a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM209E01	*Semester*	9
Course title	**Reverse Engineering**		
Independent teaching activities		*Weekly teaching hours*	*ECTS*
Lectures		2	4.5
Laboratory exercises		2	
Course type		Special background	
Course category		Compulsory for Direction 2	
Prerequisite courses		-	
Language of instruction and examinations		Greek/English	
Is the course offered to Erasmus students		Yes	
Course website (url)		https://moodle.uniwa.gr/course/view.php?	

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

- Understand and apply principles, practices and tools of reverse engineering for product research, development and evaluation.
- Evaluate and combine techniques of reverse engineering and surface CAD modeling for the complete study of reverse engineering
- Organize methodologies and state of the art tools, 3D scanning, edit cloud points /mesh as well as surface modeling
- Bibliography search aiming on a comprehensive view of the under consideration problem
- Apply and combine knowledge and good practices to develop skills in the field of reverse engineering
- Analyze social, economic and environmental impacts of AM projects as well as its current trends as a main pillar of construction

b2. General competences

- Decision-making
- Working independently
- Team work
- Criticism and self-criticism
- Production of free, creative and inductive thinking
- Demonstrate critical analysis in a concise, clear and objective way
- Formulate strategies for successful research, using appropriate methods

c) Syllabus

Definition and historical development of Reverse Engineering. Objectives and main uses. Analysis of existing technologies-Differences-Advantages-Disadvantages. Contact and non-contact systems. Data management: Point cloud and mesh. Complete CAD model reconstruction process based on the physical model using a 3D scanner. Reconstruction methodologies of 3D CAD model and comparison. Surface modeling in modern CAD systems.

Uses of reverse engineering in Industry. Commercial and research use of technologies. Analysis of commercial systems in the field of reverse engineering (Software & Hardware). Case studies.

<table>
<tr><td colspan="3">Future trends and developments.</td></tr>
<tr><td colspan="3">d) Teaching and learning methods - Evaluation</td></tr>
<tr><td>Delivery</td><td colspan="2">Face-to-face, Distance learning</td></tr>
<tr><td>Use of information and communications technology</td><td colspan="2">- Commercial/free/open source software
- Multimedia applications
- MS Teams/Moodle/eclass
- Open courses</td></tr>
<tr><td rowspan="7">Teaching methods</td><td>Activity</td><td>Semester workload</td></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Tutorials</td><td></td></tr>
<tr><td>Laboratory exercises</td><td>26</td></tr>
<tr><td>Computational exercises</td><td></td></tr>
<tr><td>Individual work</td><td>78</td></tr>
<tr><td>Course total</td><td>130</td></tr>
<tr><td>Student performance evaluation</td><td colspan="2">Intermediate assessment and final written examination. For the laboratory, individual and/or group assignments and written or oral examination or presentation of exercises or case studies.</td></tr>
<tr><td colspan="3">e) Suggested bibliography</td></tr>
<tr><td colspan="3">1. Raja V., Fernandes K.J. (2008). Reverse Engineering: An Industrial Perspective. Springer
2. Hopkinson N., Hague R.J.M., Dickens P.M.. (2006). Rapid Manufacturing: An Industrial Revolution for the Digital Age. John Wiley & Sons, Inc.
3. Ullman D.G. (2010). The Mechanical Design Process. Mc Graw Hill
4. Vukašinović N., Duhovnik J. (2019). Advanced CAD Modeling: Explicit, Parametric, FreeForm CAD and Re-engineering. Springer.</td></tr>
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