RTU Course "Global Satellite Navigation Systems"

15E02 Avionikas katedra

General data

Code	TAA531
Course title	Global Satellite Navigation Systems
Course status in the programme	Compulsory/Courses of Limited Choice; Courses of Free Choice
Course level	Undergraduate Studies
Course type	Academic
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, EN, RU
Possibility of distance learning	Not planned
Abstract	"Global navigational satellites system" based on the global navigation satellite system (GNSS) structure, operation principle and their application to studying. The studying covering such issues as cosmic, terrestrial and consumer segments of the navigation signals and their processing algorithms, the coordinate systems used for satellite navigation, the satellite system parameters and accuracy characteristics used in aviation.
Goals and objectives of the course in terms of competences and skills	Acquire knowledge about the GNSS mission, structure and operating principles. Understand the GNSS signal structures and their processing algorithms. Acquire knowledge of the GNSS tactical and technical characteristics and be able to compare them with other navigation systems parameters. Know the uses of the satellite systems in aviation, and be able to analyze their strengths and weaknesses. Acquire practical skills in the GNSS receiver applications.
Structure and tasks of independent studies	Independent work with literature and technical documentation. Independent work on the theme: The coordinate system transformation.
Recommended literature	1. J.-M. Zogg. GPS basics. Introduction to the system. Application overview. Switzerland, Thalwil, u-blox ag, 2002, 90 p.; 2. J. Bao-Yen Tsui. Fundamentals of Global Positioning System Receivers. New Jersey, John Wiley& Sons, 2005, 352 p.; 3. A. El-Rabany. Introduction to GPS/ The Global Positioning System. Boston-London, Artech House, 2002, 176 p.; 4. Соловьев Е.А. Спутниковая навигация и ее приложения. Москва, ЭКО-ТРЕНДЗ, 2003, 325 с.
Course prerequisites	Background knowledge in math, physics, electronics.

Course outline

Theme	Hours
Signal distribution in time methods of measurement.	2
Global Navigation Satellite System (GNSS) structure.	2
Navigation message structure.	4
Calculation of the object's location.	4
Coordinate system.	4
Differential Global Positioning System (DGPS).	2
Data format and hardware interfaces.	4
GNSS receivers.	2
GPS systems use during the flight route.	4
GPS systems use the landing stage, and air traffic management.	4

Learning outcomes and assessment

Learning outcomes	Assessment methods
The student knows and is able to describe the GNSS mission, structure and operating principles.	Final examination question.
The student knows and is able to describe the GNSS signal structures and their processing algorithms.	Final examination question.
The student knows the GNSS tactical and technical parameters, is able to compare them with other aviation navigation system parameters.	Final examination question.
The student knows the GNSS applications and their prospects in aviation, understands the methods of solving the navigation and air traffic control tasks.	Final examination question.
The student is able to use the GNSS receiver object location.	Practical work question.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests			Tests (free choice)		
			Lectures	Practical	Lab.	Test	Exam	Work	Test	Exam	Work

1.	2.0	3.0	1.5	0.5	0.0		*			*	