



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Navigation, communication and surveillance

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

PhD Remigiusz Jasiński

Responsible for the course/lecturer:

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### Prerequisites

Knowledge of mathematics and physics in the field presented during the studies

Ability to apply scientific methods in solving problems, carrying out experiments and inferring

Knowing the limits of one's own knowledge and skills; can precisely formulate questions, understand the need for further education.

### Course objective

To familiarize the student with the practical performance of navigation tasks related to the planning, preparation and execution of a flight in selected environmental and operational conditions, time changes, the use of typical navigation and radio navigation devices, the use of radar devices, interpretation of measurement results, assessment of the correct functioning and error estimation of



navigation and radio navigation devices . Ability to use satellite system receivers used in navigation, interpret indications and evaluate the possibility of using satellite systems in particular types and stages of navigation, use of navigation methods in professional air operations.

### Course-related learning outcomes

#### Knowledge

1. Has extended knowledge necessary to understand profile subjects and specialist knowledge of the construction, construction and manufacturing methods, of aircraft - [K2A\_W04]
2. Has detailed knowledge related to selected issues in the field of manned and unmanned aerial vehicles, in the field of on-board equipment, control systems, communication and registration systems, automation of individual systems - [K2A\_W03]
3. Has ordered, theoretically founded specialist knowledge in the field of on-board equipment: as well as on-board and terrestrial electronic communication systems, remote sensing systems, observation systems, satellite navigation systems - [K2A\_W17]

#### Skills

1. Can use the following languages: native and international to a degree enabling the understanding of technical texts and writing technical descriptions of machines in the field of aviation and aerospace using dictionaries (knowledge of technical terminology) - [K2A\_U01]
2. Can use formulas and tables, technical and economic calculations using a spreadsheet, specialized software - [K2A\_U05]

#### Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of other people - [K2A\_K01]
2. Is ready to critically evaluate his knowledge and received content, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties with solving the problem on his own - [K2A\_K02]
3. Can interact and work in a group, taking different roles in it - [K2A\_K04]
4. Is aware of the social role of a technical university graduate, and especially understands the need to formulate and transmit to the society, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering activities; makes efforts to provide such information and opinions in a commonly understandable manner - [K2A\_K0]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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

EXERCISES: Assessment of knowledge and skills on the written test on the basis of solved tasks



LABORATORY: Assessment of knowledge and skills on the basis of reports from classes prepared by the student

## Programme content

### LECTURE

1. The beginnings of air navigation
2. Basic navigational concepts and calculations
3. GNSS (Global Navigation Satellite System) navigation
4. Meteorology in aviation
5. Radio navigation devices
6. Precision landing approach systems
7. Aircraft positioning errors
8. Principles of determining the optimal flight route
9. On-board and ground-based radars: use and determination of their range and accuracy

### EXERCISES:

The exercises provide an example of solving the task on the blackboard along with analyzing the next stages. The way students solve the problem on the blackboard is reviewed by the tutor.

### LAB:

Use of radio navigation aids during flight, basic flight maneuvers, flight planning and execution.

## Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character

The exercise method (subject exercises, practice exercises) - in the form of auditorium exercises (application of acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition)

Laboratory (experiment) method (students independently conduct experiments)

## Bibliography

Basic

1. Masalski.M., Urządzenia radiowe i radionawigacyjne, Aeroklub Warszawski, Warszawa, 2009.
2. Stateczny A., Nawigacja radarowa: praca zbiorowa, Gdańskie Towarzystwo Naukowe, Gdańsk, 2011.



3. Fiedczyn S., Nawigacja lotnicza, Wydawnictwa Komunikacji i Łączności, Warszawa, 1974.
4. Kekusz G., Vademecum nawigatora lotniczego, Wydawnictwa Komunikacyjne, Warszawa, 1956.

Additional

1. Polak Z., Rypulak A., Bilski J., Awionika, przyrządy i systemy pokładowe, WSOSP, Dęblin, 1999.
2. Wolper James S., Understanding mathematics for aircraft navigation, McGraw-Hill Companies Inc, 2001.
3. Narkiewicz J., Globalny system pozycyjny, WKiŁ, 2003.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	85	3,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for tutorials, preparation for exam) <sup>1</sup>	25	1,0

<sup>1</sup> delete or add other activities as appropriate