



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Environmental impact of airports [S1Lot2-BTL>ŚOL]

### Course

Field of study

Aviation

Year/Semester

3/6

Area of study (specialization)

Air Transport Safety

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

15

### Number of credit points

4,00

### Coordinators

mgr inż. Paula Kurzawska-Pietrowicz

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### Lecturers

### Prerequisites

Knowledge: Student has a basic knowledge of air transport and the following: fuel combustion, airport operation, chemical composition of the atmosphere and exhaust gases, processes related to climate change, air pollution and its counteraction, construction of aircraft engines, operation of drives. Skills: The student is able to associate and integrate the obtained information, analyze the phenomena occurring in the environment, draw conclusions, formulate and justify opinions. Social competences: The student is able to independently search for information in the literature and knows the rules of discussion; independence in problem-solving, ability to cooperate in a group.

### Course objective

The subject focuses on the impact of airport operations on the environment, with particular emphasis on air pollution, as well as water and soil pollution. The aim of the subject is to familiarize students with the general impact of airport operations on the environment and human health, as well as to present the ways in which pollutants spread. The subject also includes a discussion of methods to reduce the impact of aviation on the environment, with particular emphasis on ways to reduce the impact of airports on the environment.

### Course-related learning outcomes

#### Knowledge:

1. Student has basic knowledge of environmental protection in transport, is aware of the threats related to environmental protection and understands the specificity of the impact of mainly air transport on the environment and the social, economic, legal and other non-technical conditions of engineering activities [L1\_W20].

#### Skills:

1. Student is able to properly plan and perform experiments, including measurements and computer simulations, interpret the results obtained, and correctly draw conclusions from them [L\_U03].
2. Student is able to design means of transport with appropriate external requirements (e.g. environmental protection) [L\_U14].
3. Student is able to make a comprehensive assessment of the environmental parameters of the aircraft drive unit based on the values of emission factors of harmful gaseous compounds and particulate matters [L\_U18].

#### Social competences:

1. Student understands that in technology knowledge and skills become obsolete very early [L\_K01].
2. Student is able to think and act in an entrepreneurial manner, e.g., finding commercial applications for the created system, having in mind not only business benefits, but also social benefits of the conducted activity [L\_K03].

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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LECTURE: assessment of knowledge and skills on the written or oral test based on the explanation of selected issues

LABORATORY CLASSES: : assessment of knowledge and skills on the basis of reports from classes prepared by the student, optional assessment of students' knowledge before starting the classes

PROJECTS: assessment of the project submitted at the end of the course cycle

### Programme content

Comprehensive discussion of the environmental impact of airports: air pollution and impact on local air quality, noise pollution, water pollution, soil degradation, waste protection, impact on climate. The influence of airport operations on the health and life of local residents, as well as flora and fauna. The use of simulation techniques for the ongoing assessment of the airports effect on the environment and for analyzing different scenarios or predicting the influence of new investments on the environment. Methods to reduce the negative environmental impact of airports.

### Course topics

The subject will address the issue of the impact of airports on the environment in terms of air, water and soil pollution. The methods of air pollution spreading and their modelling will be discussed, as well as the impact of pollution on human health and fauna and flora. The subject also includes ways of reducing the impact of airports on the environment, taking into account, among others, sustainable aviation fuels and methods of noise reduction.

### Teaching methods

Informative (conventional) lecture (transfer of information in a systematic way) - can be (propedeutical) or monographic (specialist)

Laboratory (experiment) method (students conduct experiments independently)

Project method (individual or team implementation of a large, multi-stage cognitive or practical task, which results in the creation of a work)

### Bibliography

#### Basic:

1. Paweł Głowacki, Stefan Szczeciński: Transport lotniczy : zagrożenia ekologiczne oraz sposoby ich ograniczania, Wydawnictwa Naukowe Instytutu Lotnictwa, 2013.

2. Marian Jeż: Transport lotniczy: zrównoważony rozwój, Wydawnictwa Naukowe Instytutu Lotnictwa, 2009.
3. Organizacja Międzynarodowego Lotnictwa Cywilnego. Airport Air Quality Manual. Doc. 9889. ICAO, Second Edition, 2020.
4. Maria Teresa Markiewicz: Podstawy modelowania rozprzestrzeniania się zanieczyszczeń w powietrzu atmosferycznym, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004.
5. Jerzy Merkisz: Ekologiczne problemy silników spalinowych, Wyd. Politechniki Poznańskiej, Poznań 1998.

Additional:

1. Sumeer Charkuj, Piotr Kozłowski, Michał Nęcza: Podstawy transportu lotniczego, Konsorcjum Akademickie Kraków-Rzeszów-Zamość 2012
2. Paula Kurzawska-Pietrowicz, Remigiusz Jasiński: A Review of Alternative Aviation Fuels, MDPI 2024.
3. Remigiusz Jasiński, Paula Kurzawska-Pietrowicz, Kamila Przespolewska-Gdowik: Zagrożenia ekologiczne w obszarze lotniska i ich wpływ na zdrowie i życie ludzi. Nauka dla obronności. Bezpieczeństwo infrastruktury krytycznej. 2022.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00