COURSE OUTLINE

1. GENERAL

SCHOOL:	Engineering		
DEPARTMENT:	Electrical and Computer Engineering		
LEVEL OF STUDY:	Undergraduate		
COURSE UNIT CODE:	8.005	**SEMESTER**	8th
COURSE TITLE:	Reliability Engineering		

COURSEWORK BREAKDOWN	**TEACHING WEEKLY HOURS**	**ECTS Credits**
Theory (Lectures)	4	4
TOTAL	**4**	**4**

COURSE UNIT TYPE:	Specialized knowledge/Consolidation
PREREQUISITES:	No
LANGUAGE OF INSTRUCTION/EXAMS:	Greek
COURSE DELIVERED TO ERASMUS STUDENTS	No
COURSE WEB PAGE (URL)	https://eclass.hmu.gr/courses/ECE164/

2. LEARNING OUTCOMES

Learning Outcomes

The course "Reliability Engineering" aims to provide students the state-of-the-art knowledge on the issue of reliability for different types of engineering systems. The course covers theoretical and practical aspects related to modeling principles that can be applied to the reliability calculation of any engineering system. In addition, the course focuses on techniques applied to calculate reliability in specific types of systems, including power systems, electronic systems, and human reliability.
Upon successful completion of the course, the students will be able to:

1. Recognize the basic reliability principles of engineering systems (probabilistic analysis, simulation)
2. Combine numerical methods of reliability calculation during the operation of complex engineering systems
3. Apply the modeling principles and calculation techniques of reliability in power systems and electronic systems
4. Assess human reliability

General Skills

- Retrieve, analyse and synthesise data and information, with the use of necessary technologies
- Decision making
- Autonomous work
- Work in an interdisciplinary environment
- Project planning and management

3. SYLLABUS

- Fundamentals of engineering systems reliability (reliability indices, probability distribution functions)
- Reliability modelling using probability distributions (main subsystems, Markov chains)
- Numerical techniques for calculating reliability in complex systems (network reduction techniques, failure contingency analysis, fault trees)

- Calculation of system reliability using non-exponential distributions
- Reliability analysis of power systems (generation systems, transmission (AC and DC) and distribution systems, industrial facilities, reliability worth)
- Reliability analysis of power generation systems with renewable energy and energy storage technologies
- Reliability analysis of other engineering systems (electronic and computer systems, mechanical systems, human reliability)
- Reliability analysis using Monte Carlo simulation

4. TEACHING METHODS - ASSESSMENT

MODE OF DELIVERY	In-Class Face-to-Face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	• Use of ICTs in lecturing • Use of ICT in Laboratory Teaching • Use of ICTs for the communication with students via the e-class platform
TEACHING ORGANIZATION	

Method description/Activity	***Semester Workload***
Lectures	40
Study and analysis of bibliography	10
Tutorial	10
Homework exercises	20
Independent study	40
Total Contact Hours	**120**

ASSESSMENT METHODS	**Assessment Language: Greek** All announcements for the course regulations and complementary reading material are permanently posted in the course e-class. The course grade incorporates the following evaluation procedures: **Student Assessment methods** 1. Written final exam (80%) which includes: • Solving problems related to quantitative and qualitative data • Short answer questions • Multiple choice questions 2. Homework exercises (20%)

5. RECOMMENDED BIBLIOGRAPHY

-Recommended Bibliography:

- E. Dialynas, Analysis and Calculation of Operational Reliability Indicators of Engineering Systems, Tsotras, 2016 (in Greek).
- E. Dialynas, Operational Reliability Analysis of Power Systems, Tsotras, 2013 (in Greek).
- E. Dialynas, Design of Electricity Generation and Transmission Systems with Reliability Criteria, Tsotras, 2013 (in Greek).
- I. Bakouros, Reliability and Maintenance of Engineering Systems, Sofia, 2009 (in Greek).
- I. Kontoleon, Reliability and Fault Tolerance of Systems, Aivazis, 2008 (in Greek).

- R. Billinton and R. N. Allan, Reliability Evaluation of Engineering Systems, New York: Plenum press, 1992.
- R. Billinton and R. N. Allan, Reliability Evaluation of Power Systems, New York: Plenum press, 1996.
- R. Billinton and W. Li, Reliability Assessment of Electric Power Systems using Monte Carlo Methods. Springer Science & Business Media, 1994.
- C. Singh, P. Jirutitijaroen, and J. Mitra, Electric Power Grid Reliability Evaluation: Models and Methods, Wiley-IEEE Press, 2019.

-Relevant scientific journals:

- IEEE Transactions on Reliability
- Reliability Engineering and System Safety
- Quality and Reliability Engineering International
- IEEE Transactions on Power Systems
- IEEE Transactions on Energy Conversion
- IET Generation, Transmission & Distribution