COURSE OUTLINE

1. GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	NATURAL RESOURCES DEVELOPMENT & AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**219**	**SEMESTER**	**9th**
COURSE TITLE	APPLIED CONTROL AND AUTOMATIONS		

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	4	4
LABORATORY EXCERCISES	1	1
TOTAL	5	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*	SPECIALISED GENERAL KNOWLEDGE - SKILLS DEVELOPMENT
PREREQUISITE COURSES:	• MEASUREMENTS AND SENSORS • ELECTRONICS-MICROPROCESSORS • AUTOMATIC PROCESS CONTROL • INFORMATION TECHNOLOGY APPLICATIONS IN AGRICULTURE
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	To be constructed

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, the student(s) will be able to:

- Model and recognize realistic dynamic processes under noise and error conditions and estimate the quality of the obtained model.
- Coordinate and optimize industrial controllers.
- Understand the difference between indirect and direct adaptive control.
- Apply predictive control techniques to processes with strong time delays.

- Understand the importance of robust behavior of controlled processes and the methods for achieving it.
- Understand the principles of fuzzy logic and its application in industrial controller design.
- Understand the basic principles of signal and system discretization and the basic principles of digital control.
- Understand the principles of operation of final elements and automation systems.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Applying theoretical knowledge in practice
Working independently
Teamwork
Working in an interdisciplinary environment
Decision-making
Production of free, creative and inductive thinking

3. SYLLABUS

System identification. ARMA, ARMAX, and ARX models. Output error models. Models with noise and prediction filters. Parameterization of linear models. Nonlinear models, adaptation of models to data. Model quality. Experimental design. Validity and selection of the model. Modeling software. Adaptive and self-tuning controllers. Design and tuning of three-term industrial controllers. Rules for adaptive control of reference model and their implementation. Gain design. Automatic tuning of industrial controllers. Indirect adaptive control. Direct adaptive control. Predictive control model and its applications. Practical issues and implementation. Robust control. Fuzzy control. Intelligent control. Digital control of systems. Control with computer assistance. Control software. Study of realistic processes. Modeling. Differentiation. Parameter estimation. Simulation. Experimental application. Synergy of industrial controllers. Digital implementation of process control algorithms. Practical application of feedback control. Performance of feedback control systems. Elements and arrangements of automation. Regulators, transmitters, transducers and relays. Proximity sensors. Actuators. Control valves. Servomotors. Variable speed motors. Flow, pressure, level and temperature regulators. Programmable logic controllers and other logic control arrangements. Applications of automatic control in Biosystems Engineering.

4. TEACHING and LEARNING METHODS - EVALUATION

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

Use of ICT in teaching
Laboratory education
Communication with students

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	120
Laboratory practice	30
Course total	***150***

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.

1. Written Examination (Conclusion on Theory): 100%
2. Technical laboratory reports: 40%.
3. Oral Examination in laboratory environment: 60%.

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:

1. P. Dautidis, S. Mastrogeorgopoulos, S. Papadopoulou, "Process Control", Tziola, 2012.
2. Roberto King, "Industrial Control", Papasotiriou Publications, Athens, 1996.
3. F.N. Kouboulis, "Industrial Control", New Technologies Publications, Athens, 1999.