Faculty of Mechanical Engineering									
Field of study	**Mechanics and Construction of Machinery**							**Degree level and programme type**	**Bachelor's degree**
Specialization/ diploma path	**machines technology**							**Study profile**	
Course name	**Numerically Controlled Machine Tools**							**Course code**	**IS-FME-00163S**
								Course type	**obligatory**
Forms and number of hours of tuition	**L**	**C**	**LC**	**P**	**SW**	**FW**	**S**	**Semester**	**summer**
	8	**-**	**8**	**14**	**-**	**-**	**-**	**No. of ECTS credits**	**6**
Entry requirements	**Manufacturing Technologies I**								
Course objectives	An introduction of the students to the construction of the CNC machine tools. Teaching of the activities related to the preparation of CNC machine tools to work. Knowledge of the structure and operation of the computerized numerical control. A theoretical and practical knowledge of the CNC machine tools programming.								
Course content	Technical solutions and construction of the most important assemblies and components of the CNC machine tools. Axes and movements in the CNC machine tools. A structure of the modern computer numerical control systems. Development trends of the modern CNC machine tool. Programming methods of the CNC machine tools. Basics of the CNC machine tools programming: manual programming, computer aided programming (CAD/CAM systems), workshop oriented programming.								
Teaching methods	multimedia presentation, practical classes in the workshop and in the computer laboratory								
Assessment method	lecture – written exam; laboratory classes – evaluation of reports, verification of preparation for classes; project – project completion, presentation and discussion								
Symbol of learning outcome	**Learning outcomes**								**Reference to the learning outcomes for the field of study**
LO1	student: can describe the various assemblies of the CNC machine tool								**M1_W17, M1_W19**
LO2	student: describes the structure and function of the CNC systems								**M1_W17, M1_W19**
LO3	student: describes the various methods of the CNC programming								**M1_W14**
LO4	student: remembers the rules of the creating of the CNC programme								**M1_W14, M1_U16**
LO5	student: creates CNC part programs								**M1_U16**

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO6	student: is able to work in a team, applies safety rules	M1_U02, M1_U23
LO1	evaluating the student's written exam and reports	L, LC
LO2	evaluating the student's written exam	L
LO3	evaluating the student's written exam and preparation for the laboratory classes	L, LC
LO4	evaluating the student's written exam and performance in classes	L, LC, P
LO5	discussion of the student's project	P
LO6	discussion of the student's reports, evaluation of the student's performance in the classes	LC

Student workload (in hours)		No. of hours
Calculation	lecture attendance	8
	participation in laboratory classes	8
	participation in project	14
	preparation for laboratory classes	16
	working on projects, reports, etc.	65
	participation in student-teacher sessions related to the classes/project, preparation for and participation in exam	44
	TOTAL:	155

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	51	2
Student workload – practical activities	104	4

Basic references	Serope Kalpakjian, Steven Schmid, Manufacturing Engineering & Technology, Prentice Hall; 7 edition (April 11, 2013) Helmi A. Youssef, Hassan A. El-Hofy, Mahmoud H. Ahmed, Manufacturing Technology: Materials, Processes, and Equipment, August 17, 2011 by CRC Press, Michael Fitzpatrick, Machining and CNC Technology with Student Resource DVD, McGraw-Hill Science/Engineering/Math; 3 edition (February 19, 2013)
Supplementary references	Paul K. Wright, E M Trent, Metal Cutting, Fourth Edition, Butterworth-Heinemann; 4 edition (January 17, 2000) Hans Kief, Helmut Roschiwal, CNC Handbook, McGraw-Hill Professional; 1 edition (October 12, 2012)

Organisational unit conducting the course	Department of the Materials Engineering and Production	Date of issuing the programme
Author of the programme	Andrzej Werner, Ph. D., Eng.	2021-03-22

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,

S – seminar