



Subject card

Subject name and code	Air navigation and meteorology, PG_00053254						
Field of study	Geodesy and Cartography						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
Education level	first-cycle studies		Subject group		Optional subject group		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Burdziakowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		7.0		83.0	150
Subject objectives	The purpose of the course is to teach the student the basics of aerial navigation and meteorology for the preparation and implementation of unmanned aircraft flights.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W02] has basic knowledge and understands mathematics concepts useful for coordinate calculus (in a set of real and complex numbers), for the purpose of field and volume calculations, mathematical statistics and vector calculus, as well as elementar topology	Knows and understands the principles of BSP navigation path planning. Knows aeronautical navigation equipment and can describe its operation. Can describe the basic elements of flight path planning in the context of current meteorological conditions. Knows and can perform basic meteorological analysis based on available forecasts.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_W01] has basic knowledge and understands the concepts of physics which allow to use optical and immersive instruments as well as positioning and satellite imaging	Knows and understands the basic concepts of aeronautical navigation (course, bearing, way, route, waypoints). Knows and understands the basic concepts of meteorology. Knows the basics of the formation of baric systems, can describe the phenomena affecting BSP flight and hazards.	[SW2] Assessment of knowledge contained in presentation
	[K6_U06] can solve geodetic tasks and select measurement methods for typical engineering tasks including the curvature of the Earth and the impact of gravity	Can make a BSP path plan and program it into the BSP software. Can calculate the deviation and declination corrections of the BSP compass. Can perform compass calibration. Can calculate the observed position of a BSP using position lines. Can interpret numerical weather forecasts. Can use basic sources of meteo data.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_U01] can apply the principles of physics and mathematics to a simple verification of measurement and computational methods and their results	Able to determine aircraft positions using available navigation equipment. Knows how to use on-board navigation equipment. Able to determine current meteo conditions and their impact on the navigation of an unmanned platform.	[SU2] Assessment of ability to analyse information
Subject contents	1. Fundamentals of aeronautical meteorology a. Atmosphere, exosphere, ionosphere, aerial part of the atmosphere, tropopause, standard atmosphere 2. Weather reporting a. Weather information, surface reports, data from higher layers of the atmosphere, synoptic maps 3. Assessment of meteorological conditions based on published meteorological information a. TAF, METAR, GAMET, AIRMET, Significant, Storms, other available sources of meteo information 4. Assessment of compatibility of current weather conditions with unmanned aircraft operating conditions a. Principles and operating conditions of unmanned aircraft 5. Assessment and impact of hazardous meteorological phenomena on the performance of unmanned flight. a. Dangerous meteorological phenomena in aviation, icing, thunderstorms, gusty winds, wind faults 6. Fundamentals of aviation navigation. a. Basic concepts and definitions, types of air navigation 7. Discuss basic geographic definitions used in aviation. a. Directions on the globe, geographic and magnetic path angle, course, wind direction and speed designation, airspeed 8. Satellite navigation systems a. Types, principle of operation, indications and their interpretation, area of coverage, errors and accuracy, factors affecting coverage and accuracy 9. Navigational flight preparation. a. Designation and use of navigation points, speed triangle navigation 10. Navigation systems and instruments applied to the unmanned aircraft used for practical training. a. "Navigation according to the data from the systems applied to the unmanned aircraft used for practical training" 11. Operation of the ground control station a. Types of ground control stations, construction, principle of operation 12. Navigation based on video camera image a. Methods of BSP navigation on the basis of video camera image 13. Navigation using other data sources a. Navigation on-board instruments and methods of their use		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Report	80.0%	50.0%
	Presentation	80.0%	50.0%

Recommended reading	Basic literature	https://calypteaviation.com/nauka-latania/ Nawigacja lotnicza S.S Fiedczyn Podręcznik nawigacji lotniczej - W.Wyrozumski Meteorologia i klimatologia - Krzysztof Kożuchowski, PWN
	Supplementary literature	Mechanika lotu szybowców - szkolenie szybowcowe, Dr inż. Wiesława Łanecka-Makaruk,
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Development of a selected topic in meteorology. Development of a selected technical issue in the field of navigation Programming a task in flight planning software	
Work placement	Not applicable	