



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Programming of CNC machine tools

### Course

Field of study

Mechanics and Mechanical Engineering

Area of study (specialization)

Construction of machines and devices

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

polski

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

PhD Eng. Wojciech Ptaszynski

wojciech.ptaszynski@put.poznan.pl

tel. 61 665 2039

Faculty of Mechanical Engineering

ul. Piotrowo 3, 60-965 Poznan

Responsible for the course/lecturer:

### Prerequisites

Basic knowledge of machining and machine tools. The ability to think logically, read technical drawings. Understanding the need to learn and acquire new knowledge in the field of numerically controlled machine tools

### Course objective

Learning methods of programming numerically controlled machine tools using advanced control system software and the basics of operating these machines.

### Course-related learning outcomes

Knowledge

The student should know the basic ways of programming machine tools. The student should know the



basic addresses and functions of the machining program. The student should know the basic symbols used in numerically controlled machine tools.

#### Skills

The student is able to independently program the processing of simple objects. Student is able to prepare a numerically controlled machine tool for machining. The student is able to perform basic operations on a numerically controlled machine tools.

#### Social competences

The student can work in a group. The student is aware of the possibilities of modern numerically controlled machine tools. The student is able to use advanced numerically controlled machine tools.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Credit based on a test consisting of five general questions. Credit in the case of a correct answer to min. 3 questions

Laboratory: Assessment based on an oral or written answer regarding the content of each laboratory exercise. In order to get a credit for the laboratories, all exercises must be passed - a positive grade from the answer.

#### Programme content

Lecture:

1. Introduction to programming milling machines with Heidenhain control system
2. Programming machining using simple machining cycles
3. Programming free outlines and machining free outlines
4. Programming parametric machining and using mathematical functions and program loops
5. Programming multi-axis machining (4 and 5 axes) on CNC milling machines
6. Programming the lathe in the ShopTrain system
7. Basics of operation and work on CNC machine tools with the use of special instrumentation

Lab:

1. Programming free contours in the Heidenhain control system
2. Programming the lathe in the ShopTrain system
3. Programming machining of 3 + 2 axes
4. Programming machining of any contours in the Heidenhain control system



5. Machining on a CNC lathe
6. Machining on a CNC milling machine 3 + 2 axes

### Teaching methods

Lecture illustrated by multimedia presentations

Laboratory in the workshop at numerically controlled machine tools

### Bibliography

Basic

1. Grzesik W., Niesłony P., Bartoszek M.: Programowanie obrabiarek NC/CNC. WNT 2006.
2. Instrukcja obsługi dla operatora. Dialog tekstem otwartym. HEIDENHAIN 2009
3. Proste toczenie przy pomocy ShopTurn. Siemens 20

Additional

1. Feld. M.: Projektowanie i automatyzacja procesów technologicznych. WNT 1994.
2. Kosmol J. : Automatyzacja obrabiarek i obróbki skrawaniem. WNT 2000

### Breakdown of average student's workload

	Hours	ECTS
Total workload	45	3
Classes requiring direct contact with the teacher	30	
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	15	

<sup>1</sup> delete or add other activities as appropriate