Fundusze Europejskie dla Rozwoju Społecznego
Rzeczpospolita Polska
Dofinansowane przez Unię Europejską
NAWA NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

Co-funded by the European Union

EUROPEAN UNIVERSITY FOR CUSTOMISED EDUCATION

STUDY GUIDE

INTEGRATED DESIGN FOR MODERN ADDITIVE MANUFACTURING

Organised by

Poznan University of Technology [PUT]

b-tu Brandenburg University of Technology Cottbus - Senftenberg
UC Universidad de Cantabria
Università di Catania
Université Polytechnique HAUTS-DE-FRANCE
UMONS University of Mons
University of the Peloponnese
Vaasan yliopisto University of Vaasa
Politécnico de Viseu

eunice EUROPEAN UNIVERSITY

Co-funded by the European Union

1. IDENTIFYING DATA.	
· Course Name.	Integrated design for modern additive manufacturing
· Coordinating University.	Poznan University of Technology [PUT]
· Partner Universities Involved.	--
· Course Field(s).	Computing, manufacturing
· Related Study Programme.	-
· ISCED Code.	07 Engineering, manufacturing and construction
· SDG.	GOAL 4: Quality Education (SDG), GOAL 9: Industry, Innovation and Infrastructure,
· Study Level.	Bachelor (B), Master (M)
· EUNICE Key Competencies	[Indicate the Key Competencies required for the course.] • Green – strongly • Orange- moderately • Red – partially • Blank cell - not at all

Teamworking	MODERATELY
Communication	STRONGLY
Self-management	PARTIALLY
Cognitive flexibility	MODERATELY
Digital competence	MODERATELY

	Technical competence	STRONGLY
	Global intercultural competence	NOT AT ALL

· Number of ECTS credits allocated.	3
· Mode of Delivery.	Online (self-study)
· Language of Instruction.	English
· Course Dates.	01.03.2026 – 30.04.2026
· Precise Schedule of the Lectures.	-
· Key Words.	Additive Manufacturing, Computed Aided Design, FFF, SLS, SLM
· Catchy Phrase.	Design smarter: explore modelling, materials and simulation in advanced additive manufacturing applications.

· Prerequisites and co-requisites.	The idea of 3D printing. Construction and modeling in CAx systems. English B2.
· Number of EUNICE students /staff members that can attend the Course.	60
· Course inscription procedure(s).	[Indicate the registration procedures if it differs from the standard EUNICE process]

2. CONTACT DETAILS.	
· Department.	Faculty of Mechanical Engineering
· Name of Lecturer.	Dr Eng. Habil. Robert Roszak
· E-mail.	Robert.Roszak@put.poznan.pl
· Other Lecturers.	-

3. COURSE CONTENT.

The aim of the course is to familiarize yourself with additive manufacturing methods. The course includes modeling in CAx systems. Preparation of models for additive manufacturing techniques. 3D printing methods. Materials and applications of printing techniques in engineering design. Characteristics of printed materials. Computer simulation of structures using printed materials.

4. LEARNING OUTCOMES.

Knowledge:

Student has structured, theoretically based knowledge of the strength of materials in the scope of: methods of determining external and internal forces and moments, basic tests of determining mechanical properties of materials including printed materials, determining stresses and displacements.

Student has basic knowledge of information technology and computer science in the scope of the basics of functioning of computer hardware and software in the processes of processing, transmitting, presenting and securing information.

Student has knowledge of computer-aided engineering systems in mechanics, machine construction and technology, in particular CAx computer engineering systems in product design and its improvement and in preparing the product for production. Can design elements of machine parts using additive manufacturing techniques (3D modeling, finite element method, 3D printing).

Skills:

Student can obtain information from literature, databases and other appropriately selected sources (also in English or another foreign language considered as the language of international communication) in the field of mechanics and machine construction and other engineering and technical issues consistent with the field of study; can integrate the obtained information, interpret it, and draw conclusions and formulate and justify opinions.

Student can prepare documentation regarding the implementation of an engineering task in the field of mechanics and machine construction (structure, technology, organization) and prepare a text containing a discussion of the results of the implementation of this task.

Student can select printed engineering materials for use in mechanics and machine construction.

Student can select and apply AM manufacturing technologies to shape the form, structure and properties of products, design technological processes together with the selection of devices for printing using additive methods.

Social competences:

The student is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions made.

The student is able to cooperate and work in a group, assuming different roles in it.

The student is able to appropriately define priorities for the implementation of a task defined by himself or others.

5. OBJECTIVES.

The technology described in this course was originally referred to as rapid prototyping. The term rapid prototyping (RP) is used in a variety of industries to describe a process for rapidly creating a system or part representation before final release or commercialization. In other words, the emphasis is on creating something quickly and that the output is a prototype or basis model from which further models and eventually the final product will be derived. Management consultants and software engineers both use the term rapid prototyping to describe a process of developing business and software solutions in a piecewise fashion that allows clients and other stakeholders to test ideas and provide feedback during the development process. In a product development context, the term rapid prototyping was used widely to describe technologies which created physical prototypes directly from digital data. This course is about these latter technologies, first developed for prototyping, but now used for many more purposes.

6. COURSE ORGANISATION.

UNITS

1.	Introduction to the principles of design using SolidWorks, Ansys
2.	Preparation of geometric models for FFF, SLA, PolyJet printing techniques.
3.	Manufacturing of models using FFF, SLA, PolyJet methods. Optimization of printing processes to improve the quality and strength of manufactured components

4.	The role of 3D techniques in the process of preparing a product concept.
5.	Properties, testing and simulation of elements manufactured using additive techniques.

LEARNING RESOURCES AND TOOLS.
Virtual course
PLANNED LEARNING ACTIVITIES AND TEACHING METHODS.
Lectures, CAD software.

7. ASSESSMENT METHODS, CRITERIA AND PERIOD.
Online Moodle exam.
OBSERVATIONS.

8. BIBLIOGRAPHY AND TEACHING MATERIALS.

1. Ian Gibson , David Rosen , Brent Stucker , Mahyar Khorasani, Additive Manufacturing Technologies, Springer Book, 2021
2. Damir Godec, Joamin Gonzalez-Gutierrez, Axel Nordin, Eujin Pei, Julia Ureña Alcázar, A Guide to Additive Manufacturing, Springer Book, 2022
3. Eujin Pei, Alain Bernard, Dongdong Gu, Christoph Klahn, Mario Monzón, Maren Petersen, Tao Sun, Springer Handbook of Additive Manufacturing, Springer Book, 2023