COURSE DESCRIPTION CARD - SYLLABUS

Course name

Machining

Course

Field of study

Mechanical engineering

Year/Semester

2/4

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

20

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

PhD.Eng. Zbigniew Nowakowski

email: zbigniew.nowakowski@put.poznan.pl

phone +48(61) 665 27 52

Faculty of Mechanical Engineering

St. Piotrowo 3, 60-965 Poznań, room 605

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of the methods and kinematics of cutting, the cutting tools used and the construction of machine tools. The ability to operate simple technical devices, capability of making use of information retrieved from different sources.

Course objective

Introducing basic knowledge of machining, cutting tools, cutting process and its physical, technological and economical effects.

Course-related learning outcomes

Knowledge

The student has basic knowledge of subtractive technologies applied in machine manufacturing process.

The student is able to characterize the kinematics of different methods of cutting.
The student will be able to describe design features of cutting tool and properties of tool materials.
The student is able to describe energetical and tribological relationships occurring in machining.
The student is able to characterize the surface layer after machining.
The student is able to determine economilcal and performance cutting speed.

Skills

Knows how to define application scope for given forming technology.
Knows how to select proper technology to manufacture given part and can justify his/her choice.
Knows how to characterize given manufacturing technology and can describe its pros and cons.
Knows how to perform initial economical analysis of manufacturing technology in given case.

Social competences

Is well aware of the necessity for continuous learning; knows how to inspire other people to learn.
Is aware of the non-technical aspects and results of subtractive manufacturing.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lectures is verified at the end of the semester, in the form of a mixed test, a single choice of 40 questions and 2 calculation tasks.

Skills acquired in the laboratory classes are verified on the basis of:
- to get two positive marks from the test, checking the knowledge from the classes,
- reports from each laboratory classes in which the ability to present and develop measurement results is assessed, the ability to analysis - comparing results, theoretical knowledge of the subject under examination and the ability to make conclusions.

The final grade from the laboratory classes is a weighted average of the test (60%) and reports (40%).

Programme content

Scope of lecture:
- characteristics and application of machining in contemporary manufacturing,
- machining operations types and its kinematics,
- contemporary materials for cutting edge and cutting tools,
- geometry of the cutting edge and machining effects,
- mechanics of the cutting process - minimum thickness of cut, chip shaping,
- selected physical phenomenons occurring in machining process (heat, diffusion, adhesion, friction),
- energetical aspects: cutting force, power and torque,
- machinability of materiale,
- tribological aspects of cutting tool operation - wear, durability and reliability of cutting edges,
- characteristics of the surface layer and its role in modern technology,
- economics and optimization of the cutting process,
- modern machining technologies (HM, HSM, HPC, DM, MQL etc.).

Laboratory classes include:
- design and application of cutting tools (tools with defined geometry and abrasive tools),
- evaluation of geometric characteristics of surface layer subjected to different types of machining,
- evaluation of machinability of different materials based on force and temperature measurement,
- comparison of cutting ability and econamical performance of different cutting materials.

Teaching methods

Lecture: multimedia presentation illustrated with examples, animations and short films, discussion.

Laboratory classes: execution of experimental studies, solving problem, discussion, teamwork.

Bibliography

Basic

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Kawalec M., Kodym J., Jankowiak M., Laboratorium z podstaw skrawania, Wydawnictwo Politechniki Poznańskiej, Poznań, 1984.

Olszak W., Obróbka skrawaniem. WNT Warszawa 2008.

Słupik H., Obróbka skrawaniem. Podstawy teoretyczne. Wydawnictwo Politechniki Śląskiej. Gliwice 2010.

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Additional

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Miernik M., Skrawalność metali. Metody określania i prognozowania, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2000.

Wieczorowski M., Cellary A., Chajda J., Przewodnik po pomiarach nierówności powierzchni czyli o chropowatości i nie tylko, Politechnika Poznańska, ITM, ZMiSP, Poznań 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) [1]	45	2

[1] delete or add other activities as appropriate