COURSE DESCRIPTION CARD - SYLLABUS

Course name
Additive manufacturing

Course

Field of study
Management and production engineering

Year/Semester
1/1

Area of study (specialization)

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	45	
Tutorials	Projects/seminars	

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Knowledge in the field of information technology and expertise in engineering graphics, CAD/CAM systems, and manufacturing techniques. The ability to prepare a digital product model using 3D CAD software. Capability to collaborate effectively in a design team, awareness of accountability for tasks performed, and understanding the need to continuously acquire new knowledge.

Course objective

Understanding of additive manufacturing techniques and methods, including knowledge of the additive manufacturing production process, data preparation methods, finishing (post-processing) techniques, basic machine operation and maintenance.

Course-related learning outcomes

Knowledge

1. The student has an expanded knowledge of manufacturing techniques, including additive manufacturing and rapid prototyping.

2. The student has knowledge of developmental trends in manufacturing techniques.

3. The student has well-established theoretical knowledge in the field of assessing the quality of products and production processes.

Skills

1. Is able to notice and identify problems occurring in systems and production processes and select and use methods and tools appropriate to solve them

2. Is able to select a manufacturing technique for the production of products

3. Is able to organize production taking into account customer demand and production resources

Social competences

1. Is aware of the need to critically analyze and evaluate their proposals and actions

2. Is aware of the shortcomings of his knowledge and the need to cooperate with experienced employees and experts

3. Can think and act in a creative and enterprising way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

a) in the field of lectures, the assumed learning outcomes are verified by:

Assessment of knowledge on a written colloquium. Questions can be both open-ended and closed-ended. Passing the lecture if obtaining at least 50.1% correct answers. Up to 50.0% - ndst, from 50.1% to 60.0% - dst, from 60.1% to 70.0% - dst+, from 70.1 to 80 - db, from 80.1% to 90 .0% - db+, from 90.1% - very good.

b) in the field of laboratories, the assumed learning outcomes are verified by:

Evaluation of the student's preparation for individual laboratory classes and evaluation of the realization of laboratory exercises.

Programme content

Lectures:

- Additive Manufacturing - introduction, sources of knowledge, the place of additive technology in engineering.

- Basic concepts related to additive manufacturing.

- Contemporary methods for preparing production. Additive technologies (3D printing) in Rapid Prototyping, Rapid Manufacturing and Rapid Tooling, engineering applications.

- The most known additive manufacturing methods.

- Data exchange in additive manufacturing processes.

- Sample projects realized with additive manufacturing.

- Detailed information about FFF method.

- Detailed information about SLA method.

Laboratories:

- Introduction to Additive Manufacturing Lab and discussing health and safety rules.

- Ways of preparing data for additive manufacturing process.

- Preparing the FFF method for manufacturing.

- FFF devices' use and maintenance.

- Manufacturing with the FFF method.

- Preparing the DLP method for manufacturing.

- DLP devices' use and maintenance.

- Manufacturing with the DLP method.

- Post-processing of additive manufactured products.

- Assessment of properties of additive manufactured products.

- Iterative design and manufacturing of sample product.

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. Lecture conducted remotely using the synchronous access method.

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. E. Chlebus, Innowacyjne technologie Rapid Prototyping - Rapid Tooling w rozwoju produktu, Oficyna Wydawnicza Politechniki Wrocławskiej , Wrocław, 2003

2. P. Siemieński, G. Budzik, “Techniki przyrostowe. Druk 3D. Drukarki 3D”, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2015

3. Ian Gibson, David W. Rosen, Brent Stucker , 2010, Additive Manufacturing Technologies, Rapid Prototyping to Direct Digital Manufacturing, Springer, Boston, MA

Additional

1. Pająk E., Dudziak A., Górski F., Wichniarek R., Techniki przyrostowe i wirtualna rzeczywistość w procesach przygotowania produkcji, Poznań 2011, ISBN 978 83 86912 56 8, Wydawnictwo Promocja 21

2. G. Budzik, J. Woźniak, Ł. Przeszłowski, "Druk 3D jako element przemysłu przeszłości. Analiza rynku i tendencje rozwoju", Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2022

3. B. Evans, "Practical 3D Printers: The Science and Art of 3D Printing", Apress, New York, 2012

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	65	2,5

[1] delete or add other activities as appropriate