COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Mechanical Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΟΠ0810	**SEMESTER**	9th
COURSE TITLE	Theory of Reliability and Maintainability		

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	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*	Specialized general knowledge
PREREQUISITE COURSES:	There are no prerequisite courses. It is recommended that students who interested in attending the course have completed successfully the following course: Applied Statistics I.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://www.mie.uth.gr/?page_id=18488&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 introduce students to the concept of reliability of simple and complex systems and make them familiar with probabilistic techniques for its computation and its use for the design of optimal maintenance policies.
Upon successful completion of this course, the student will be able to:

- Analyze experimental failure data for reliability estimation
- Compute the reliability of complex systems from the reliability of their consisting units
- Compute the availability of systems for given maintenance policies
- Design maintenance policies that maximize availability or minimize cost of failures and maintenance

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, use of the necessary technology *Project planning and management with the Respect for difference and multiculturalism*

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
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…
…….

- Retrieving, analyzing and synthesizing data and information, with the use of necessary technologies Autonomous work
- Decision making
- Project design and management
- Exercising judgment and self-evaluation
- Promotion of free, innovative and inductive thinking
- Development of new research ideas

(3) **SYLLABUS**

Reliability: concept of reliability, time to failure distributions, failure rate, mean time to failure (MTTF), constant and time varying failure rates, failure types (early, random, wear-out), bathtub curve, interaction between individual loads and system capacity. Redundancy: active and standby redundant systems, combined series-parallel systems, method of minimal paths and minimal cuts, reliability bounds. Maintenance: system availability, preventive and corrective maintenance, periodic inspections for nondetectable failures. Failure and maintenance interactions: computation of reliability, availability and MTTF by Markov analysis.

(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 class web page	
TEACHING METHODS	*Activity*	*Semester workload*

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*	Lectures	70
	Homework	35
	Autonomous work	45
	Course total	*150*
STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, shortanswer 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. Written final exams (70%) II. Homework (30%)	

(5) **ATTACHED BIBLIOGRAPHY**

-Suggested bibliography:

- *Κοντολέων Ι.Μ., Αξιοπιστία και Ανεκτικότητα Βλαβών Συστημάτων, Εκδόσεις Αϊβάζη, 2000.*
- *Μπακούρος Ι.Λ., Αξιοπιστία και Συντήρηση Τεχνολογικών Συστημάτων, Εκδόσεις Σοφία, 2009.*
- *Ξηρόκωστας Δ.Α., Επιχειρησιακή Έρευνα: Αντικατάσταση, Συντήρηση, Αξιοπιστία, Εκδόσεις Συμμετρία, 1988.*
- *Ebeling C.E., Reliability and Maintainability Engineering, McGraw-Hill, 1997.*
- *Lewis E.E., Introduction to Reliability Engineering, John Wiley & Sons, 1996.*
- *O'Connor P.D.T., Practical Reliability Engineering, John Wiley & Sons, 1991.*

- Related academic journals:

- *IEEE Transactions on Reliability*
- *Quality and Reliability Engineering International Reliability Engineering and System Safety*