

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



Version 07.2024

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

Module Name	Research of the mechanical engineering product parameters control reliability (ДОСЛІДЖЕННЯ ДОСТОВІРНОСТІ КОНТРОЛЮ ПАРАМЕТРІВ ВИРОБІВ АШИНОБУДУВАННЯ)
ECTS Credits	6
Responsible	Patsera S.T.
Institute(s)	Department of Mechanical Engineering Technology and Materials Science
Duration	1 year (semester)
Teaching Language	Ukrainian
Learning Outcome (Competencies)	<p>Competences: Perform software implementation of algorithmic models in Microsoft Excel, Fuzzy Logic and NI LabVIEW environments, which provides appropriate skills in research automation.</p> <p>Knowledge acquired by a student:</p> <ol style="list-style-type: none"> 1. Apply theoretical knowledge and practical skills in modelling the measurement and control of geometric parameters of parts 2. Conduct scientific research using simulation and statistical modelling when the objects of research are the processes of tolerance control of linear dimensions of parts, the accuracy of which is regulated by international standards for tolerances and fit (smooth shafts, gear crowns, right-hand splines, etc.) 3. Know the accuracy characteristics of coordinate-measuring machines for determining the manufactured parts dimensions
Contents	The training will include lectures and practical work. During the course, students will learn forecasting and programming techniques in Microsoft Excel, NI LabVIEW and Fuzzy Logic.
Teaching Methods	Lectures, practical works and control activities 65 h. Self-study 115 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 practical work
Workload	180 h.

Module Name	Computer research of details processing on multi-faceted CNC Machines (КОМП'ЮТЕРНІ ДОСЛІДЖЕННЯ ПРОЦЕСІВ ОБРОБКИ ДЕТАЛЕЙ НА БАГАТОВІСНИХ ВЕРСТАТАХ З ЧПК)
ECTS Credits	9
Responsible	Derbaba V.A.
Institute(s)	Department of Mechanical Engineering Technology and Materials Science
Duration	1 year (semester)
Teaching Language	Ukrainian
Learning Outcome (Competencies)	Competences: Ability to apply new modern methods of products and objects manufacture technological processes developing in the field of professional activity with the definition of special equipment operation rational technological modes Knowledge acquired by a student: 1. To perform simulation and statistical research of control systems of mechanical quantities used in machine-building technology 2. Conduct 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.
Contents	The training will include lectures and practical 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, practical works and control activities 130 h. Self-study 140 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 practical work
Workload	270 h.

Module Name	Optimization of cutting modes on CNC machines (ОПТИМІЗАЦІЯ РЕЖИМІВ РІЗАННЯ НА ВЕРСТАТАХ З ЧПК)
ECTS Credits	6
Responsible	Bohdanov O.O.
Institute(s)	Department of Mechanical Engineering Technology and Materials Science
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:

	<ol style="list-style-type: none"> 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 tool dimensional stability 3. Estimate the dependence of the tool dimensional stability characteristics on the speed and temperature of cutting. 4. Experimentally determine the optimal cutting modes. 5. Analyze and graphically determine the economic speed of cutting. 6. Establish the connection between the cutting speed and the presentation at a minimum wear tool. 7. Set optimal processing modes.
Contents	The training will include lectures and practical 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, practical works and control activities 65 hours. Independent work 115 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 practical work
Workload	180 h.

Module Name	Innovative experimental and theoretical research in the field of applied mechanics (ІННОВАЦІЙНІ ЕКСПЕРИМЕНТАЛЬНІ І ТЕОРЕТИЧНІ ДОСЛІДЖЕННЯ В СФЕРІ ПРИКЛАДНОЇ МЕХАНІКИ)
ECTS Credits	9
Responsible	Aleksieienko S.V.
Institute(s)	Department of Materials Science and Mechanical Engineering Technologies
Duration	1 year (1 semester)
Teaching Language	Ukrainian
Learning Outcome (Competencies)	Competence: Ability to identify, pose and solve engineering-technical and scientific-applied problems. Ability to generate new ideas. Ability to plan and carry out experimental and theoretical research on applied mechanics and related interdisciplinary problems, to develop and summarize the results of research. Knowledge acquired by a student: <ol style="list-style-type: none"> 1. Independently set and solve problems of an innovative nature, argue and defend the obtained results and decisions. 2. Search for necessary information in scientific and technical literature, electronic databases and other sources, assimilate, evaluate and analyze this information. 3. Apply automation systems for research, design and construction work, technological training and engineering analysis in mechanical engineering.

	4. Plan and carry out experimental and theoretical research in the field of applied mechanics, analyze their results, substantiate conclusions.
Contents	The module is focused on studying modern methods, concepts and technologies in the field of applied mechanics with an emphasis on an innovative approach. During the training, students will study the theoretical foundations of mechanics, the use of modern tools for modeling and analysis, as well as conducting experiments to confirm theoretical assumptions and discover new knowledge. The course also focuses on the development of critical thinking, creative skills and the ability to think innovatively in students.
Teaching Methods	Lectures, practical works and control activities 78 h. Self-study 192 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 practical work
Workload	270 h.

Study schedule MSc. ENTER (from October 2024)

Modules	1 st term L/E/S/P	2 nd term L/E/S/P	3 rd term L/E/S/P	4 th term L/E/S/P	CP
Compulsory modules					
Research of the mechanical engineering product parameters control reliability	2/3/0/0 DUT				6
Computer research of details processing on multi-faceted CNC Machines	2/4/0/0 DUT				9
Optimization of cutting modes on CNC machines	2/3/0/0 DUT				6
Innovative experimental and theoretical research in the field of applied mechanics	2/4/0/0 DUT				9
Compulsory modules					
Current Issues in Enabling Technologies for Circular Economy		LUT Online Teaching			5
Knowledge Discovery and Process Data Analysis		LUT Online Teaching			5
Process Intensification		LUT Blended Teaching			5
Academic Entrepreneurship		LUT Blended Teaching			6
Start-ups and venture formation		LUT Blended Teaching			6
Elective modules: Students must choose at least 3 CP to achieve 30 CP in total.					
Simulation, Laboratory Course		LUT Online Teaching			5
Advanced Course in Life Cycle Assessment		LUT Blended Teaching			8
Integration of Product's Design, Sustainable Production and Material Selection		LUT Blended Teaching			5
Bioeconomy		LUT Blended Teaching			5
Development of New Sustainable Products and Solutions		LUT Blended Teaching			5
Power-to-X processes		LUT Online Teaching			5
Fluid Dynamics in Chemical Engineering		LUT Contact Teaching			5

Modules	1 st term L/E/S/P	2 nd term L/E/S/P	3 rd term L/E/S/P	4 th term L/E/S/P	CP
Compulsory modules					
Training in Particle Technology			1/2/0/0 TUBAF		4
Training in Endurance and Design			1/2/0/1 TUBAF		6
Conception of Process Equipment			2/1/0/0 TUBAF		5
Sustainable Engineering			2/1/0/0 TUBAF		4
Project - Process Design Mineral Processing / Recycling			0/0/2/8 TUBAF		5
Elective modules: Students must choose at least 6 CP to achieve 30 CP in total.					
Maintenance Engineering *			2/1/0/0 TUBAF		4
Process Development in Mechanical Process Engineering *			2/0/1/0 TUBAF		4
Recycling - Secondary Raw Materials *			3/0/1/0 TUBAF		6
Master Thesis (Mechanical and Process Engineering)				22 Wo (DUT/LUT/ TUBAF)	30

Legend - Teaching Methods:

In contact hours per week

L= Lecture

E= Exercise

S= Seminar

P= Practical application