COURSE DESCRIPTION CARD - SYLLABUS

Course name

Machining

Course

Field of study

Mechanical and Automotive Engineering

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

part-time

Requirements

compulsory

Number of hours

Lecture

9

Laboratory classes

0

Other (e.g. online)

0

Tutorials

9

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr inż. Marek Rybicki

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Responsible for the course/lecturer:

Prerequisites

1) The student has basic knowledge of physics, mathematics and mechanics.

2) The student is able to use the acquired knowledge to analyze specific manufacturing techniques and is able to use information obtained from the library and the Internet.

3) The student shows independence in solving problems, gaining and improving the acquired knowledge and skills, understanding the need to learn.

Course objective

Acquainting future engineers with kinematics, technological possibilities, machine tools and cutting tools for various cutting methods. Acquiring the ability to select a cutting method, tool and cutting parameters for a technological task. Understanding the method of calculating technological and geometric cutting parameters, forces, cutting torque and power, theoretical roughness and the selection of cutting parameters with regard to the efficiency and unit cost of machining.

Course-related learning outcomes

Knowledge

1) Has a basic knowledge of the methods of linear measurements, measurements of stresses, strains, velocities, temperatures and fluid streams, including measurements of these quantities by electrical means.

2) Has basic knowledge of manufacturing techniques used in the engineering industry, such as casting, forming, reducing and incremental machining, welding and other joining techniques, cutting, coating and surface treatments.

3) Has elementary knowledge of electric drives in machines, including three-phase current, AC and DC motors, frequency and voltage converters, power electronics.

Skills

1) Can design a technology of making a simple machine element as well as a technology for assembling and disassembling a machine.

2) Can organize and substantively manage the process of designing and operating a simple machine from a group of machines from the group covered by the selected diploma path.

3) Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.

Social competences

1) Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on his own.

2) Is ready to fulfill social obligations and co-organize activities for the benefit of the social environment.

3) Is ready to initiate actions for the public interest.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Choice test or descriptive answer to questions, possible oral answer on the correction. Activity and attendance at the lecture increase the grade.

Classes: Solving computational problems. Being active increases your score. In order to obtain a credit for the exercises, the number of absences cannot exceed 1/3 of the classes.

In case of answers to: 50 to 60% of questions - satisfactory, above 60 to 70% - satisfactory +, above 70 to 80% - good, above 80 to 90% - good +, above 90 to 100% % - very good.

Programme content

LECTURE:

1) Introduction (classification of manufacturing techniques, conditions of material decohesion, cutting kinematics, cutting methods and their selection).

2) Tool and machined materials (types of tool materials in machining and abrasive machining, tool wear and tool life, classification of machined materials according to ISO and their machinability).

3) Kinematics, technological possibilities, tools and machine tools in the machining methods (turning, milling, drilling operations, broaching).

4) Kinematics, technological possibilities, tools and machine tools in abrasive machining methods (grinding, honing, superfinishing, lapping, smoothing, abrasive transfer machining, machining with abrasive brushes, abrasive blasting).

5) Thread machining (making threads by turning, milling, threading, grinding, ...).

6) Machining of teeth (shaping different teeth by milling, broaching, skiving, grinding, ...).

7) Trends in cutting technique (high-performance machining, new cutting zone cooling / lubrication techniques, complete machining, micro machining, hybrid machining).

EXERCISES:

1) Catalog selection of tools and initial range of cutting parameters. ISO marking of tools).

2) Kinematics of the cutting process (cutting speed, feed speed, feed per revolution and per tooth, cutting time).

3) Basic elements of the tool geometry (main entering angle, rake angle, clearance angle, corner radius, ...)

4) Dimensions and cross-sections of the cut layer (depth of cut, milling width, thickness of the cut layer, width of the cut layer, cross-sectional area of the cut layer on one blade and total).

5) Forces, moment and cutting power.

6) Tool life and economics of the cutting process (Taylor formula, economic and performance tool life, economic cutting speed, unit cost of machining).

7) Theoretical roughness of the machined surface.

Teaching methods

Presentation, exercises, work with catalogs

Bibliography

Basic

1) Dul-Korzyńska B.: - Obróbka skrawaniem i narzędzia. Oficyna Wydawnicza Politechniki Rzeszowskiej 2009.

2) Erbel J. (red.): Encyklopedia technik wytwarzania w przemyśle maszynowym. Tom II. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001.

3) Filipowski R., Marciniak.: Techniki obróbki mechanicznej i erozyjnej. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.

4) Kawalec M.: Ćwiczenia z podstaw skrawania. Skrypt 1138, Wydawnictwo Politechniki Poznańskiej 1983.

5) Kosmol J. (red.): Techniki wytwarzania – obróbka wiórowa i ścierna. Wydawnictwo Politechniki Slaskiej, Gliwice 2002.

6) Olszak W.: Obróbka skrawaniem. WNT Warszawa 2008.

7) Żebrowski H. : Techniki wytwarzania. Obróbka wiórowa, ścierna i erozyjna. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004.

Additional

1) Cichosz P.: Narzędzia skrawające. WNT. Warszawa 2008.

2) Czasopisma naukowo-techniczne: Mechanik, Przegląd Mechaniczny, Werkstatt und Betrieb

3) Materiały firm narzędziowych (strona ZOS IMt PP)

4) Schneider G.: Cutting tool applications. ASM International 2002

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	18	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	32	1,0

[1] delete or add other activities as appropriate