# MICROCOMPUTERS

## 1. GENERAL

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|---|---|---|---|
| **SCHOOL** | ENGINEERING | | |
| **SECTION** | INFORMATICS & COMPUTER ENGINEERING | | |
| **LEVEL OF STUDIES** | UNDERGRADUATE | | |
| **COURSE CODE** | | **SEMESTER OF STUDY** | BP 7th, EY 7th, 9th |
| **COURSE TITLE** | MICROCOMPUTERS | | |

| **INDEPENDENT TEACHING ACTIVITIES** *in case the credits are awarded in distinct parts of the course e.g. Lectures, Laboratory Exercises, etc. If the credits are awarded uniformly for the entire course, indicate the weekly teaching hours and the total number of credits* | **WEEKLY HOURS TEACHING** | **CREDIT UNITS** |
|---|---|---|
| Lectures | 2 | |
| Practice Exercises | 1 | |
| Laboratory exercises | 1 | |
| *Add rows if needed. The organization of teaching and the teaching methods used are described In detail at 4.* | **4** | **5** |

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| **COURSE TYPE** *Background, General Knowledge, Scientific Area, Development Skill* | Scientific Area, Skills Development |
| **PREREQUISITES COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATION:** | Greek |
| **THE COURSE IS OFFERED TO ERASMUS STUDENTS** | No |
| **ONLINE COURSE PAGE (URL)** | https://eclass.uniwa.gr/courses/ICE239/ (Theory) https://eclass.uniwa.gr/courses/ICE236/ (Laboratory) |

## 2. LEARNING OUTCOMES

**Learning Outcomes**

*The learning outcomes* of the course are described, the *specific knowledge, skills and abilities* of *an appropriate level that students will acquire after the successful completion of the course.*

*Consult Appendix A*

- *Description of the Level* of *Learning Outcomes for each* course *of study according to the European Higher Education Area Qualifications Framework*
- *Descriptors of Levels 6, 7 & 8 of the European Qualifications Framework* for *Lifelong Learning and Annex B*
- *Summary Guide for writing Learning Outcomes*

After attending the course the student will have:

- acquire the basic knowledge of application development with microcomputers.
- understand the design and programming techniques of a microcomputer system of the open architectural platform Arduino and Raspberry pi and acquire the appropriate skills to implement these methods.
- acquire the ability to design and program systems based on microcontrollers.
- gain experience in software and hardware to implement practical applications.
- the ability to certify the proper functioning of microcomputer systems through simulation tools.

**General Skills**

| *Taking into account* the *general competencies that* the *graduate must have acquired (as listed in* the *Diploma Supplement and listed below) which of them is the subject aimed at?* | |
|---|---|
| *Search, analysis and synthesis of data and information, using the necessary technologies*<br>*Adapting to new situations Decision making*<br>*Autonomous work*<br>*Teamwork*<br>*Working in an international environment*<br>*Working in an interdisciplinary environment*<br>*Generating new research ideas* | *Project planning and management*<br>*Respect for diversity and multiculturalism Respect for the natural environment*<br>*Demonstrate social, professional and ethical responsibility and sensitivity to gender issues Criticism and self-criticism*<br>*Promotion of free, creative and inductive thinking* |
| • Autonomous work<br>• Teamwork<br>• Working in an international environment<br>• Work in an interdisciplinary environment<br>• Generating new research ideas<br>• Promotion of free, creative and inductive thinking | |

## 3. COURSE CONTENT

- Introduction to open source and hardware platforms.
- Description of the hardware and software of the Arduino and Raspberry pi platform.
- Examples of programming.
- Connection of external sensors and application development.
- Examples of sensor reading programming.
- Advanced applications.
- Description of holiday use techniques.
- Description of the techniques for using timers.
- Description of the SPI and I2C serial communication methods.
- Library creation description.
- Description of the interface with the Processing platform.
- Description of the interface with Matlab.
- Programming applications with Arduino.
- Advanced applications with Raspberry pi (driving a matrix LED display, 'RE, using a camera to implement color, motion, pattern recognition algorithms).

## 4. TEACHING AND LEARNING METHODS - ASSESSMENT

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|---|---|
| **HOW TO DELIVER**<br>*Face-to-face, Remote education , etc.* | Face-to-face (in class) |
| **USE OF TECHNOLOGIES INFORMATION AND**<br>*Use of ICT* in *Teaching, in Laboratory Training, in Communication with students* | • Teaching using ICT<br>• Use of specialized hardware and software<br>• Electronic Communication for assignment or submission of Assignments through the<br>• platform e-learning of the University. |
| **TEACHING ORGANIZATION**<br>*The way and methods of teaching* are described *in detail*.<br>*Lectures, Seminars*, *Laboratory Exercise, Field Exercise, Bibliography* Study & Analysis, *Tutorial, Practice* (placement), *Clinical Practicum*, *Art Workshop*, *Interactive teaching*, *Educational* | |

| Activity | Semester Workload |
|---|---|
| Lectures | 26 |
| Practice exercises | 13 |
| Laboratory Exercises | 13 |
| Assignments | 21 |
| Independent Study | 52 |

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|---|---|---|
| *visits, Project preparation, Writing of work / assignments, Artistic creation, etc. The student's study hours for each learning activity are listed as well as and non-guided study hours so that the total workload at semester level corresponds to ECTS standards* | **Course Total** (25 hours of load working per credit unit) | **125** |

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| **STUDENT EVALUATION**<br>*Description of the evaluation process*<br><br>*Assessment Language, Assessment Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment,* Report */Report, Oral Exam, Public Presentation, Laboratory Work, Clinical Patient Examination, Artistic Performance,* Other / *Other*<br><br>*Clearly defined* evaluation *criteria* are mentioned and *if and where they are accessible to students.* | • The assessment of students is carried out in Greek, through a final written examination, twice each academic year.<br>• The written exam is of graded difficulty and includes short-answer questions and problem-solving questions.<br>• The grade is posted electronically and finalized after the students see their writing to solve questions.<br>• Indicative answers to the exam topics are posted on the course website. |

## 5. RECOMMENDED-BIBLIOGRAPHY

*- Suggested Bibliography :*

1. Papazoglou Panagiotis, Lionis Spyridon-Polychronis, "Application Development with Arduino", A. TZIOLA PUBLICATIONS & SONS SA, (Eudoxus Code: 41954966).

*- Notes :*

1. I. Ellinas, "Didactic notes", 2016.
2. I. Ellinas, "Raspberry Pi Teaching Notes", 2018.

*- Other books:*

1. Michael Margolis, “Arduino Cookbook, O’Reilly, 2011.
2. Simon Monk, “Raspberry Pi Cookbook, Software and Hardware Problems and Solutions”, O’Reilly, 2016.
3. Tim Cox, “Raspberry Pi for Python Programmers Cookbook”, Packt, 2016.

*- Online Resources :*

- https://www.arduino.cc/
- https://learn.adafruit.com/series/learn-arduino
- http://www.ladyada.net/learn/arduino/
- https://www.raspberrypi.org/
- https://pythonprogramming.net/introduction-raspberry-pi-tutorials/