COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Department of Computer Engineering & Informatics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NE5678	SEMESTER	Fall (Elective Course)
COURSE TITLE	Special Purpose Systems Design		

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 and tutorials	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*	Specialized knowledge Skills development
PREREQUISITE COURSES:	Logic Design I (NY163), Logic Design II (NY164), Topics in Computer Architecture (NY261), and Modern Topics in Computer Architecture (NY262)
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	http://pc-vlsi18.ceid.upatras.gr/design_of_special_purpose_systems.html

(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*

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

(1) distinguish the attributes of reliability, availability, safety, maintainability, performability and dependability,

(2) add redundancy to a system to improve any or a combination of the above attributes.

(3) consider different redundancy addition fields, that is :

- Hardware redundancy,
- Information redundancy,
- Time redundancy, and
- Software redundancy,

(4) understand the advantages and disadvantages of using redundancy in each field, and

(5) evaluate whether the redundancy added is capable to provide the desired level of dependability.

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…
…….

Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas

(3) SYLLABUS

Introduction

- Dependability as a Design Goal
- Applications
- Terminology, Complexity and Models

Faults, Errors, Failures

- Physical Causes of Faults
- Fault Characteristics
- Common Fault Models
- Common Error Models

Design Techniques

- Hardware Redundancy
- Information Redundancy
- Time Redundancy
- Software Redundancy

Application of the Developed Theory

- Design Cycle Modification to accommodate Dependability
- A Design Example

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Wide use of ICT and more specifically :
· The course is backed up by a web page providing all course material. This page is duly updated.
· The preferred communication method with the students is email.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>26 hours</td></tr>
<tr><td>Tutorials</td><td>13 hours</td></tr>
<tr><td>Study</td><td>80 hours</td></tr>
<tr><td>Exams</td><td>3 hours</td></tr>
<tr><td>Course total</td><td>122 hours</td></tr>
<tr><td></td><td></td></tr>
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</td></tr>
<tr><td>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.</td><td>The evaluation is performed in Greek language and is based on a final written test that includes multiple choice questions, short-answer questions and problem solving.

Sample solutions to the written test are announced to provide students with a reference point for their marking. After the test marks are announced the students have the opportunity to see and argue about their mistakes.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

· Design and Analysis of Fault - Tolerant Digital Systems, Barry W. Johnson, Addison-Wesley Publishing Company, 1989.
· Theory and Practice of Reliable System Design, D. P. Siewiorek and R. Swarz, Digital Press, 1982.
· Fault Tolerance Principles and Practices, T. Anderson and P.A. Lee, Prentice-Hall International, 1981.
· Fault Tolerant and Fault Testable Hardware Design, P. K. Lala, Prentice-Hall International, 1985.
· Error Coding for Arithmetic Processors, T.R.N. Rao, Academic Press, 1974.
· Error Correcting Codes, W.W. Petersen and E.J Weldon Jr., 2nd edition, MIT Press, 1972.
· Fault-tolerant Systems, Israel Koren & C. Mani Krishna, Morgan Kaufmann, 2007.

- Related academic journals:

· IEEE Transactions on Computers
· Proceedings of the IEEE
· IEEE Transactions on Dependable and Secure Computing