COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technological machineshttps://usosadm.prv.put.poznan.pl/usosadm/przedmioty/przedmioty.jsf#[N1ZiIP2>MTe]

Course

Field of study
Management and Production Engineering

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
8

Laboratory classes
16

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

Lecturers

Prerequisites

Basic knowledge in the field of theory of machines, machine parts, engineering graphics and other areas of education in the field of study. Basic knowledge of cutting tools and machining, and electrical engineering. Orderly theoretical knowledge in the field of study. Ability to use literature (acquiring knowledge from the indicated sources) and the Internet, has the ability to work in a team. Understanding the need for learning, acquire and improve skills throughout life and the importance of team collaboration.

Course objective

Providing students with basic knowledge about the construction and operation of conventional and numerically controlled metalworking machines and the basics of their operation, knowledge about kinematic chains, shaping systems, knowledge about main and feed drives, control systems, as well as skills in operating selected machine tools, including numerically controlled ones. Developing students' self-education skills with elements of independent acquisition of knowledge and developing technical interests.

Course-related learning outcomes

Knowledge:
The student should define the concept of a machine and a machine tool and provide examples, describe the movements occurring in machines and devices.

The student should characterize the drives of machines and devices, list and describe the drive motors used and indicate the accompanying mechanisms.
The student should recognize, distinguish, list and describe individual cutting machines.

Skills:
The student is able to select appropriate machines and devices for a given type of technological operations. Analyze and evaluate their construction, select components, plan and supervise maintenance tasks to ensure reliable operation.
The student is able to notice their social and economic aspects when formulating and solving engineering tasks.
The student is able to use the indicated sources of knowledge with understanding and is able to independently educate himself/herself.

Social competences:
Understand the need for lifelong learning; able to inspire and organize learning process of other people.
Able to cooperate and working in the group, taking different roles.
Is open to discussion of complex technical problems and is capable of communicating its knowledge in an understandable way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: acquired knowledge is verified by a final test. The test consists of 8 open questions. Credit in the case of correct answers to min. half of the questions (50% threshold).
Assignment of grades to percentage ranges of results: <90-100> very good; <80-90) good plus; <70-80) good; <60-70) satisfactory plus; <50-60) satisfactory; <0-50) unsatisfactory.
Laboratory classes: acquired knowledge and skills are verified on the basis of an oral or written answer regarding the content of each laboratory exercise performed, reports on each laboratory exercise. To get a laboratory credit, all exercises must be completed and passed (positive assessment of responses and reports).

Programme content

Definitions of machine, machine tools.
Machine drives, applications.
Mechanisms and components of machines.
Machines and machine tools.

Course topics

Lecture:
Division and comparison of conventional and numerically controlled machine tools. Drives of technological machines: main and feed - servo drives. Construction, operation and purpose of conventional and numerically controlled metalworking machine tools (lathes, milling machines, drilling machines, boring machines and boring-milling machines, planing and slotting machines, broaching machines, cutting-off machines, grinding machines). Control. Group machine tools, machining centers, flexible machining systems: ASO, ESO. Gear machine tools. Erosion machining machines.Laboratory classes:
Preparing and machining of parts on a CNC lathe
Preparing and machining of parts on a CNC milling machine.
Thread cutting by machine on CNC machine tools
Measurement of clearance in the mechanical gearbox of the rotary axis of machine tool feed drive
Testing the efficiency of the mechanical transmission
Cutting the cylindrical gears on the milling machine
Programming the machining of simple shapes
Programming machining using tool radius compensation
Programming of machining using machining cycles
Programming machining in the ShopMill system
Programming multi-stage shaft machining
Programming shaping machining in the ShopTurn system

Teaching methods

Lecture: multimedia presentation, discussion.
Laboratory classes: independent performance of practical exercises, devices, materials, tools, apparatus, measuring instruments, discussion.

Bibliography

Basic:
Wrotny L. T., Obrabiarki skrawające do metali, WNT, Warszawa 1979.
Honczarenko J., Obrabiarki sterowane numerycznie, WNT , Warszawa 2009.
Kosmol J., Automatyzacja obrabiarek i obróbki skrawaniem, PWN, Warszawa, 2000.
Kosmol J., Serwonapędy obrabiarek sterowanych numerycznie, WNT Warszawa, 1998.
Singh N.: CNC programming and control, by John Wiley & sons, Inc. London, 1996.
Metody twórczego rozwiązywania problemów inżynierskich, Branowski B., Wyd. WKT NOT, 1999.
Podstawy Konstrukcji Maszyn (tom 2), pod red. Marka Dietrycha, PWN, Warszawa, 1999.
Podstawy konstrukcji maszyn, Zbigniew Osiński, PWN 2012.
Krzysztof Netter, Maszyny i urządzenia technologiczne w obróbce ubytkowej. Laboratorium, Wydawnictwo Politechniki Poznańskiej, Poznań 2021.

Additional:
Poradnik inżyniera mechanika. T.3. Zagadnienia technologiczne, rozdz. III, VI, VII. WNT, Warszawa 1970.
Kosmol J., Napędy mechatroniczne, WNT Warszawa, 2013.
Pritschow G., Technika sterowania obrabiarkami i robotami przemysłowymi. Oficyna Wydawnicza Politechniki Wrocławskiej, 1995.
Pająk E., Zaawansowane technologie współczesnych systemów produkcyjnych, Wydawnictwo Politechniki Poznańskiej, Poznań 2000.
Skoczyński W., Sensory w obrabiarkach CNC, Wydawnictwo Naukowe PWN SA, Warszawa,2018.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	24	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	51	2,00