COURSE DESCRIPTION CARD - SYLLABUS

Course name
Advanced manufacturing techniques [S1ETI2>ZTW]

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

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

Lecturers

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.

Course-related learning outcomes

Knowledge:
1. has basic knowledge of technologies for producing and processing engineering materials.

Skills:
1. is able to obtain information from literature, databases and other sources, integrate it, interpret it and draw conclusions, formulate and justify opinions.

2. is able to select appropriate manufacturing technologies to design products, their structure and properties, recognizing social, economic, ecological and legal aspects.

Social competences:
1. understands the need for continuous education (e.g. by participating in courses and postgraduate studies) in order to improve professional and social competences and the need to think and act in an entrepreneurial and innovative way.
2. is aware of the importance of engineering activities and their non-technical aspects, including the impact on the environment.

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 tests from previous classes and tasks to be completed at home.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

The program content concerns the selection of appropriate manufacturing techniques of various engineering materials by removal (cutting and erosion) and addition. Computational exercises in the subject are related to the selection of tools from catalogs and manufacturing parameters in order to obtain a specific structure and properties of products.

Course topics

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 assisted machining
4) The essence and application of additive processing (laser cladding, 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 lubrication / cooling techniques of cutting zone)
Exercise
1) Kinematics of the cutting process (cutting speed, feed rate, feed per revolution and per tooth)
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.
7) Catalog selection of tools and manufacturing parameters

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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Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00