



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

3D Printing\_1

### Course

Field of study

Product Lifecycle Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

English

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr inż. Radosław Wichniarek

Responsible for the course/lecturer:

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Wydział Inżynierii Mechanicznej

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### Prerequisites

Students must have basic knowledge of information technology, engineering graphics, CAD systems (solid and surface modelling) and manufacturing techniques.

### Course objective

Understanding modern techniques of additive manufacturing, also referred to as 3D printing. Acquiring the ability to use additive manufacturing for rapid prototyping of physical prototypes.

### Course-related learning outcomes

Knowledge

Has an ordered, theory-based general knowledge about modern manufacturing techniques.



Has basic knowledge of machining and assembly processes as well as their automation.

#### Skills

He can indicate the possibility of using TCT techniques while carrying tasks related to the production planning.

Is able to make a detailed assessment of the structure's technology and indicate the possibilities of its improvement. Is able to communicate in this regard with technologists and designers.

Is able to perform basic working operations and maintenance of machines for additive manufacturing.

#### Social competences

Can determine the requirements for additive manufacturing machine operator.

Is aware of the impact of the development of additive manufacturing techniques on society.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture part: based on a knowledge test.

Laboratory part: based on the student's preparation for individual laboratory classes.

#### Programme content

Lecture part:

1. 3D Printing - general issues of additive manufacturing technologies.
2. Division and short presentation of the most important methods of additive manufacturing.
3. Structure and properties of FDM / FFF products.
4. FDM / FFF technological processes preparation.
5. Supplementary processes (e.g. vacuum casting in silicone molds).
6. Case studies.

Laboratory part:

1. Additive manufacturing machines construction.
2. Product designing for additive manufacturing - needs and limitations.
3. Acquisition and incorporation of geometric data from non-engineering CAD systems.
4. Model design data preparation for manufacturing, saving in STL format, processing STL files, selection of resolution for STL file.
5. Generating the NC code based on the digital product geometry.



6. Products manufacturing using FDM/FFF machines.

7. Post-processing methods.

### Teaching methods

Lecture part: mostly in the form of conventional lectures, content submitted in a form ready to remember; partly lectures take the form of a problem with active discussion with students.

Laboratory part: presentation by the teacher of practical issues related to additive manufacturing and independent work of students at research positions with supervision of the teacher.

### Bibliography

Basic

1. Chua C. K., Leong K. F., and Lim C. S., 2010, "Rapid Prototyping: Principles and Applications", World Scientific Publishing Co. Pte. Ltd., Singapore
2. Ian Gibson, David W. Rosen, Brent Stucker , 2010, Additive Manufacturing Technologies, Rapid Prototyping to Direct Digital Manufacturing, Springer, Boston, MA, USA

Additional

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	20	1,0

<sup>1</sup> delete or add other activities as appropriate