



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Navigation [S1Lot2>Naw]

### Course

Field of study

Aviation

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

0

### Number of credit points

1,00

### Coordinators

Tomasz Nowak

### Lecturers

### Prerequisites

A student starting this subject should have basic knowledge of the shape of the Earth, coordinate and reference systems, and the basics of radio navigation. They should also have the ability to apply the scientific method to solving problems and be willing to work as part of a team.

### Course objective

Familiarizing the student with the practical performance of navigation tasks related to planning, preparing and executing a flight in selected environmental and operating conditions, changing time, using typical navigation and radio navigation devices, using radar devices, interpreting measurement results, assessing the correctness of functioning and estimating errors of navigation and radio navigation devices. The ability to use satellite system receivers used in navigation, interpreting indications and assessing the possibility of using satellite systems in individual types and phases of navigation, using navigation methods in professional flight operations. The ability to apply the calculations of grouping parameters in practice.

### Course-related learning outcomes

Knowledge:

1. has basic knowledge of vocabulary used in English to describe mathematical operations and data presented in a diagram/graph. Has knowledge of

formulating a text in English explaining/describing a selected specialist issue,  
has basic knowledge of vocabulary used in English to describe  
technological support for air communication, flight control systems, airport safety procedures  
related to the presence of animals, aircraft control surfaces, aircraft maneuvers  
2. has basic knowledge of the mechanisms and laws governing human behavior and psyche

Skills:

1. is able to use information and communication techniques appropriately, which are applied at various stages of the implementation of aviation projects.
2. is able to organize, cooperate and work in a group, assuming various roles in it and is able to appropriately define priorities for the implementation of a task specified by himself or others).

Social competences:

1. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of malfunctioning engineering projects that have led to serious financial, social losses or to serious loss of health or even life.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated in the written test - 1.5 hours.

Exercises:

- knowledge acquired during the exercises is verified by two 45-minute tests conducted during 3 and 7 classes

### Programme content

Lecture:

Navigation Basics: Earth, Earth's motion, directions, course, distance, units, distances, speed. Climb/descent rate gradient. Navigation speed triangle. Flight log.

Exercises:

WGS-84 ellipsoid. Air miles. Airspeed (TAS), mach (M). CAS/TAS/M relationships. Ground speed (GS). Construction and application of the navigation speed triangle. WGS-84 ellipsoid. Air miles. Airspeed (TAS), mach (M). CAS/TAS/M relationships. Ground speed (GS). Construction and application of the navigation speed triangle.

### Course topics

Navigation Basics: Earth, Earth's motion, directions, course, distance, units, distances, speed. Climb/descent rate gradient. Navigation speed triangle. Flight log.

### Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board.
2. Exercises: examples given on the board and performing tasks given by the instructor - practical exercises.

### Bibliography

Basic:

1. Narkiewicz J., Podstawy układów nawigacyjnych, PWN, Warszawa 1999 r.
2. Ortyl A., Autonomiczne systemy nawigacji lotniczej, WAT, Warszawa 2000 r.
3. Janik F., Malinowski C., Podstawowa nawigacja lotnicza, Wydawnictwa komunikacyjne, Warszawa 1957 r.
4. Wyrozumski W., Podręcznik nawigacji lotniczej, Aeroklub PRL,
6. Wolper James S., Understanding mathematics for aircraft navigation, McGraw-Hill Companies Inc, 2001 r.
7. Narkiewicz J., Globalny system pozycyjny. WKiŁ 2003 r.
8. Advanced Avionics Handbook FAA-H-8083-6, Federal Aviation Administration. Washington 2009 r.

Additional:

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### Breakdown of average student's workload

	Hours	ECTS
Total workload	32	1,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	2	0,00