Kielce University of Technology

FACULTY OF MECHATRONICS AND MECHANICAL ENGINEERING

Annex 9
to the Rector's Ordinance No. 35/19
of 12 June 2019

COURSE SPECIFICATION

Course code	**M#1-S1-ME-KWW-409**
Course title in Polish	**Podstawy programowania CNC**
Course title in English	**Fundamentals of CNC Programming**
Valid from (academic year)	**2019/2020**

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**first-cycle**
Type of education	**academic**
Mode of study	**full-time**
Specialism	**Computer-Aided Manufacturing**
Department responsible	**Department of Manufacturing Engineering and Metrology**
Course leader	**Łukasz Nowakowski, BEng, PhD**
Approved by	

COURSE OVERVIEW

Course type	**specialism-related**
Course status	**compulsory**
Language of instruction	English
Semester of delivery	**semester 4**
Pre-requisites	**Engineering Drawing, Fundamentals of Machining**
Examination required (YES/NO)	NO
ECTS value	**5**

Mode of instruction	**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	**30**		**15**	**30**	

LEARNING OUTCOMES

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	They will have a fundamental knowledge of the techniques of manufacturing machine parts, methods of joining materials, taking into account additive and laser technologies, rapid prototyping and reverse engineering, also has a basic knowledge of the construction of various types of processing systems and shaping materials.	MiBM_W10
	W02	They will have a fundamental knowledge related to selected issues in the field of machine construction, production technology of basic elements of machines and devices, their operation, evaluation of operational properties and wear, diagnosis of the technical condition, repair technology and safe use.	MiBM1_W15
Skills	U01	They will be able to use computer software in the field of mechanics and machine construction	MiBM1_U02
	U02	They will have knowledge of designing a simple technological process in the field of mechanics and machine construction and select appropriate machines and devices for this purpose	MiBM1_U08
Competence	K01	On completion of this programme students will understand the need for and know the opportunities of gaining further professional qualifications (second cycle programmes, third cycle programmes, postgraduate non-degree courses, training courses) to enhance their professional, personal and social development.	MiBM1_K01
	K02	They will be aware of and understand the relationships between engineering and non-engineering activities, including their impact on the environment and the responsibility for decision-making.	MiBM1_K02

COURSE CONTENT

Type of instruction*	Topics covered
lecture	As part of the lectures, the following content will be provided, covering the basic issues of: construction of numerically controlled machine tools, types of kinematic systems, technological possibilities of individual groups of numerically controlled machine tools, devices used on numerically controlled machine tools, types of controllers used in numerically controlled machine tools. Students will also be acquainted with the basics of manual programming of lathes and milling machines, program structure, stock definition, tool definition, simple tool path programming and machine functions.

laboratory	As part of the laboratory classes, students will complete 6 practical exercises covering the following content: • getting acquainted with the construction and operation of numerically controlled lathes located in the laboratory (starting the machine, basic control operation, equipping the machine with tools, measuring the tool, clamping the stocks, setting the program zero point, creating a simple machining program, simulating the program, starting the machining process), • implementation on a lathe of a simple technological process, which was developed during the design classes, • performing quality control of the processed item, introducing corrections to the machining program, • getting acquainted with the construction and operation of numerically controlled milling machines located in the laboratory (starting the machine, basic control operation, equipping the machine with tools, measuring the tool, clamping the stocks, setting the program zero point, creating a simple machining program, simulating the program, starting the machining process), • implementation on a milling machine of a simple technological process, which was developed during design classes • performing quality control of the processed item, introducing corrections to the machining program,
project	As part of the design classes, students will be familiarized with the operation of numerically controlled machine tool control systems simulators, with the use of which they will develop two simple technological processes for a lathe and milling machine. The scope of the project includes: • development of a model and technical drawing of a selected item in a CAD program, • selecting the machine tool, holder and tools that will be used in the production process, • selection of technological parameters of the machining process, • development of programs controlling the operation of numerically controlled machine tools, • selection of measurement tools necessary to verify the correctness of the designed object.

*) Please delete rows in the table above that are not applicable.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			
U01			X	X	X	
U02			X	X	X	
K01						X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	examination assessment	The pass mark is a minimum of 50 points out of a possible 100 for the final in-class test.

laboratory	non-examination assessment	Regular class attendance. A minimum of 50 points out of a possible 100 for each post-lab report and the final in-class test.
project	non-examination assessment	Regular class attendance. The pass mark is a minimum of 50 points out of a possible 100 for the project.

*) Please delete rows in the table above that are not applicable.

OVERALL STUDENT WORKLOAD

ECTS weighting							
	Activity type	**Student workload**					**Unit**
1.	Scheduled contact hours	L	C	Lab	P	S	h
		30		15	30		
2.	Other contact hours (office hours, examination)	2		2	2		h
3.	**Total number of contact hours**	**81**					h
4.	**Number of ECTS credits for contact hours**	**3,2**					ECTS
5.	**Number of independent study hours**	**44**					h
6.	**Number of ECTS credits for independent study hours**	**1,8**					ECTS
7.	**Number of practical hours**	**75**					h
8.	**Number of ECTS credits for practical hours**	**3,0**					ECTS
9.	**Total study time**	**125**					h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**5**					ECTS

READING LIST

1. Basics of CNC Programming by Pawan Negi, Mangey Ram, Om Prakash Yadav
2. CNC Programming with G Code for Beginners: Learn the basics of machining with G-Code Kindle Edition by Vokocic Nest Publications
3. CNC Machining Handbook: Building, Programming, and Implementation Paperback by Alan Overby
4. Heidenhain Programming Manuals and Operator Documentation