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** |
| **Mathematical methods for scientists and engineers** | **Igor Dudarev****PhD, DSc, Professor** | **5** |
| **Research of technological systems** | **Igor Dudarev****PhD, DSc, Professor** | **5** |
| **CAD-graphics and design of machines** | **Viktor Sychuk****PhD, Professor** | **5** |
| **Sustainable development for engineers** | **Mykola Melnychuk,****PhD, DSc, Professor** | **5** |

**Sustainable development for engineers**

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| **Course disposition** | The course consists of lectures, literature assignment, project assignment and written examination. |
| **Department** | Material Science |
| **ECTS credits** | 5 ECTS |
| **Learning outcomes** | -Knowledge of world trends in toward of sustainable development of humankind and the role of engineers in certain ways of developing sustainable technologies; -Ability to perform calculations of index indicators of sustainable development; -Ability to use the main set of indicators of sustainable development;-Apply modern methods of determining environmental, economic and social security of human;-Apply methods of eco-audit and LSA-analysis during technology design; -Ability to use strategic planning methods for the development and implementation of technical products and technologies; -Formed a comprehensive, objective and creative approach to discussing the most acute and complex problems of sustainable development. |
| **Course description** | In most industrialized countries, the engineer is envisaged as a bright individual inventing or designing new products, processes or public works at his1 drawing board. However, his inventiveness might just be channeled too much towards developing clever technology, and too little towards societal needs. Scientifically trained engineers must focus on questions of sustainability and how social and environmental issues impact on technology. This course to give the engineering student insight into the challenge that sustainable development poses to the engineering profession, the contribution of engineering to sustainable development, and the barriers and pitfalls to beware. The engagement of engineers in sustainable development is good for sustainable development, and good for the engineer who wants to broaden his perspective.***Course content***: Influence of world consumption and production systems on natural systems. Technology is the culprits or the saviors. Methods of measuring sustainability. Sustainable development and companies. Design and sustainable development. Innovation processes and strategic planning. Technologies for sustainable development. |
| **Literature** | 1) Carl Mulder. Sustainable development for engineers. - Netherlands; Greenleaf, .2011.-288p.2) Sustainable development: ecological and economic optimization of territorial production systems: Textbook / NV Karaeva, RV Korpan, T.A. Kotsko and others. / Зазаг. ed. І.В. Nedina. –Sumy: VTD “University Book”, 2008. –384 p3) Socio-economic potential of sustainable development: a textbook for students. of universities / L.G. Melnik (scientific editor), L. Hans (scientific editor). –Sumy: ITD "Univ. Knjiga", 2007. –1120 p.4) Course of engineering ecology. Ed. Mazura II .M .: Higher. shk., 1999. .447 s. |
| **Examination**  | Individual reflection based on group assignments and written examination Grade - A, B, C, D, E, FX, F |
| **Examiner / Teacher** | **Mykola Melnychuk m.melnychuk@lntu.edu.ua** |

**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**  |

**MATHEMATICAL METHODS FOR SCIENTIST AND ENGINEERS**

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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 methods for scientist and engineers” is preparing highly qualified specialist with knowledge and skills of advanced mathematical methods in science and engineering.After successfully completing this course, a student should be able to solve problems of scientific research using mathematical methods.  |
| **Lecture Topic** | Semi-analytical source (SAS) method for heat conduction problems with moving heat source. Complete synchronization of a time-fractional reaction-diffusion system with Lorenz nonlinearities. Oblique scattering by thin vertical barriers in water of finite depth. Numerical investigation of heat flow and fluid flow in a solar water heater with an evacuated-tube collector. Linear multistep method with application to chaotic processes. |
| **Literature** | 1. Dutta, H. (Ed.). (2020). Mathematical Methods in Engineering and Applied Sciences (1st ed.). CRC Press.2. Bayin, S. S. (2006). Mathematical methods in science and engineering. John Wiley L. Sons, Inc.3. Haye, S. I. (2001). Advanced Mathematical Methods in Science and Engineering. Marcel Dekker, Inc. |
| **Subject’s Passing Form** | Exam |
| **Programme Author / Teacher** | **Igor Dudarev, 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, PhD docent** |