COURSE DESCRIPTION CARD - SYLLABUS

Course name
Advanced manufacturing techniques

Course

Field of study
Education in Technology and Informatics

Year/Semester
3/6

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes

Other (e.g. online)

Tutorials
15

Projects/seminars

Number of credit points

3

Lecturers

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

Prerequisites

The student has basic knowledge of physics, mathematics and mechanics. The student is able to use the acquired knowledge to analyze specific manufacturing techniques and is able to use information obtained from the indicated sources. The student shows independence in solving problems, gaining and improving the acquired knowledge and skills, understanding the need to learn.

Course objective

1. Acquainting future engineers with kinematics, technological possibilities, machine tools and tools for various cutting and eroding methods.

2. Understanding the method of calculating theoretical roughness, parameters, moment forces and cutting power. Acquiring the ability to select the material and geometry of the blade, cutting and eroding parameters as well as the length of the roll-out and coast-down paths of various tools.

Course-related learning outcomes

Knowledge

1. He knows the issues related to the technology of production and processing of engineering materials [K1_W11].

Skills

1. Can obtain information from literature, databases and other properly selected sources, integrate them, interpret them and draw conclusions, formulate and justify opinions [K1_U01].

2. Can use acquired mathematical knowledge to describe processes, create models, write algorithms and other activities in the field of technology and computer science [K1_U04].

3. Can select materials with appropriate physicochemical and design properties for engineering applications [K1_U20].

4. Can choose appropriate manufacturing technologies in order to shape products, their structure and properties [K1_U21].

Social competences

1. Understands the need for continuous training (eg through participation in courses and postgraduate studies) in order to improve professional and social competences [K1_K03].

2. Is aware of the importance of engineering activity and its non-technical aspects, including the impact on the environment [K1_K06].

3. Can think and act in an entrepreneurial and innovative way [K1_K08].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written exam (in case of answers to: from 50 to 60% of questions - dst, above 60 to 70% - dst +, above 70 to 80% - db, above 80 to 90% - db +, above 90 to 100% - very good)

Classes: Assessment based on two small tests conducted in the middle and at the end of the semester. In order to obtain credit for the exercises, the number of absences cannot exceed 1/3 of the classes. In case of solving from 50 to 60% of the tasks - dst, above 60 to 70% - dst +, above 70 to 80% - db, above 80 to 90% - db +, above 90 to 100% - very good)

Programme content

Lecture

1) Classification of manufacturing techniques.

2) Kinematics and technological possibilities of various cutting methods:

a. performed with tools with defined geometry (turning, milling, milling, drilling operations, broaching, chiselling),

b. performed with tools of undefined geometry (grinding, ultrasonic assisted grinding, honing, oscillating superfinishing, abrasive transfer machining, rotary / vibration abrasive machining, abrasive blasting).

3) The essence and technological possibilities of erosive machining.

a. EDM machining (drilling and cutting),

b. Electrochemical treatment

c. Erosion blasting (cutting: laser, water jet and abrasive water jet, plasma and electron beam, laser: cutting aid

4) The essence and application of additive processing (laser surfacing, selective laser sintering)

5) Materials for machining and erosion tools.

6) Accuracy and roughness achieved with various machining methods.

7) Machinability of various materials

8) Trends in cutting technique (high speed machining HSM, high speed machining HPM, hard machining HM, complete machining, hybrid machining, micro machining, new cutting zone lubrication / cooling techniques)

Exercise

1) Kinematics of the cutting process:

a. Cutting speed, feed rate, feed per revolution and per tooth.

b. The roll-out and coast-down distance and machine time.

2) Geometric and technological elements of the cutting layer with different processing methods:

a. Width and thickness of the cut layer, depth of cut,

b. Variation of the cross-section of the cutting layer for one blade and the total cross-section.

3) Forces, moment and power with different methods and types of cutting.

4) Tool life and periodic cutting speed.

5) Theoretical surface roughness after cutting.

6) Selection of conditions for EDM.

Teaching methods

1. Lecture: multimedia presentation, solving example tasks on the blackboard,

2. Exercises: problem solving, discussion.

Bibliography

Basic

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Additional

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2 Shaw M.C.: Metal Cutting Principles. Oxford University Press, Oxford 1996.

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Breakdown of average student's workload

	Hours	ECTS
Total workload	83	3,0
Classes requiring direct contact with the teacher	36	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	27	1,0

[1] delete or add other activities as appropriate