COURSE OUTLINE

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	PRODUCT AND SYSTEMS DESIGN ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**5203**	**SEMESTER**	**8**
COURSE TITLE	**Robotics and Digital Fabrication**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	**3**	**6**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background, skills development
PREREQUISITE COURSES:	NONE
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK/ENGLISH
COURSE DELIVERED TO ERASMUS STUDENTS	YES
MODULE WEB PAGE (URL)	https://eclass.uowm.gr/

2. LEARNING OUTCOMES

Learning outcomes

On successful completion of this module the learner will be able to:

The students are able to:

- understand the basic principles of Robotics.
- understand the structural analysis of robotic manipulators and their degrees of freedom.
- understand the kinematic analysis of robotic mechanisms, as well as the analytical and numerical methods of kinematic analysis.
- determine the driving forces/torques in robotic mechanisms, the structure of industrial robots, the geometry of robotic manipulators, the workplace of industrial robots, the angles of orientation, the mechanisms of the end effector and the actuation systems.
- solve problems that relate to the kinematic and control of robotic manipulators.
- understand the basic principles of 3D printing.
- recognize the basic parts of a 3D printer.
- realize a 3D printing.

General Skills

Upon successful completion of the program students will:

- have the theoretical and practical background on the field of product and systems design engineering and the corresponding profession.
- utilize scientific knowledge to understand, analyze and solve problems.
- apply a wide range of scientific and technical knowledge concerning the design and development of products and systems.

3. COURSE CONTENTS

- Terminology and types of robotic manipulators.
- Degrees of freedom and kinematic analysis of robotic manipulators.
- Velocities and static forces.
- Determination of driving forces and torques.
- Trajectory description of the end effector and workspaces.
- Position control.
- Categories, structure and operation of 3D printers.
- Categories, structure and operation of laser CNC engraving machines.
- Numerical control of 3D printers, engravers and similar Cartesian mechanisms.

4. TEACHING METHODS - ASSESSMENT

MODE OFDELIVERY	In class, face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Video and slide presentations via projector • Support of teaching process via the electronic platform e-class • Communication with students.
TEACHING METHODS	

Activity	*Semester workload*
Lectures	90
Non-directed study	60
Course total	**150**

ASSESSMENT METHODS	Final written exam which includes: i. Short-answer questions ii. Multiple choice questions iii. Problem solving Assignment

5. ATTACHED

- Suggested bibliography:

1. Βιβλίο [94643354]: Ρομποτική, Όραση και Έλεγχος, Peter Corke Λεπτομέρειες
2. Βιβλίο [68373927]: Εισαγωγή στη Ρομποτική: Μηχανική και Αυτόματος Έλεγχος, John J. Craig Λεπτομέρειες