

COURSE OUTLINE

1. GENERAL INFORMATION

SCHOOL	MARITIME AND INDUSTRIAL STUDIES		
DEPARTMENT	INDUSTRIAL MANAGEMENT AND TECHNOLOGY		
LEVEL OF STUDY	POSTGRADUATE		
COURSE UNIT CODE	L-IND302	SEMESTER OF STUDY	3rd
COURSE TITLE	Industry 4.0 Systems		
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	
	3	6	
<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>	Specialized general knowledge		
PREREQUISITE COURSES:	None		
LANGUAGE OF INSTRUCTION and EXAMINATION/ASSESSMENT:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)			

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>Modern world is characterized by the emergence of a new production model that is internationally identified by the term Industry 4.0. The core of this model is based on the increased digitization of production processes, in which physical objects are integrated with the information network, allowing the decentralization of production and its adaptation to the prevailing external conditions in real time. Key feature of this new model is the extensive further automation of production systems in order to increase their speed, flexibility and efficiency, without jeopardizing sustainability and/or safety. The scope of the course is to present in detail this new model that combines both elements of new technologies and forms of organization, such as cyber-physical systems, decentralized production systems, 'smart' logistics/manufacturing systems, 'smart' energy systems, advanced work support systems, etc.</p> <p>Upon successful completion of the course, the students will have understood the concept of Industry 4.0 and the associated technologies involved, analyzing and discussing relevant topics such as:</p> <ul style="list-style-type: none"> • Industrial Internet of Things – IIoT • Advanced/'Smart' Manufacturing

- ‘Smart’ Factory & Products
- Preventive diagnostics techniques and facility maintenance
- Digital Twins, Augmented Reality, etc.

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

The general competences that the student should have acquired and that the course is aimed at are:

- 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
- 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
- Social, professional and ethical responsibility and sensitivity to gender issues
- Critical consciousness, criticism and self-criticism
- Development of free, creative and inductive thinking

3. COURSE CONTENT

The course covers the following topics:

- Introduction to the concept of Industry 4.0
- Industrial Internet of Things (IIoT)
- IIoT Key Enabling Technologies
- Cloud Computing, Edge & Fog Computing, 5G-mobile telecommunications
- Industrial Analytics
- Digital Twins
- Additive Manufacturing Technologies – 3D Printing
- IoT Applications (Smart agriculture, Smart Health, Smart cities and electricity grids)

A combination of teaching and learning methods will be used in order to actively involve students and emphasize on the practical application of the topics under consideration: lectures using audiovisual media, analysis and discussion of scientific texts and experiential (group) exercises.

In addition, articles, audiovisual lecture material, web addresses, useful information, exercises and case studies are posted at e-class.

4. TEACHING METHODS - ASSESSMENT

TEACHING MODE

Face-to-face, in-class lecturing, on distance teaching and distance learning etc.

In-class lecturing/seminars and/or **webinars**

<p align="center">USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</p> <p align="center"><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 e-class platform.</p> <p>Communication with students: Face-to-face at office hours, email, e-class</p>															
<p 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"> <thead> <tr> <th align="center"><i>Activity / Method</i></th> <th align="center"><i>Semester Workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td align="center">30</td> </tr> <tr> <td>Project</td> <td align="center">60</td> </tr> <tr> <td>Self-study of lecture material</td> <td align="center">30</td> </tr> <tr> <td>Exams (written)</td> <td align="center">3</td> </tr> <tr> <td>Counselling</td> <td align="center">27</td> </tr> <tr> <td>Course Total</td> <td align="center">150</td> </tr> </tbody> </table>		<i>Activity / Method</i>	<i>Semester Workload</i>	Lectures	30	Project	60	Self-study of lecture material	30	Exams (written)	3	Counselling	27	Course Total	150
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<p>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</p> <p>Assessment Methods: Course material is posted at e-class during the semester. The final grade of the course is as follows:</p> <ul style="list-style-type: none"> • 80% from the project (both written text and oral presentation) • 20% from the participation of students in course activities <p>Project topics and evaluation criteria are posted on e-class at the beginning of the semester.</p> <p>In case of failure to complete the project in the first examination period, the project is submitted and assessed via an oral presentation in September re-sit examination period.</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/or e-class. Students have the opportunity to receive explanations about the grade they received.</p>															

5. SUGGESTED BIBLIOGRAPHY

<p>- <i>Bibliography</i></p> <ul style="list-style-type: none"> • Holler J., Tsiatsis V., Mulligan C., Avesand S., Karnouskos S. and Boyle D., <i>From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence</i>, Elsevier Academic Press, 2014 • Ustundag A. and Cevikcan E., <i>Industry 4.0: Managing the Digital Transformation</i>, Springer, 2018 <p>- <i>Relevant Journals (indicative):</i></p> <ul style="list-style-type: none"> • <i>Computers in Industry</i> • <i>International Journal of Advanced Manufacturing Technologies</i> • <i>Journal of Intelligent Manufacturing</i>
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- *Journal of Cleaner Production*
- *Journal of Intelligent and Fuzzy Systems*
- *Lecture notes*
- *Workshop material*