




SYLLABUS
of the academic discipline
«Electrical Engineering and Avionics»
Specialty: 134 «Aviation and Rocket-Space
Engineering»
Field of Study: 13 «Mechanical Engineering»



Level of higher education	First Bachelor degree
Discipline status	Academic discipline of the selective component of the professional cycle
Semester (autumn/spring)	Autumn
The Scope of Discipline, ECTS credits/hours	4 credits/120 hours
Language of Study	Ukrainian or English
Subject of Study	Structure, principle of operation and scope of use of aviation devices, as well as general knowledge of the purpose, operation and fundamentals of the use of aviation electronic systems (avionics).
Goal of Study	The course is aimed at developing students' skills for the disclosure of scientific concepts, methods, technologies for building aircraft instruments and aircraft electronic systems based on the chapter 31 ATA «INDICATING/RECORDING SYSTEMS» (00 General, 10 Instruments and Control Panels, 15 Maintenance practices, 30 Recording System, 50 Central Warning Systems, 60 Control and Display Systems) and world-class regulatory and technical documents (ARINC-4xx, 5xx, 6xx, 7xx)
Outcomes of Study	<ul style="list-style-type: none"> – stable knowledge of methods of modeling and analysis of single-phase and three-phase electric circuits; – the laws of electrical engineering, methods of calculating electric circuits of direct and alternating current; general principles of electromechanical energy conversion and principles of operation of electric machines; – devices used to control the operation of the power plant; – types and fundamentals of operation of the main electronic indicators used on the aircraft; – function, composition, location, operation, management and control of major aviation electronic systems; – advantages and disadvantages of using fiber optics on board the aircraft.
Competence	<p>The acquired knowledge will allow:</p> <ul style="list-style-type: none"> - the use of methods for calculating linear and non-linear electric circuits; - to carry out installation and dismantling of sensors of devices of control the operation of power plant; - the use basic aviation electronic systems.
Academic logistics	<p>Discipline content:</p> <p>Module 1 «Aviation devices and electrical circuits»</p> <p>Elements of an electric circuit: node, branch, current source and EMF. Ohm's law in complex form for active, capacitive and inductive passive elements of a series electric circuit. Calculation of electric circuits by the method of adding Kirchhoff's equations. Calculation of electric circuits by the method of loop currents. The phenomenon of resonance. Electric circuits with mutual induction. Devices for measuring altitude and speed parameters. Gyroscopic instruments for measuring heeling and pitch angles. Course meters. Fuel measuring systems. Aviation manometers.</p>

	<p>Aviation tachometers, position indicators, vibrometers. Aviation thermometers.</p> <p>Module 2 "Aviation electronic systems"</p> <p>Electronic indicators. Information complex of altitude-speed parameters. Onboard integrated navigation and landing equipment. Meteorological radar station. Radio altimeter. Early warning system for approximation the earth. Collision prevention and control system. Equipment for short-range radio navigation system. Aircraft rangefinder. Automatic radio compass. Aircraft respondent. Satellite navigation equipment. Computational aircraft control system. Automatic engine control system. Automatic flight control system. Application of fiber optics in aircraft systems</p> <p>Types of classes: lectures, laboratory</p> <p>Teaching methods: academic classes, online</p> <p>Forms of study: full-time, extra-mural</p>
Prerequisites	General and professional knowledge in the field of aviation, physics, electrical engineering and electronics, computer technology
Details	Knowledge of the discipline can be used in the disciplines of aircraft maintenance and their functional systems, as well as in writing a degree thesis.
Information support from the NAU fund and repository of scientific and technical library (STL)	<p>NAU Scientific and technical library:</p> <ol style="list-style-type: none"> 1. Zakharchenko V.P. Aircraft Electrical Power Supply. Guide to Laboratory Practical Work / V.P. Zakharchenko, S.V. Enchev, V.V. Tykhonov, S.S. Tovkach. – K.: NAU, 2015. – 92 p. 2. Захарченко В.П., Єнчев С.В., Ільєнко С.С., Тихонов В.В., Товкач С.С. (2021). Електропостачання повітряних суден. Навчальний посібник для здобувачів вищої освіти ОС «Бакалавр» спеціальностей 173 «Авіоніка», 141 «Електроенергетика, електротехніка та електромеханіка» – К. : НАУ, 2021. – 236 с 3. Churina O.Y., Mazur T.A., Tovkach S.S. (2020). Modeling and Decision Making in Power Systems and Consumers. Lecture course for students of specialty 141 «Electrical Power Engineering, Electrical Engineering and Electromechanics». – K.: NAU, 2020. – 60 p. 4. Belska O.A., Tovkach S.S. (2016). Electrical Engineering and Electronics. Guide to Laboratory Practical Work for students of direction 6.050604 «Power Plant Manufacturing». – K.: NAU, 2016. – 64 p. 2. Воробьев В.Г., Глухов В.В., Кадышев И.К. Авиационные приборы, информационно-измерительные системы и комплексы: учеб. для вузов. – М.: Транспорт, 1992. – 399 с. 3. Instrument Flying Handbook. U.S. Department of Transportation Federal Aviation Administration, 2008. – 387 p. 4. Самолет Ан-148-100. Руководство по техническому обслуживанию. – К.: АНТК «Антонов», 2004 [Электронный ресурс]. 5. Авиационные приборы: учебник / под ред. С.С. Дорофеева. – М.: Военное издательство, 1992. – 495 с. 6. Бортовые информационные системы: Курс лекций/А. А. Кучерявый; под. ред. В.А. Мишина и Г.И. Ключева.- 2-е изд., перераб. и доп. – Ульяновск: УлГТУ, 2004. – 504 с. 7. Civil avionic systems / Ian Moir, Allan Seabridge, Malcolm Jukes. / Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom: John Wiley & Sons, Ltd, 2003. – 2nd edition. – 612 p. <p>NAU repository: https://er.nau.edu.ua/handle/NAU/9092</p>
Location and logistics	5.103, 5.203 multimedia equipment
Semester control, examination methods	Exam, testing

Department	Automation & Power Management Department
Faculty	Aerospace faculty
Teacher (s)	 <p> TOVKACH SERHII SERHIIIOVYCH Position: Associate Professor Academic title: Associate Professor Scientific degree: Candidate of Technical Sciences (Engineering) Teacher profile: Orcid Author ID: 0000-0002-8740-298X, Scopus Author ID: 57206192351, ResearcherID: Q-2695-2019 https://scholar.google.com.ua/citations?user=gJqZwiUAAAAJ&hl=ru Tel.: 406-74-31, 097-297-52-11 E-mail: serhii.tovkach@nau.edu.ua Workplace: 5.107 </p>
Originality of academic discipline	The course is based on ATA Chapter of the International Air Transport Association (IATA)
Link to discipline	https://classroom.google.com/u/0/c/NTM1NTQzMTc0OTha