

a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM907Y02	Semester	7
Course title	Engineering design		
Independent teaching activities		Weekly teaching hours	ECTS
Lectures		5	5.5
Laboratory exercises			
Course type		Knowledge deepening/consolidation	
Course category		Compulsory Elective for Direction 1 & 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=225	
b) Learning outcomes and general competences			
b1. Learning outcomes			
Upon successful completion of this course, the student will be able to: - Methodically approach the design problem in specific predefined steps - Analyze the engineering problem in individual subsystems - Identify the main and sub-functions establishing the Function Structure - Determine solution principles based on intuitive methods - Extend the solutions range, based on systematic methods of combining solutions - Evaluate the principles of solutions according to technical and economic criteria - Conduct a project-study to develop the principle solution into a final construction solution - Use the basic embodiment design principles for the design, optimization and control of the final construction solution - Collaborate with his fellow students to implement the steps of the engineering design methodology in a structured approach to solve engineering problems of mechanical constructions in a collaborative teamwork environment.			
b2. General competences			
- Search for, analysis and synthesis of data and information with the use of the necessary technology - Adapting to new situations - Decision-making - Working independently - Team work - Working in an international environment - Working in an interdisciplinary environment - Production of new research ideas - Project planning and management - Respect for difference and multiculturalism - Respect for the natural environment - Showing social, professional and ethical responsibility and sensitivity to gender issues - Criticism and self-criticism - Production of free, creative and inductive thinking			
c) Syllabus			

Concepts of mechanical systems – conversion of energy, material, signal. Methodological steps in Engineering Design. Conceptual Design. Compiling the Requirements List. Abstracting to identify the essential problems. Establishing Function Structures. Natural phenomena investigation to find solution principles. Intuitive methods of finding solutions. Innovative design methodology. Methodical search for solutions for individual functions using classification matrices. Methodical combination of individual into overall solutions. Technical and economic evaluation of solutions. Search for weak spots. Optimize solutions. Conducting the design study. Basic configuration rules. Transmission path of force. Work allocation to individual parts. Manufacture according to standardization, production and assembly rules. Identifying errors. Evaluation of design studies. Design of the final solution (individual parts and assembly) by using a 3D-CAD system. Practical exercises: Application of the Engineering Design methodology on a complex mechanical system as an assignment during the semester. Implementation and presentation of the methodology steps.

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 - Open courses	
Teaching methods	Activity	Semester workload
	Lectures	26
	Tutorials	39
	Laboratory exercises	
	Computational exercises	
	Individual work	91
	Course total	156
Student performance evaluation	Final exam (70%), Engineering design group-project (30%).	
e) Suggested bibliography		
1. Στεργίου Κ.: <i>Σχεδιασμός των Κατασκευών</i>. Σύγχρονη Εκδοτική. 2. Pahl, G., Beitz, W., Feldhusen, J., Grote, K.H. (2014). <i>Engineering Design. A Systematic Approach</i>. Springer Verlag, 3rd ed., 3. Blessing, Lucienne, Chakrabarti, Amaresh. <i>DRM, a Design Research Methodology</i>. Springer 4. Ernst Eder W., Hubka V., Hosnedl S.: <i>Design Engineering: A Manual for Enhanced Creativity</i>. CRC Press. 5. Roth, K.: <i>Konstruieren mit Konstruktionskatalogen: Band 1: Konstruktionslehre</i>. Springer 6. Ehrlenspiel, K.: <i>Cost-Efficient Design</i>, Springer.		