**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Department of Computer Engineering & Informatics | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | 23Y211 | **SEMESTER** | | 4nd | |
| **COURSE TITLE** | Computer Architecture Lab | | | | |
| **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** |
| tutorials | | | 1 | | 1 |
| Laboratory exercises | | | 2 | | 1 |
|  | | |  | |  |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | | ***Total*** | | **2** |
| **COURSE TYPE**  *general background,  special background, specialised general knowledge, skills development* | Specialized general knowledge  Skills development | | | | |
| **PREREQUISITE COURSES:** | Principles of Computer Systems (ΝΝΥ104)  Digital Design I (ΝΝΥ107)  Digital Design Laboratory (NNY206) | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | <https://eclass.upatras.gr/courses/CEID1408/> | | | | |

1. **LEARNING OUTCOMES**

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| **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 lab, a student will be able to :  A.   1. write assembly language programs for an ARM processor 2. debug assembly language programs 3. given the programming model and the instruction set of a processor to write programs in its assembly language   B.   1. understand the processor operation at the microoperations level 2. write microprograms 3. define an instruction set and support it by writing the necessary microprograms 4. write programs using the instruction set that he has defined | |
| **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…*  *…….* |
| Decision-making  Adapting to new situations  Working independently  Teamwork  Working in an international environment  Production of new research ideas | |

1. **Syllabus**

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| Part A.  ARM programming model.  The instruction set of ARM.  Programming at the assembly language level.  Program debugging.  Part B.  The laboratory exercises are based on the use of a simulator of a microprogrammable computer, developed in our laboratory, running on a Windows environment. The students have the opportunity to design a machine language instruction set and then to write the necessary microprograms which implement the designed instruction set. After loading the microprograms into the control memory, the students can write programs using the machine language, which they have designed and implemented, and run them in the microprogrammable computer. |

1. **TEACHING and LEARNING METHODS - EVALUATION**

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| **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* | Wide use of ICT and more specifically :   * The course is backed up by a web page providing all necessary documentation for the laboratory exercises. * The preferred communication method with the students is email. |
| **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*** | | Tutorials | 13 hours | | Laboratory exercises | 26 hours | | Study and Laboratory exercises preparation | 39hours | | Report preparation | 10 hours | | Laboratory exams | 2 hour | | ***Course total*** | ***90 hours*** | |  |  | |
| **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.* | The evaluation is performed in the Greek language.  The evaluation is based on:   * the correctness of the programs developed by the students during their lab exercise, * the quality of documenting the programs that they try to develop via their reports, and * a final practical exam in which they are asked to develop in the lab a small program and execute it. |

1. **ATTACHED BIBLIOGRAPHY**

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| *- Suggested bibliography:*   * Computer Architecture, Dimitrios Nikolos, 1st edition 2017, in Greek * Computer Organization and Design: The Hardware/software Interface, Vol.1, 2010, D. A. Patterson, J. L. Hennessy, in Greek   *- Related academic journals:*   * IEEE Micro * IEEE Transactions on Computers * IEEE Transactions on VLSI Systems * IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems |