(Ф 21.01 – 03)

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| | **SYLLABUS OF THE SUBJECT**<br>**«MATHEMATICAL METHODS OF MODELING AND OPTIMIZATION OF TRANSPORT SYSTEMS AND PROCESSES»**<br><br>Educational Professional Program**:** «Air Transportation Management»<br>Field of study: 27 «Transport»<br>Speciality: 275 «Air Transport Technologies»<br>Specialization: 275.04 «Air Transport Technologies» |
| **Higher Education Degree** | The second level (master degree) |
| **Subject status** | Subject of mandatory component cycle |
| **Course of study** | 1 |
| **Semester** | 2 |
| **Subject volume, ECTS credits / total amount of hours** | 5,0/150 |
| **Language** | Ukrainian, English |
| **To be studied (study subject)** | The discipline is a part of the theoretical basis of knowledge and skills for the study of technological disciplines for training in the field of transportation managment. |
| **Why is it interesting and must be learned? (purpose)** | The aim of discipline studing is to develop skills of research and their further application in the preparation of master's thesis, in writing research articles |
| **What is studied? (learning results)** | - Development of new and improve existing transport systems and technologies, define development goals, existing constraints, efficiency criteria and scope;<br>- Development and analyze of graphical, mathematical and computer models of transport systems and technologies;<br>- Management of complex technological and production processes of transport systems and technologies, including unpredictable and those that require new strategic approaches;<br>- Use specialized software for analysis, development and improvement of transport systems and technologies;<br>- Analyze scientific recommendations and justify the feasibility of modern methods of controlling movement of vehicles (aircraft) |
| **How is it possible to use the gained knowledge and skills? (competencies)** | - Ability to search, process and analyze information from various sources;<br>- Ability to develop and manage projects;<br>- Ability to conduct research at the appropriate level;<br>- Ability to conduct research within a narrow specialization, identify problems, set goals and solve them using appropriate research methods;<br>- Ability to identify and apply promising aproachs of modeling of transport processes;<br>- Ability to use modern technologies of transport and forwarding activities;<br>- Ability to manage supply chains and logistics centers;<br>- Ability to manage traffic flows;<br>- Ability to use specialized software to solve complex problems in the field of transport systems and technologies;<br>- Ability to apply modeling and optimization methods to study and improve the efficiency of aviation transport systems and their management processes. |
| **Academic logistics** | **Module 1. "Mathematical methods of optimization and modeling of systems and processes"**<br>Topic 1. Introduction. Objects and type of models. Classification of systems and processes. Schematization and description of the object |

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| | Topic 2. Statistical (simulation) modeling<br>Topic 3. Identification of mathematical models of systems and processes<br>Topic 4. Neural networks<br>Topic 5. Mathematical models based on queuing theory<br>Topic 6. Problems of mathematical optimization of the object. Optimization with constraints<br>Topic 7. Unconditional one- and multifactor nonlinear optimization without restrictions<br>Topic 8. Bayesian method and method of risk minimization<br>**Module №2 (educational component) "Term paper"**<br>Types of classes: lectures, laboratory classes<br>Teaching methods: explanatory and illustrative method; method of problem presentation; reproductive method; research method.<br>Forms of education: full-time |
| **Prerequisites** | This discipline is based on knowledge of such discipline as "Supply Chain Management and Logistics Centers" |
| **Post-requisites** | This discipline is the basis for the study of disciplines: "Undergraduate Practice", "Unified State Qualification Exam", "Qualification Work". |
| **Information support from the fund and repository of NAU library** | 1. Васильєв В.В., Квач Ю.М., Киркач К.В. Математичні методи моделювання та оптимізації систем і процесів: Навч. посібник. – К.: НАУ, 2012. – 270 с.<br>2. Основи теорії і методів оптимізації: Навчальний посібник. Черкаси: Брама-Україна, 2015. – 608 с.<br>3. Оптимізаційні методи та моделі.: Підручник. – К., 2014. – 372 с.<br>4. Інформатика, основи системології та програмування: лабораторний практикум/ МОН України; Національний авіаційний університет; Городній О. В., Труш О. І., Чижевський Й. Ф., уклад. – Київ: НАУ-друк, 2015. – 48 с.– CD<br>**3 Internet Information resources**<br>3.3.1 Сайт розробника Matlab (MathWorks.) / [Електронний ресурс]. - Режим доступу: www.matlab.com<br>3.3.2 Авторські керівництва та довідкові матеріали по роботі з продуктами MathWorks [Електронний ресурс]. - Режим доступу: http://matlab.exponenta.ru<br>3.3.3 Сайт розробника Mathcad / [Електронний ресурс]. - Режим доступу: www.mathcad.com<br>3.3.4 Керівництва та довідкові матеріали по роботі з MathCAD / [Електронний ресурс]. - Режим доступу: http://old.exponenta.ru/soft/mathcad/Users Guide/0.asp<br>3.3.5. Форум, присвячений роботі у MathCAD / [Електронний ресурс]. - Режим доступу: http://www.cyberforum.ru/mathcad<br>3.3.6. Сторінка сайту МФТІ, присвячена математичному моделюванню транспортних потоків / [Електронний ресурс]. - Режим доступу: https://mipt.ru/education/chair/computational_mathematics/upload/22b/Book-arpglktefbb.pdf<br>3.3.7. Сайт та бібліотека, присвячені проблемам логістики / [Електронний ресурс]. - Режим доступу: https://logists.by/ |
| **Location and logistics** | Class for theoretical training, laptop, mobile device (phone, tablet) with Internet connection for: communication and surveys; homework; performing tasks of independent work; testing (current, boundary, final control) |
| **Semester control, examination techniques** | Exam, term paper, testing |
| **Department** | Air Transportation Management Department |
| **Faculty** | Faculty of Transport, Management and Logistics |

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| **Lecturer(s)** |  | **Yakushenko Oleksandr**<br>**Посада:** доцент<br>**Degree:** к.т.н.<br>**Academic status:** доцент Associate professor<br>**Teacher profile:**<br>https://scholar.google.com.ua/citations?user=rewS2yEAAAAJ&hl=uk<br>**Тел.:** 044 406 -72-85<br>**E-mail:** oleksandr.yakushenko@npp.nau.edu.ua<br>**Робоче місце:** 2.113а |
| **Originality of the subject** | Author's course, teaching in Ukrainian and English | |
| **Link to the subject** | https://er.nau.edu.ua/handle/NAU/34200 | |