

COURSE OUTLINE

1. GENERAL INFORMATION

SCHOOL	MARITIME AND INDUSTRIAL STUDIES		
DEPARTMENT	INDUSTRIAL MANAGEMENT AND TECHNOLOGY		
LEVEL OF STUDY	UNDERGRADUATE		
COURSE UNIT CODE	TEΠΛΗ05	SEMESTER OF STUDY	8 th
COURSE TITLE	ROBOTICS AND MECHATRONICS (ELECTIVE COURSE)		
INDEPENDENT TEACHING ACTIVITIES <i>in case in which credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures, Laboratory exercises and Project			5.5
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at section 4.</i>			
COURSE TYPE <i>general background, special background, specialized general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	None		
LANGUAGE OF INSTRUCTION and EXAMINATION/ASSESSMENT:	Greek / English (in ERASMUS class)		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.unipi.gr/courses/BDT241/		

2. LEARNING OUTCOMES

<p>LEARNING OUTCOMES</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:</i></p> <p>APPENDIX A</p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications' cycle, according to the European Higher Education Area's Qualification Framework.</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and APPENDIX B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>The course is preparatory for training and advanced study in robotic systems. It intends to introduce students to the basic principles of robot and sensor operation. The purpose of the course is threefold: (i) to provide theoretical and practical understanding of robotic systems; (ii) to provide practical experience in the use of robotic systems; and (iii) to support and encourage further study in the Robotics area. The course aims at developing students' interest in the lab implementation of the course material. Special emphasis is given to problem solving.</p> <p>Upon successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Evaluate interdisciplinary systems design through the example of robotics and mechatronics and their applications • Demonstrate knowledge on the physics of the components of a mechatronic system and the ways to gather information from the sensors • Evaluate common motion control techniques • Analyze the benefits and risks of integrating robotic systems into production systems

- Assess the suitability and mechanical efficiency of robotic arms in industry
- Understand the complexity, type and characteristics of sensors working together in a modern robotic system
- Implement simple materials with a simple robot model with electric motors

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aims

Search for, analysis and synthesis of data and information, by the use of technologies that are necessary according the case

Adapting to new situations

Decision-making

Independent work

Team work

Working in an international environment

Working in an interdisciplinary environment

Introduction of innovative research

Project planning and management

Respect for difference and multiculturalism

Environmental awareness

Social, professional and ethical responsibility and sensitivity to gender issues

Critical consciousness, criticism and self-criticism

Development of free, creative and inductive thinking

- Search for, analysis and synthesis of data and information, by the use of technologies that are necessary according the case
- Adapting to new situations
- Decision-making
- Independent work
- Team work
- Working in an international environment (ERASMUS)
- Working in an interdisciplinary environment (ERASMUS)
- Introduction of innovative research
- Project planning and management
- Respect for difference and multiculturalism
- Environmental awareness
- Social, professional and ethical responsibility and sensitivity to gender issues
- Critical consciousness, criticism and self-criticism
- Development of free, creative and inductive thinking

2. COURSE CONTENT

The course covers the following topics:

- Principles of operation and manipulation of robots and sensors
- Kinetic, dynamic and static analysis of robotic arms
- Workspace analysis and robotic arm assembly
- Robot motion planning, programming and control
- Strategies based on sensory and technical decisions
- Robotic systems and applications
- Mechatronics and applications
- Analysis of DC motors
- Encoders
- Control Systems and Sensors
- Robot development project

The course involves two-hour weekly lectures as well as 4 two-hour laboratory classes. The laboratory part is conducted at the Laboratory of Advanced Manufacturing Techniques & Testing. Commercial software packages are used. Students are trained in workshops with a rotation system. The workshop program is posted on the course website and at eclass at the beginning of the semester.

Also, articles, audiovisual lecture material, web addresses, useful information and exercises are posted at eclass.

3. TEACHING METHODS - ASSESSMENT

<p style="text-align: center;">TEACHING MODE</p> <p><i>Face-to-face, in-class lecturing, on distance teaching and distance learning etc.</i></p>	In-class lecturing / Laboratory teaching																	
<p style="text-align: center;">USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</p> <p><i>Use of ICT in Teaching, Laboratory Education, Communication with students</i></p>	<p>Teaching: Lectures with audiovisual media, support of the learning process through the eclass platform</p> <p>Laboratory Education: Use of commercial software packages</p> <p>Communication with students: face-to-face at office hours, email, eclass</p>																	
<p style="text-align: center;">COURSE DESIGN</p> <p><i>Description of teaching techniques, practices and methods:</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, clinical practice, Art Workshop, Interactive teaching, Educational visits, project, Essay writing, Artistic creativity, etc.</i></p> <p><i>The study hours for each learning activity as well as the hours of non- directed study are given according to the principles of the ECTS</i></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><i>Activity / Method</i></th> <th style="text-align: center;"><i>Semester Workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">42</td> </tr> <tr> <td>Laboratory</td> <td style="text-align: center;">10</td> </tr> <tr> <td>Project</td> <td style="text-align: center;">54.5</td> </tr> <tr> <td>Self-study of lecture material and lab exercises</td> <td style="text-align: center;">28.5</td> </tr> <tr> <td>Counselling</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td>Exams (written)</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Course Total</td> <td style="text-align: center;">137.5</td> </tr> </tbody> </table>		<i>Activity / Method</i>	<i>Semester Workload</i>	Lectures	42	Laboratory	10	Project	54.5	Self-study of lecture material and lab exercises	28.5	Counselling	0.5	Exams (written)	2	Course Total	137.5
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<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS</p> <p><i>Detailed description of the evaluation procedures:</i></p> <p><i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice questionnaires, short- answer questions, open-ended questions, problem solving, written work, Essay/report, oral exam, public presentation, laboratory work, art interpretation, other.....etc</i></p> <p><i>Evaluation criteria are specifically defined and given as well as if and where they are reported and accessible to students.</i></p>	<p>Language of exams: Greek / English (in ERASMUS class)</p> <p>Assessment Methods: After the last lecture, the exam material is posted at eclass. . The final course grade is formed as follows:</p> <ul style="list-style-type: none"> • By the project (40%) • By the written exams (60%) taken in the examination period of the spring semester and, in case of failure, in the September resits. <p>The written examination includes problem solving/exercises, multiple choice and short-answer questions. It is conducted with closed books.</p> <p>The evaluation of students with special learning difficulties in writing and reading (as certified and qualified by a competent institution) is performed according to the relevant procedure decided by the Department Assembly.</p> <p>Notification of the Assessment Criteria: The evaluation criteria are made known during the first lecture and are clearly stated on the course website and e-class. The answers to the exam questions are posted at eclass after the exam date. Students have the opportunity to discuss their exam paper with the course instructor (at the posted office hours) after the announcement of the course grades.</p>																	

4. SUGGESTED BIBLIOGRAPHY

-Suggested Bibliography :

- ΡΟΜΠΟΤΙΚΗ, Δημ. Εμίρης και Δημ. Κουλουριώτης, εκδόσεις Τζιόλας, έτος 2020, ISBN 9789604186112

-Scientific Journals: not applicable

-Lecture Notes
-Laboratory Workbook