Faculty of Transport and Mechanical Engineering - **Lutsk National Technical University**

**Proposal of the subjects for Erasmus+ student**





Faculty of Transport and Mechanical Engineering - **Lutsk National Technical University**

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| **UDERGRADUATE STUDY** | **ECTS** |
| **Management of international projects** | **Larysa Savosh,****PhD., associate professor** | **5** |
| **Mathematical modeling and simulation in industrial engineering** | **Igor Dudarev****PhD, DSc, Professor** | **5** |
| **CAD/CAM/CAE technologies in mechanical engineering** | **Oleksandr Povstianoi****PhD, DSc, Professor** | **5** |
| **Research of technological systems** | **Igor Dudarev****PhD, DSc, Professor** | **5** |
| **CAD-graphics and design of machines** | **Viktor Sychuk****PhD, associate professor** | **5** |
| **Basics of technological equipment reliability** | **Olha Zaleta ,****PhD, associate professor** | **5** |

**BASICS OF TECHNOLOGICAL EQUIPMENT RELIABILITY**

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| **Class Type** | Class |
| **Department** | Applied mechanics and mechatronics |
| **ECTS Points** | 5 ECTS |
| **Effects of Education Process** | The purpose of teaching the course “Basics of technological equipment reliability” is preparing highly qualified engineer with knowledge on the concept of reliability as an indicator of the functional efficiency of technological equipment and also with skills of calculating its main quantitative parameters using statistical data obtained experimentally.As a result of completion of the discipline "Basics of technological equipment reliability" students will be able to: determine the main characteristics and general level of reliability of technological equipment; effectively use algorithms for calculating the reliability parameters; set and solve engineering problems related to research, testing and reliability assessment of the equipment; predict the working condition of technological equipment; determine maintenance and repair strategies to ensure reliability; distinguish the expediency of using different methods of increasing reliability. |
| **Lecture Topic** | Basic concepts and definitions of reliability theory. The concept of failure, classification and characteristics of failures. Parameters of reliability, durability, maintainability and maintainability of technological equipment. The main provisions of forecasting the working condition of technological equipment. Maintenance and repair strategies to ensure reliability. Methods of increasing reliability. Control of reliability of technological equipment. |
| **Literature** | 1. Coen van Gulijk, Elena Zaitseva (2014). Reliability Engineering and Computational Intelligence (1st ed.). Springer London.2. Yohannes Yebabe Tesfay (2021). Developing Structured Procedural and Methodological Engineering Designs. Applied Industrial Engineering Tools. Springer Cham.3. Steve S. Niu, Deyun Xiao (2022). Process Control: Engineering Analyses and Best Practices. Springer Cham.4. Bruno G. Rüttimann, Martin T. Stöckli (2022) Elements of Advanced Manufacturing Theory. Springer Cham. |
| **Subject’s Passing Form** | Exam |
| **Programme Author / Teacher** | **Olha Zaleta, Associate Professor** |

**MATHEMATICAL MODELING AND SIMULATION IN INDUSTRIAL ENGINEERING**

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| **Class Type** | class |
| **Department** | Department of technologies and equipment of processing industries |
| **ECTS Points** | 5 ECTS |
| **Effects of education process** | The purpose of teaching the course “Mathematical modeling and simulation in industrial engineering” is preparing highly qualified specialist with knowledge and skills of mathematical modeling and simulation of technological processes and equipment across many different areas.After successfully completing this course, a student should be able to:understand modeling process;clearly explain various methods used to model data;apply problem-solving strategies to reach solutions of engineering problems.In addition, the student should be able to: solve engineering and technological problems; use computer technology to solve problems of mathematical modeling. |
| **Lecture Topic** | The elementary mathematical models and basic concepts of mathematical modeling. Derivation of models from the fundamental laws of nature. Phenomenological models. Mechanistic models. Empirical model building. Strategies for simplifying mathematical models. Full factorial designs with two-level factors. Model building in mathematical programming. |
| **Literature** | 1. Velten, K. (2009). Mathematical Modeling and Simulation. WILEY-VCH.2. Giordano, F. R., Fox, W. P., Horton, S. B. (2014). A first course in mathematical modeling, Brooks/Cole.3. Mesterton-Gibbons, M. (1988). A concrete approach to mathematical modeling. Addison-Wesley.4. Williams, H. P. (2013). Model building in mathematical programmin. 5th ed. John Wiley & Sons Ltd. |
| Subject’s Passing Form | Exam |
| **Programme Author / Teacher** | **Igor Dudarev, Professor**  |

**RESEARCH OF TECHNOLOGICAL SYSTEMS**

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| **Class Type** | class |
| **Department** | Department of technologies and equipment of processing industries |
| **ECTS Points** | 5 ECTS |
| **Effects of education process** | The purpose of teaching the course “Research of technological systems” is preparing highly qualified specialist with knowledge and skills of the scientific bases of research of technological systems.After successfully completing this course, a student should be able to:independently plan to organize and conduct scientific research, including multidisciplinary, in the conditions of research laboratories and in production conditions; use methods of mathematical modeling and optimization to create models of technological processes and optimization of their parameters;plan and carry out research of technological systems. |
| **Lecture Topic** | The role of research in the development of technical systems. Technical system as an object of scientific research and design. Modeling of technical system. Reliability and performance of technological systems. Experimental studies of technological systems. Multifactorial experiment. Optimization of technological systems. Combinatorial methods for optimizing the structure of the technological system. |
| **Literature** | 1. Design Science Research. Cases. (2020). Eds.: Jan vom Brocke, Alan Hevner, Alexander Maedche, 319.2. Creswell, J. W. (2014). Research design: qualitative, quantitative, and mixed methods approaches. SAGE, 273.3. Williams, H. P. (2013). Model building in mathematical programmin. 5th ed. John Wiley & Sons Ltd. |
| **Subject’s Passing Form** | Exam |
| **Programme Author / Teacher** | **Igor Dudarev, Professor**  |

**CAD/CAM/CAE TECHNOLOGIES IN MECHANICAL ENGINEERING**

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| **Class Type** | class |
| **Department** | Applied mechanics and mechatronics |
| **ECTS Points** | 5 ECTS |
| **Effects of education process** | The ability to solve complex automated tasks and practical problems in applied mechanics and mechatronics, which involves the use of special theories and practical skills in the use of CAD/CAM/CAE systems in mechanical engineering, which is characterized by complexity and uncertainty of conditions. |
| **Lecture Topic** | Mastery by students and meaningful study, use of existing design automation tools in various industries:• the essence of technical preparation of machine-building production, its constituent parts and the structure of technological processes using automated design systems;• analysis and calculation of automated CAD/CAM/CAE systems (T-FLEX, SOLIDWORKS, POWERSHAPE);• productivity and cost-effectiveness of detail design, technical standardization and methods of reducing the cost of products using modern CAD/CAM/CAE systems;• the validity of proposals for improving automated design with the possibility of processing typical parts, based on the production capabilities of real enterprises. |
| **Literature** | 1. Basics of technological equipment design using SolidWorks. Part 1 – Design: a study guide / O. Povstyanoi, V.Rud - Lutsk: Lutsk NTU, 2017. - 360 p.2. Shih R. Introduction to Finite Element Analysis Using SOLIDWORKS Simulation / R. Shih. — SDC Publications, 2015. — 500 p.:ISBN-13: 978-1630570095.3. Huei-Huang Lee. Machanics of Meterials Labs with SolidWorks Simulation 2014. 2014. – 278 p |
| **Subject’s Passing Form** | Exam |
| **Programme Author / Teacher** | **Oleksandr Povstianoi, Professor**  |

**MANAGEMENT OF INTERNATIONAL PROJECTS**

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| **Class Type** | Class |
| **Department** | International Economic Relations |
| **ECTS Points** | 5 ECTS |
| **Effects of education process** | The purpose of the course “Management of International Projects” is to prepare qualified specialists with the knowledge on the use of modern project approaches to solving problems of management processes at different levels, focus on achieving results with minimal time and money, and mastering project management methodology as a progressive management tool.The student will be able to carry out substantiation and selection of international projects; build a team in an international project and manage it; draw up a schedule of project activities and monitor its implementation; identify possible project risks and develop measures to reduce them; manage conflicts in international projects. |
| **Lecture Topic** | Project Management in Organizations. Strategic Management and Project Selection. The Project Manager. Managing Conflicts and Negotiation. Project in the Organizational Structure. Project Activity and Risk Planning. Budgeting Estimating Costs and Risks. Scheduling. Resource Allocation. Monitoring and Information Systems. Project Control. |
| **Literature** | 1. Kerzner, H. (2017). Project Management: A Systems Approach to Planning, Scheduling, and Controlling (12th Ed). Wiley. 2. Kerzner, H. (2017). Project Management: Case Studies (5th Ed). Wiley. 3. Meredith, J. & Mantel, S. (2017). Project Management: A Managerial Approach (10th Ed). Wiley.4. PMI Standards Committee (2017). A Guide to the Project Management Body of Knowledge (6th Ed). Project Management Institute: Upper Darby, U. S. A |
| **Subject’s Passing Form** | Exam |
| **Programme Author / Teacher** | **Larysa Savosh, Associate Professor** |

**CAD-GRAPHICS AND DESIGN OF MACHINES**

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| **Class Type** | class |
| **Department** | Applied mechanics and mechatronics |
| **ECTS Points** | 5 ECTS |
| **Effects of Education Process** | The purpose of teaching the course “CAD-graphics and design of machines” is preparing highly qualified specialist with knowledge and skills in using CAD/CAM/CAE software designing machine building parts and assemblies.As a result of completion of the discipline "CAD-graphics and design of machines" students will be able to: design in CAD software products (AutoCAD, SolidWorks, PowerShape) parts and components from them in three-dimensional space; form drawings of designed products (AutoCAD, SolidWorks); conduct "virtual" tests of the developed models of parts and mechanisms (SolidWorks Simulation); eliminate possible shortcomings of the developed designs, at the stage of computer modeling, and not after the already made and tested prototype (SolidWorks Simulation); develop technology of manufacturing of the designed parts and mechanisms (FeatureCAM, Mach3, LinuxCNC); get acquainted with the work of modern equipment in the field of engineering design, namely with lathes, milling and laser machines equipped CNC systems, 3D printer and 3D scanner, electronic digital microscope. |
| **Lecture Topic** | Basic information and development of CAD systems. Methods and principles of designing elements in CAD systems. CAE systems for virtual testing of designed products. CAM systems for creating manufacturing technologies. Equipment with numerical program control. Additive technologies and 3D scanning. Software that controls automated equipment. |
| **Literature** | 1. A.A. Alyamovsky. Engineering calculations in SolidWorks – M.: DMK Press, 2010. – 464 p.2. Programming and adjustment of CNC equipment [Text]: Methodical instructions for practical classes for applicants of the first (bachelor's) level of higher education educational-professional program "Applied Mechanics" field of knowledge 13 Mechanical Engineering specialty 131 Applied mechanics of full-time and part-time forms of education / V.A. Sychuk. - Lutsk: Lutsk NTU, 2020. - 32 p.3. CAD cutting tools, equipment and technological processes [Text]: Methodical instructions for practical classes for students majoring in 131 "Applied Mechanics" full-time and part-time forms of education / style. V.A. Sychuk. - Lutsk: Lutsk NTU, 2017. - 28 p4. Help information in SolidWorks, AutoCAD, PowerShape, FeatureCAM, Mach3, Linux CNC EMC2.  |
| **Subject’s Passing Form** | Exam |
| **Programme Author / Teacher** | **Viktor Sychuk, Associate Professor** |