reduction techniques.

(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*	

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
	Laboratory practice	30
	Study and analysis of bibliography	81
	Course total	***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.*	Final Exam (80%) and laboratory assignments (20%)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Μούτσικας, Μ., *Μέθοδοι Προσομοίωσης και Υπολογιστικές Στατιστικές Τεχνικές*, Πανεπιστημιακές Σημειώσεις, Πανεπιστήμιο Πειραιά, 2004.
2. Κουϊκόγλου, Β., Κωνσταντάς, Δ., *Προσομοίωση Συστημάτων Διακριτών Γεγονότων*, Δίσιγμα, 2016
3. Βιδάλης, Μ., *Προσομοίωση Επιχειρησιακών Συστημάτων*, Πανεπιστημιακές Σημειώσεις, Πανεπιστήμιο Αιγαίου, 2005.
4. Ρουμελιώτης, Μ., Σουραβλάς Σ., *Τεχνικές Προσομοίωσης*, Τζιόλα, 2015.
5. Σφακιανάκης, Μ., *Προσομοίωση και Εφαρμογές*, Εκδόσεις Πατάκης, 2001.
6. Averill M. Law, W. David Kelton, *Simulation Modeling and Analysis*, McGraw-Hill, Inc., 1991.
7. Ross S. M., *Simulation*, 4th edition, Elsevier Academic Press, 1997.

- Related academic journals: