RTU Course "Modern Technologies of Fiber-Optical Networks in Aviation"
15E02 Avionikas katedra

General data

Code	TAA535
Course title	Modern Technologies of Fiber-Optical Networks in Aviation
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Professional
Field of study	Transport
Responsible instructor	Smirnovs Igors
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV, RU
Possibility of distance learning	Not planned
Abstract	Subject is discussed in the following topics. The optical signal sources and receivers, fiber optics environmental properties. Optical communication technology and associated equipment. Aircraft optical communication system structural characteristics. Aircraft optical local area networks.
Goals and objectives of the course in terms of competences and skills	To acquire fiber-optic communication technology theoretical foundations introduced to the use of technology in aircraft. To acquire aircraft fiber optic local network structure, characteristics, operating principles and testing algorithms. To be able to apply theoretical knowledge in practical work - avionics equipment maintenance.
Structure and tasks of independent studies	Independent work on themes: "B777 aircraft avionics equipment for local area network", "B777 aircraft cabin local area network".
Recommended literature	1. Introduction to Fiber Optics. John Crisp, 2002, 230 p. 2. Fiber-Optiic Systems for Telekommunications. R. L. Freeman, 2002, 511 p. 3. Optical Fiber Communications. Gerd Kaiser, 2010, 413 p. 4. Optical Fiber Communications. Principles and Practice. John M. Senior, 2009, 1075 p. 5. Civil Avionics Systems. I. Moir, A. Seabridge, 2002, 416 p. 6. Avionic Systems. Operation & maintenance. James W. Wasson, Jeppesen. Sanderson Training products, 2004, 318 p.
Course prerequisites	Physics, electronics, communication systems basics, aviation communications systems and networks, digital equipment.

Course outline

Theme	Hours
Physical aspects of optical communications.	4
Fiber optic cables.	2
Optical connectors, passive optical devices.	4
Light sources.	2
Light radiation detectors.	2
Light transmission losses.	4
Regenerator and fiber optic amplifiers.	2
Optical network design principles.	6
Aircraft structural characteristics of an optical network. ARINC 636 data bus.	2
Aircraft LAN structure. Avionic equipment, local area network.	2
Cabin local area network. Aircraft local area network testing.	2

Learning outcomes and assessment

Learning outcomes	Assessment methods
The student knows fiber optic transmission's environmental characteristics, wavelengths, light wire construction, is able to evaluate data transmission channel characteristics and advantages.	Final examination question.
The student knows fiber optic cable types, construction, characteristics, is able to evaluate advantages and disadvantages of a specific type of cable.	Final examination question.
The student knows passive optical devices (reflector, connector, attenuator, filter, switches), task characteristics and is able to evaluate product advantages and disadvantages of a particular fiber optic system.	Independent work and final examination question.
The student knows light source and detector types, characteristics, principles and is able to evaluate product advantages and disadvantages of a particular fiber optic system.	Independent work and final examination question.
The student knows light transmission loss and attenuation in fiber optic cables and prevention methods.	Final examination question.
The student knows synchronous optical network (SONET) architecture, signal structure, synchronous digital hierarchy (SDH), is able to use this knowledge to aircraft fiber optic network study and maintenance.	Independent work and final examination question.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	2.0	3.0	2.0	0.0	0.0		*	