SYLLABUS OF THE SUBJECT
«OPERATIONS RESEARCH ON TRANSPORT»

Educational Professional Programs: «Air Transportation Management»
«Aerial Works and Services Management»
«Multimodal Transport and Logistics»
«Onboard Support of Air Passenger Transportation»
Field of study: 27 «Transport»
Speciality: 275 «Air Transport Technologies»
Specialization: 275.04 «Air Transport Technologies»

Higher Education Degree	First (Bachelor)
Subject status	Academic subject of mandatory component
Course of study	2,3
Semester	4,5
Subject volume, ECTS credits / total amount of hours	7,0/210
Language	Ukrainian, English
To be studied (study subject)	Operations research focuses on solving practical problems that can be described using mathematical models.
Why is it interesting and must be learned? (purpose)	Provide a sufficient level of competence of specialists in scientific substantiation and making optimal management decisions on the organization of transportation and transport management using mathematical models and modern computers.
What is studied? (learning results)	- Take responsibility, show public awareness, social activity and participation in the life of civil society, think analytically, critically understand the world; - Apply, use modern information and communication technologies to solve practical problems in the organization of transportation and design of transport technologies; - Investigate transport processes, experiment, analyze and evaluate the parameters of transport systems and technologies; - Develop, design, manage projects in the field of transport systems and technologies; - Classify and identify transport processes and systems. Evaluate the parameters of transport systems. Perform system analysis and forecasting of transport systems; - Evaluate the parameters of traffic flows. Design schemes and networks of transport systems. Develop technologies for operational management of traffic flows; - Investigate the types and types of transport systems. Find solutions for optimizing the parameters of transport systems. Assess the effectiveness of infrastructure and technology of transport systems; - Organize international transportation. Apply methods of customs documentation. Use of customs control methods; - Develop conceptual, logical and physical models of the database. Be able to program databases using SQL; - Be able to apply modern computer-integrated technologies and have the skills to develop algorithms and programs using high-level languages; - Critically evaluate the scientific values and achievements of society in the development of transport technologies

	- Knowledge and understanding of the subject area and understanding of professional activity; - Ability to abstract thinking, analysis and synthesis; - Ability to analyze and forecast the parameters and performance of transport systems and technologies, taking into account the impact of the external environment; - Ability to design transport (transport-production, transport-warehousing) systems and their individual elements; - Ability to assess operational, technical and economic, technological, legal, social, and environmental components of the organization of transportation; - Ability to organize international transportation; - Ability to evaluate plans and proposals for the organization and technology of transportation, drawn up by other entities, and make the necessary changes based on technical and operational parameters and principles of operation of facilities and devices of transport infrastructure, vehicles (vessels); - Ability to solve complex specialized problems and solve practical problems in the field of transport using theories and methods of modern transport science based on a systems approach and taking into account the complexity and uncertainty of the conditions of transport systems; - Ability to conduct research at the appropriate level; - Ability to generate new ideas (creativity); - Ability to work independently and in a team; - Ability to optimize logistics operations and coordinate orders for transportation of goods from producer to consumer, comply with laws, rules and requirements of quality management systems
How is it possible to use the gained knowledge and skills? (competencies)	- Apply, use modern information and communication technologies to solve practical problems in the organization of transportation and design of transport technologies;
Academic logistics	**Content of the discipline:** Module №1 "Linear and nonlinear programming": Topic 1. Tasks of research of operations in transport systems. Classification of optimization problems. Topic 2. Statement of the problem of linear programming. Methods of solving ZLP. Topic 3. Duality in the problems of LP. Topic 4. Models of problems of integer LP. Topic 5. Transport task. Topic 6. Unconventional transport problems. Topic 7. Problems of nonlinear programming. Topic 8. Application of linear and nonlinear programming in aviation. Module № 2 “Network models. Problems of dynamic programming ". Topic 1. Optimal flows on networks. Topic 2. Problems of calendar planning and schedule theory. Problems of temporal ordering. Topic 3. Methods of network planning. Topic 4. Solving network problems in Excel and using TORA. Topic 5. Problems of dynamic programming. General characteristics. Topic 6. The simplest problems of dynamic programming. Topic 7. Probabilistic dynamic programming. Topic 8. Application of network and dynamic programming methods in aviation.

	Types of classes: lectures, laboratory classes Teaching methods: explanatory-illustrative method; method of problem statement; reproductive method; research method Forms of study: full-time, part-time
Prerequisites	The discipline is based on knowledge of such disciplines as: "Higher Mathematics", "Operation of vehicles", "Information systems and technologies in transport", "Passenger traffic".
Post-requisites	The discipline is the basis for the study of such disciplines as: "Technical and economic research of transport development", "Fundamentals of design of transport processes", "Information support of multimodal transport", "Cargo", "Organization and technology of loading and unloading", "Interaction" modes of transport "," International transport "," Ergonomic support of transport processes ".
Information support from the fund and repository of NAU library	1. Козаченко Д.М., Вернигора Р. В., Малашкін В. В Основи дослідження операцій у транспортних системах: приклади та задачі. – Дніпропетр. нац. ун-т залізн. трансп. ім. акад. В. Лазаряна – Дніпропетровськ, 2015. – 280 с. 2. Крюков М.М., Кравець Т.В., Крижановська Т.В., Коновалюк В.С., Семененко Т.М. Дослідження операцій у транспортних системах у прикладах і задачах. Навч. посіб.для студ. вищ. навч.закл. – К.: ДЕТУТ, 2014. – 199 с. 3.http://e-books.ksavm.senet.ru/Books/physics/akulich-i.m.-matematicheskoe-programmirovanie-v-primerah-i-zadachah.pdf 4.https://tvims.files.wordpress.com/2012/01/d182d0b0d185d0b0-d185-d0b0-d0b2d0b2d0b5d0b4d0b5d0bdd0b8d0b5-d0b2-d0b8d181d181d0bbd0b5d0b4d0bed0b2d0b0d0bdd0b8d0b5-d0bed0bfd0b5d180.pdf 5. http://eadnurt.diit.edu.ua/bitstream/123456789/8967/1/Kozachenko_textbook.pdf 6.https://www.scribd.com/doc/316680593/Operations-Research-Hamdy-Taha-pdf
Academic logistics	Classroom of theoretical training, laptop, mobile device (phone, tablet) with Internet connection for: communication and surveys; homework; performing tasks of independent work; passing the test (current, boundary, final control).
Prerequisites	Graded Test, Examination, Calculation and Graphic Paper, Testing
Post-requisites	Air Transportation Management Department
Information support from the fund and repository of NAU library	Faculty of Transport, Management and Logistics
Academic logistics	 **KONOVALIUK VALENTYNA STANISLAVIVNA** **Position:** Associate Professor **Scientific Degree:** PhD in Physics and Mathematics **Academic Status:** Associate Professor **Teacher profile:** https://scholar.google.com.ua/citations?view_op=list_works&hl=uk&user=bsGosKIAAAAJ **Tel.:** 044 406-70-94 **E-mail:** valentinakonovaliuk@gmail.com **Location:** 2.113a
Prerequisites	Author's course, teaching in English and Ukrainian
Post-requisites	https://er.nau.edu.ua/handle/NAU/34200