

Course description

1 General information

Course name	Simulation and CNC technology
Course code	
Level of study (B.Sc, M.Sc., Ph.D.)	M.Sc.
ECTS	5
Course manager	prof. dr hab. inż. Wojciech, Bogusław Zebala, Institute of Production Engineering
Course length	One (1) semester
Coordinator for international programs	erasmus@mech.pk.edu.pl

2 Prerequisites

- Basic knowledge concerning production engineering.
- Basic knowledge concerning CAD/CAM programs.

2 Program

Type	Lectures	Classes	Labs	Computer labs	Project	Seminar
Hours	15		15	15	15	

3 Contents

Lectures		
No.		Hours
1	Features and advantages of machining simulation models.	3
2	Tendency in CNC manufacturing technology. Tendency CNC in cutting tool machine construction. Dry and MQL machining. Manufacturing of parts made of difficult-to-cut materials.	4
3	Modeling of cutting processes. Advances developments in material removal process simulation.	4
4	Monitoring and supervising of machining in the Industry 4.0 idea.	4

Labs		
No.		Hours
1	Cutting tools geometry measurements.	2
	Working on the machine tool control panel.	2
	Preparing the machine tool for operation and starting the NC program.	3
	Monitoring and supervising of machining. Cutting force component and temperature in turning process measurements.	4
2	Monitoring and supervising of machining. Cutting force component and temperature in milling process measurements.	4

Computer labs		
No.		Hours
1	Design of turning process with CAD/CAM systems.	4
2	Design of milling process with CAD/CAM systems.	4
3	Simulation research of machining processes.	6
4	Optimization of turning and milling processes - selected examples.	1

Project		
No.		Hours
1	Optimization of turning processes.	7
2	Optimization of milling processes.	8

3 Learning Outcomes (skills and knowledge):

- Student knows the basic issues related to simulation and optimization of the machining process.
- Student knows the basic factors affecting the cutting process (protective coatings, cutting tool geometry and cooling method).
- Student knows the structure and principle of operation of the monitoring and supervising machining processes.
- Student can analyze the load of the tool edge, temperature field distribution and stress.
- Student is able to use software for optimization the machining proces.

4 Assessment policy (examination):

- Report on laboratory exercises.
- Project
- Tests

5 Literature

1. Boothroyd G. — Fundamentals of Metal Machining., Londyn, 1965, Edward Arnold Ltd.
2. Paulo D. & Jackson M.J. — Nano and Micromachining., Londyn, 2009, Wiley.
3. Sandvik — Modern Metal Cutting - a Practical Handbook, Sweden, 1994, Sandvik.
4. Grzesik W. — Advanced Machining Processes of Metallic Materials, Amsterdam, 2008, Elsevier.
5. Zebala W. — Modelowanie procesu skrawania, Kraków, 2011, Politechnika Krakowska.
6. Jabłoński W., Słodki B. – Machining – Reference notes for foreign students SU 1683, Kraków, 2006, AGH.