COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	ELECTRICAL AND COMPUTER ENGINEERING DEPT.		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**ECE_ENE950**	**SEMESTER**	**9**
COURSE TITLE	Programmable Control and PLC's		

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	2	
Laboratory	2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).	4	5

COURSE TYPE *general background, special background, specialised, general knowledge, skills development*	Specialised, Skill Development
PREREQUISITE COURSES:	No. Students are advised to have already attended the courses: Power Electronics I, Power Energy Systems, Electrical Machines
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://www.ece.uop.gr/

(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 goal of this course is to provide basic knowledge on programmable control and programmable logic controllers (PLCs), as well as on their applications in the automatization of industrial and other processes.

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
- Work in an international environment
- Work in an Interdisciplinary environment
- Development of new research ideas
- Respect to the natural environment
- Criticism and self-criticism
- Promotion of free, creative and inductive thinking

(3) SYLLABUS

Theory

Introduction to programmable control and programmable logic controllers (PLCs).

Structure and units of programmable logic controllers, operating voltages (input/output), wiring of elements on a controller, routing, terminology.

Methods and programming languages (LAD, FBD, STL), programming devices, digital and analog signals, basic programming commands, usage of auxiliary commands, program structure, mass information transport commands, programming of timers, counters, comparisons, special commands (transfer, control flow etc).

Analog signal processing.

Applications of automization of industrial processes, interconnection and industrial PLC networks.

Laboratory

The lab part of the course involves practical exercises concerning familiarization with PLC hardware (PLC station creation, routing, operating voltages, input-output wiring) and PLC software (use of Simatic Manager software, applications and examples of process automatization, use of simulation software and simulation of automatization cases).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In lecture
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Support of learning process through the platform “e-class” (slides ppt and communication). Programming of PLC device

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***
Lectures	26 hours
LaboratoryExercises (in Lab)	26 hours
Lab assignments	32 hours
Lecture & bibliography study (at home)	41 hours
Course Total	***125 hours (5 ECTS)***

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.

I. Theory (60% of grade):
- Written final exam (100% of theoretical grade) which involves theoretical questions and exercises.

II. Lab exercises/assignments (40% of total grade-compulsory):
- Final exam on lab configuration (100% of lab grade).

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Σ. Ρουμπή, *Αυτοματισμός με προγραμματιζόμενους ελεγκτές*, Εκδόσεις Συμεών, 1992.
- Ν. Μαραντίδη, *Αυτοματισμός με SIMATIC S7*, Έκδοση Siemens, 2000.
- Ν. Φωτιάδη, *Έλεγχοι με προγραμματιζόμενη μνήμη*, Εκδόσεις Ίων, 1996.
- Ι. Μπερέτα, *Προγραμματισμός με PLC*, Εκδόσεις Τζιόλα, 2002.
- D. Collins, E. Lane, *Προγραμματιζόμενοι ελεγκτές*, Εκδόσεις Τζιόλα, 1997.
- F. D. Petruzella, *Προγραμματιζόμενοι λογικοί ελεγκτές*, Εκδόσεις Τζιόλα, 2000.
- Ν. Α. Πανταζή, *Προγραμματιζόμενοι λογικοί ελεγκτές*, Εκδόσεις Ίων, 2001.
- Γ. Κρανά, *Βιομηχανικοί αυτοματισμοί και προγραμματιζόμενοι λογικοί ελεγκτές*, Εκδόσεις Ίων, 1998.
- K. H. John, M. Tiegelkamp, *Programming industrial automation systems,* Springer, 2010.
- W. Bolton, *Programmable logic controllers*, Newnes, 2009.
- C. T. Jones, *Step7 in 7 steps: A practical guide to implementing S7-300/S7-400 programmable logic controllers*, Brilliant Training, 2006.
- F. D. Petruzella, *Programmable logic controllers,* McGraw-Hill, 2005.
- J. R. Hackworth, F. D. Hackworth, *Programmable logic controllers: Programming methods and appli-cations*, Prentice Hall, 2004.
- H. Berger, *Automating with SIMATIC,* Publicis, 2003.
- J. Crispin, *Programmable logic controllers and their engineering applications*, McGraw-Hill, 1997.