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EUROPEAN UNIVERSITY FOR CUSTOMISED EDUCATION

STUDY GUIDE

3D DESIGN OF MECHANICAL SYSTEMS

Organised by

University of the Peloponnese

1. IDENTIFYING DATA.	
· **Course Name.**	3D Design of Mechanical Systems
· **Coordinating University.**	University of the Peloponnese
· **Partner Universities Involved.**	-
· **Course Field(s).**	Engineering
· **Related Study Programme.**	Mechanical Engineering and other Engineering
· **ISCED Code.**	07 – Engineering, manufacturing and construction
· **SDG.**	Industry, innovation and infrastructure (SDG 9); Responsible consumption and production (SDG 12)
· **Study Level.**	the course is open for Bachelor (B) and Master (M) level students
· **EUNICE Key Competencies**	• Green – strongly • Orange - moderately • Red – partially • Blank cell - not at all

Problem solving	
Teamworking	
Communication	
Self-management	
Cognitive flexibility	
Digital competence	
Technical competence	
Global intercultural competence	

· **Number of ECTS credits**	5 ECTS

allocated.	
· Mode of Delivery.	The course is delivered “Online live” and “Online self-study”
· Language of Instruction.	The language of instruction will be English
· Course Dates.	Friday, 19/02/2027 9.00 – 12.00 (CET) Friday, 26/02/2027 9.00 – 12.00 (CET) Friday, 05/03/2027 9.00 – 12.00 (CET) Friday, 12/03/2027 9.00 – 12.00 (CET) Friday, 19/03/2027 9.00 – 12.00 (CET) Friday, 09/04/2027 9.00 – 12.00 (CET) Friday, 16/04/2027 9.00 – 12.00 (CET) Friday, 23/04/2027 9.00 – 12.00 (CET) Friday, 14/05/2027 9.00 – 12.00 (CET) Friday, 21/05/2027 9.00 – 12.00 (CET) Friday, 28/05/2027 9.00 – 12.00 (CET) Friday, 04/06/2027 9.00 – 12.00 (CET) Friday, 11/06/2027 9.00 – 12.00 (CET)
· Precise Schedule of the Lectures.	3-hours weekly. Hands-on training using Computer Aided Design software, assignments, problem solving
· Key Words.	Computer Aided Design (CAD), 3d design, mechanical design
· Catchy Phrase.	Design the future, possibly by futuristic designs

· Prerequisites and co-requisites.	- Student must have sufficient understanding of mechanisms and design principles; - The study levels this course is available for: B and M; - Required linguistic skills: adequate knowledge of English and mechanical engineering terminology
· Number of EUNICE students that can attend the Course.	20
· Number of EUNICE students that can attend the course per institution	2
· Course inscription procedure(s).	The standard EUNICE process

2. CONTACT DETAILS.	
· Department.	Mechanical Engineering
· Name of Lecturer.	Ioannis Diamantakos
· E-mail.	diamond@uop.gr

· Other Lecturers.	-

3. COURSE CONTENT.

This course concerns the three-dimensional design of mechanical components and mechanisms with the help of specialized computer design software.

4. LEARNING OUTCOMES.

- Basic principles of 3D design.
- 3D modeling strategies.
- 3D design software usage for geometrical modelling, mechanisms design and kinematic studies.
- Numerical simulation of structural elements behaviour.
- 3D printing applications.

5. OBJECTIVES.

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

- Understand the basic principles of operation of modern 3D design software (3d CAD).
- Understand 3D geometric modeling strategies for accurate and more efficient mechanical component design.
- Use appropriate commands and functions of 3D design software for the production of geometric models of simple and complex mechanical components.
- Leverage the software's capabilities to synthesize mechanisms consisting of multiple mechanical components
- Use commands and functions to connect mechanical components, as well as to study their movement within mechanisms.
- Perform simple structural analyses on structural elements using numerical simulation of their behavior.
- Use CAD models in CAE, CAM and 3D printing applications, taking special care for the special requirements of each production technique.

6. COURSE ORGANISATION.

UNITS	
1.	Parametric design. Basic elements of a 3D digital object: sketch, feature, body, reference elements.
2.	Design strategies. Methods of production of 3D geometry: construction with sweeping techniques, construction modeling method
3.	3D design software environment, object display capabilities, geometric model storage.

4.	Sketch - 1: circles, dimensions, lines, constraints, curves. Creation of 3D objects by extrude.
5.	Sketch - 2: auxiliary/axial lines, angular distances, circular layout, circle arcs.
6.	Creation of complex three-dimensional objects with successive extrusions.
7.	Processing of three-dimensional objects: Circular and rectangular arrangement, creation of curvature radii
8.	Use auxiliary design layers. Creating threads.
9.	Create 3D objects by rotate and sweep
10.	Assembly of mechanisms from multiple components: insertion of multiple components in the same model, connections between objects
11.	Basic elements of structural analysis of components using the Finite Element method.
12.	Preparation of geometric models for 3D printing or machining.

LEARNING RESOURCES AND TOOLS.

- Laboratory notes.
- Presentations.
- Design examples.

PLANNED LEARNING ACTIVITIES AND TEACHING METHODS.

- Presentations.
- Case studies
- Online design courses

7. ASSESSMENT METHODS, CRITERIA AND PERIOD.

The course will be evaluated at the end of the semester using a combination of a mechanism to be designed in a CAD software and oral exam.

OBSERVATIONS.

A mechanism composed of a number of different components will be designed in the CAD software. Components of gradually increasing complexity will be designed. Components will have to be connected together using different joint types.
The course is graded.

8. BIBLIOGRAPHY AND TEACHING MATERIALS.

Teaching material will be provided to the students during the semester.