a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM209Y02	*Semester*	9
Course title	**Additive manufacturing (3D Printing)**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	3	7.0
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?id=1141

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 additive manufacturing for research, development and product evaluation.
- Evaluate and combine techniques of additive manufacturing in conjunction with used materials for the optimal process of products manufacturing.
- Apply and combine knowledge and good practices to develop skills in the field of AM processing
- Organize methodologies and state of the art tools for converting CAD to AM (Additive Manufacturing) model, processing point clouds/meshes as well as surface modeling.
- Design for Additive Manufacturing models in order to improve their mechanical properties based on their use.
- Search for bibliography aiming on a comprehensive view of the under consideration problem.
- 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 Additive Manufacturing. The effect of AM. Overview of the seven processes in Additive Construction according to ASTM F42 (VAT Photopolymerisation / Material Jetting / Binder Jetting / Material Enemies / Powder Bed Fusion / Sheet Lamination / Directed Energy Deposition). Analysis of the AM technologies, with reference to the benefits and limitations in their use. Materials and mechanical properties of AM objects. Complete process from CAD modeling, costing, to the most suitable selection of AM process for a given application. Modeling of components based on their construction (Design for

Additive Manufacturing-DfAM). Commercial and research use of technologies. Analysis of commercial systems in the field of AM (Software & Hardware). Case studies. Future trends and developments.

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face, Distance learning	
Use of information and communications technology	- Commercial/free/open source software - Multimedia applications - MS Teams/Moodle/eclass - Open courses	
Teaching methods	*Activity*	*Semester workload*
	Lectures	26
	Tutorials	
	Laboratory exercises	39
	Computational exercises	
	Individual work	91
	Course total	156
Student performance evaluation	Intermediate assessment (40%) and written final examination (60%), which include short answer questions (40%) and problem solving (60%). For the laboratory, individual and/or group assignments and written examination or presentation of case studies.	

e) Suggested bibliography

1. Andre J.C., (2017). From Additive Manufacturing to 3D/4D Printing 1. John Wiley & Sons, Inc.
2. Singh R., Davim J.P., (2019). Additive Manufacturing. Applications and Innovations. CRC Press.
3. Chua C.K., Wong C.H., Yeong W.Y. (2017). Standards, Quality, Control, and Measurement Sciences in 3D Printing and Additive Manufacturing. Academic Press.
4. Gibson I., Rosen D., Stucker B. (2010). Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing. Springer.