

ΞΣΥ821 – DIGITAL MANUFACTURING SYSTEMS

1. GENERAL

SCHOOL	School of Technology		
DEPARTMENT	Department of Forestry, Wood Sciences, and Design		
LEVEL	<i>Undergraduate</i>		
CODE	ΞΣΥ821	STUDENT SEMESTER	8 th
COURSE TITLE	Digital Manufacturing Systems		
ACTIVITIES		WEEKLY HRS	ECTS
	Lectures and Workshops	3	5
TYPE OF COURSE	Scientific area		
PREREQUISITES:	None		
LANGUAGE TEACHING AND EXAMINATION:	Greek		
THE COURSE OFFERED TO STUDENTS ERASMUS	No		
WEBPAGES COURSE (URL)	https://eclass.uth.gr/courses/FWSD_U_156/		

2. LEARNING OUTCOMES

Learning Outcomes
<p>The aim of the course is to present the main principles which govern manufacturing systems in a digital environment.</p> <p>At the end of the course students will be able to:</p> <ul style="list-style-type: none"> • Know the environment on which processes that are necessary for product design are implemented • Apply suitable additive and subtractive manufacturing methods for the implementation of a design project • Follow suitable strategies which will optimise product manufacturing processes • Know the code that can digitally guide production machinery and intervene when necessary • Use low cost fast prototyping machinery to manufacture reliable prototypes • Capture natural objects using 3D scanners • Digitally edit 3D models and optimise them for reproduction • Produces parts using CNC machines • Prints 3D objects using 3D printers • Establish and/or restore communication among CAD-CAM and CNC systems
General Skills
<p>Upon successful completion of the course, the students will be able to develop and cultivate basic professional and social skills:</p> <ul style="list-style-type: none"> • Search, analysis and synthesis of data and information, using the necessary technologies

- Adaptation to new situations
- Decision making
- Autonomous work
- Teamwork
- Demonstration of social, professional and moral responsibility and sensitivity to gender issues
- Exercise criticism and self-criticism
- Promoting free, creative and inductive thinking

3. COURSE CONTENT

In the theoretic part the following topics are described:

Introduction to digital manufacturing. Subtractive digital manufacturing method. CAM systems operation principles. Definition and creation of cutters in a digital environment. Definition and creation of various processing types. Programming two-dimensional processes. Complex surface programming. Cutting simulation and cutting condition optimisation. Additive digital manufacturing method. Three-dimensional printing operation principles. Printing materials and technologies. 3D printing parameter optimisation. Capturing natural objects using 3D scanners. Digital model editing and optimisation for reproduction.

Students develop final semester assignments in groups. Course lectures and other activities are supported by workshops, where each student team is discussing their work and seeking solutions to any problems it faces or specialized knowledge about specific aspects of its work.

The final semester assignment requires submission of the assignment materials as well as a 10 minute oral presentation at week 12. The semester assignment counts for 20% of the total course assessment and the remaining 80% is obtained through written examination.

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY METHOD	Face to face	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of a course website on the e-class platform for posting (a) notes, (b) internet links, (c) announcements, search tools and social networks Furthermore, use of equipment such as video projector, interactive board, and use of server and terminal stations at the laboratory room.	
TEACHING ORGANISATION	Activity	Semester Workload
	Interactive Teaching – Lectures	26
	Studio workshops	13
	Semester assignments	40
	Self-study	46
	Course Total	125
STUDENT EVALUATION	Both intermediate and final evaluation is applied. The evaluation of the theoretical part is carried out by: <ol style="list-style-type: none"> 1. Optional intermediate written examination 2. Semester assignment 	

5. RECOMMENDED-BIBLIOGRAPHY

- Recommended literature:

- Βασικές αρχές συστημάτων CAD/CAM/CAE, Kunwoo Lee, Κλειδάριθμος, 2009. (in Greek)
- (21st Century Skills Innovation Library_ Makers as Innovators) Terence O'Neill, Josh Williams- 3D Printing- Cherry Lake Publishing (2013).
- Joan Horvath, Mastering 3D Printing, Apress (2014)
- Design for CNC: Furniture Projects and Fabrication Technique, Gary Rohrbacher, 2017.
- Τεχνολογίες Προσθετικής Κατασκευής: Τριδιάστατη εκτύπωση, ταχεία προτυποποίηση και άμεση ψηφιακή κατασκευή, Ian Gibson, David Rosen και Brent Stucke, 2015. (in Greek)
- Σύγχρονες Τεχνολογίες Κατασκευής με την βοήθεια Η/Υ, Γιαννατσής, Δεδούσης, Κανελλίδης, 2015. (in Greek)

- Relevant scientific journals:

- International Journal of Computer Aided Manufacturing
- Journal of Additive Manufacturing
- International Journal of Additive and Subtractive Material Manufacturing
- Rapid prototyping Journal