Course Descriptions for the Joint Study Programme
"International Master of Science in Engineering, Entrepreneurship and Resources (MSc. ENTER)

Version 09.2019

Courses at **Dnipro University of Technology**
with the Specialization "**End-to-End Engineering of Machine-Building Production**"

Module Name	**COMPUTER RESEARCHES OF PROCESSING OF DETAILS ON MULTI-FACETED CNC MACHINES** **Комп'ютерні дослідження процесів обробки деталей на багатовісних верстатах з ЧПК**
ECTS Credits	9
Responsible	Derbaba V.A.
Lecturer(s)	Derbaba V.A.
Institute(s)	Department of Materials Science and Mechanical Engineering Technologies
Duration	1 year (semester)
Teaching Language	Ukrainian
Learning Outcome (Competencies)	Competences: Ability to apply new modern methods of working out of technological processes of manufacture of products and objects in the field of professional activity with the definition of rational technological modes of operation of special equipment Knowledge acquired by a student: 1. To perform simulation and statistical research of control systems of mechanical quantities used in machine-building technology 2. To carry out structural and parametric optimization of technological processes of production of machine building products based on computer modeling in CAD / CAM / CAE systems. 3. To study technological processing systems, using the theory of automatic control of the processes of cutting materials processing. 4. Investigate the components of technological processing systems using modified thermomechanical process models
Contents	The training will include lectures and laboratory work. During the study, students will model parts with complex surfaces and calculate the automated processing technology on multi-axis CNC machines using progressive cutting and auxiliary tools.
Teaching Methods	Lectures, laboratory works and control activities 128 h. Self-study 142 hours. Total load 270 h.
Assessment Methods	Written exam
Grading	100 points 90… 100 Excellent 75 ... 89 Good

	60 ... 74 Satisfactory 0 ... 59 Fail
Materials/literature	Summary of lectures, methodical recommendations for laboratory work
Workload	270 h.

Module Name	**OPTIMIZATION OF CUTTING MODES ON CNC MACHINES**
ECTS Credits	**6**
Responsible	Zil V.V.
Lecturer(s)	Zil V.V.
Institute(s)	Department of Materials Science and Mechanical Engineering Technologies
Duration	1 semester
Teaching Language	Ukrainian
Learning Outcome (Competencies)	Competences: Ability to use methods of fundamental sciences for the solution of general engineering and professional tasks. Ability to apply theoretical knowledge and practical skills in the design of technological processes and technological equipment. Knowledge acquired by a student: 1. Evaluate the effect of cutting speed on the force and the coefficient of friction on the surfaces of the tool. 2. Estimate the new characteristics of the dimensional stability of the tool 3. Estimate the dependence of the characteristics of the dimensional stability of the tool on the speed and temperature of cutting. 4. Experimentally determine the optimal cutting modes. 5. Set the economic cutting speed and the economic period of the instrument's stability. 6. Analyze and graphically determine the economic speed of cutting. 7. Establish the connection between the cutting speed and the presentation at a minimum wear tool. 8. Set optimal processing modes.
Contents	The training will include lectures and laboratory work. During the training, students will conduct simulation of processes for processing details with complex surfaces on multi-axis CNC machines with a choice of optimal cutting modes by linear programming.
Teaching Methods	Lectures, laboratory works and control activities 56 hours Independent work 124 hours Total load 180 hours
Assessment Methods	Written exam
Grading	100 points 90… 100 Excellent 75 ... 89 Good 60 ... 74 Satisfactory 0 ... 59 Fail
Materials/literature	Summary of lectures, methodical recommendations for laboratory work
Workload	180 h.

Module Name	MATHEMATICAL MODELING OF SYSTEMS
ECTS Credits	**6**
Responsible	Churikanova O.Yu.
Lecturer(s)	Churikanova O.Yu.
Institute(s)	Department of Materials Science and Mechanical Engineering Technologies
Duration	1 semester
Teaching Language	English
Learning Outcome (Competencies)	Competences: Ability to solve complex tasks and problems in a particular area of professional activity or in the process of study that involves research and / or innovation and is characterized by uncertainty of conditions and requirements. Knowledge acquired by a student: 1. To have the terminology used in simulation of technological systems. 2. Perform a mathematical description of the technological process. 3. Solving optimization problems. 4. Use numerical methods for solving nonlinear programming problems. 5. Use the methods of solving multicriteria optimization problems. 6. To carry out operatively - scheduling in technological systems on the basis of the theory of schedules. 7. To be able to use in practice the mathematical methods of modeling in the analysis of the technological process.
Contents	The training will include lectures and laboratory work. During the exercise students will study the methods of mathematical modeling of systems
Teaching Methods	Lectures, laboratory works and control activities 52 hours. Independent work 128 hours. Total load 180 hours.
Assessment Methods	Differential score
Grading	100 points 90… 100 Excellent 75 ... 89 Good 60 ... 74 Satisfactory 0 ... 59 Fail
Materials/literature	Summary of lectures, methodical recommendations for laboratory work
Workload	180 h.

Module Name	SYSTEM-STRUCTURAL OPTIMIZATION OF PROCESSING PROCESSES ON CNC MACHINES
Code	
ECTS Credits	**9**
Responsible	Patsera S.T.
Lecturer(s)	Patsera S.T.
Institute(s)	Department of Materials Science and Mechanical Engineering Technologies
Duration	1 year (two semester's)
Teaching Language	Ukranian (English?)
Learning Outcome (Competencies)	Competence: Ability to conduct research on system-structural optimization of processing processes on CNC machines. Ability to develop technological processes for the processing of parts using modern technology and the use of CNC machines. Ability to apply new modern methods of working out

	technological processes of manufacturing products and objects in the field of professional activity with the definition of rational technological modes of operation of special equipment. Knowledge acquired by a student: 1. To apply system-structural modeling of processes of mechanical processing. 2. Apply the algorithm for choosing the optimal method of manufacturing the workpiece. 3. Apply the synthesis of possible routing details on the basis of the graph method. 4. Apply an algorithm for optimal choice of a model of a CNC machine based on the application of the theory of fuzzy sets. 5. Apply the synthesis of advanced processing methods.
Contents	The training will include lectures and laboratory work. During the training, students will conduct modeling and structural optimization of the route of detail processing, the composition of equipment and technological equipment. Then parametric multicriteria optimization of the processes of processing details with complex surfaces on multi-axis CNC machines will be performed.
Teaching Methods	Lectures, laboratory works and control activities 128 h. Self-study 142 hours. Total load 270 h.
Assessment Methods	Written exam
Grading	100 points 90… 100 Excellent 75 ... 89 Good 60 ... 74 Satisfactory 0 ... 59 Fail
Materials/literature	Summary of lectures, methodical recommendations for laboratory work
Workload	270 h.