



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Air Navigation

Course

Field of study

Aerospace Engineering

Area of study (specialization)

Flight Training For Civil Aviation

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

mgr inż. Tomasz Nowak

Responsible for the course/lecturer:

Prerequisites

The student starting this subject should have basic knowledge of basic knowledge about the shape of the Earth, coordinate systems and reference as well as the basics of radio navigation. He should also have the ability to apply the scientific method in solving problems and be ready to cooperate within a team.

Course objective

To acquaint 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, change of time, use of typical navigation and radio navigation devices, use of radar devices, interpretation of measurement results, assessment of correctness of functioning and estimation of navigation and radio navigation equipment errors . Ability to use satellite system receivers used in navigation, interpretation of indications and assessment of the possibility of using satellite systems in particular types and phases of navigation, use of navigation methods in professional air operations. The ability to put into practice calculations of grouping parameters.



Course-related learning outcomes

Knowledge

1. has detailed knowledge related to selected issues in the field of navigation of flight mechanics and piloting techniques, and the use of flight simulators.
2. has basic knowledge of technical vocabulary, in particular specialized terminology used in the fields of science and technology related to aviation engineering.
3. has basic knowledge necessary to understand profile subjects and specialist knowledge about construction, methods of construction, manufacture, operation, aircraft control, safety systems, economic, social and environmental impact in the field of aviation engineering for selected specialties:

1. Piloting of aircraft
2. Aero engines and airframes.

Skills

1. knows how to use a language to a degree enabling understanding of technical texts in the field of aviation (knowledge of technical terminology).
2. has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.
3. can obtain information from literature, the Internet, databases and other sources. Is able to integrate obtained information, interpret and draw conclusions from them.

Social competences

1. is aware of the importance of maintaining the principles of professional ethics.
2. is able to properly set priorities for the implementation of the task specified by him or others based on available knowledge.
3. understand the need for critical assessment of knowledge and continuous education.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated on the written test - 1.5 hour

Exercises:

The knowledge acquired as part of the exercises is verified by two 45-minute colloquia carried out during 7 and 15 classes

Programme content



Lecture:

Semester 3:

BASICS OF NAVIGATION

The Earth

Form

Earth rotation

Position

Position reference system

Triangle of velocities (TOV)

Construction

Projections

Methods of projection

Polar stereographic

Direct Mercator

Lambert

Exercises:

Semester 3:

Direction

Datums

Track and heading

Distance

WGS-84 ellipsoid

Units

Graticule distances

Air mile

Speed



True airspeed (TAS)

Mach number (M)

CAS/TAS/M relationship

Ground speed (GS)

Flight log

Gradient versus rate of climb/descent

Triangle of velocities (TOV)

Construction

Dead reckoning (DR)

Dead reckoning (DR) technique

Navigation in climb and descent

Average airspeed

Average wind velocity (WV)

Ground speed (GS)/distance covered during climb or descent

VISUAL FLIGHT RULE (VFR) NAVIGATION

Ground features

Ground features

Visual identification

VFR navigation techniques

Use of visual observations and application to in-flight navigation

Unplanned events

GREAT CIRCLES AND RHUMB LINES

Great circles

Properties

Convergence

Rhumb lines



Properties

Relationship

Distances

Conversion angle

CHARTS

Chart requirements

ICAO Annex 4 'Aeronautical Charts'

Convergence

Scale

Practical use

Symbology

Plotting

Time

Local Mean Time (LMT)

Mean solar day

Local Mean Time (LMT) and Universal Time Coordinated (UTC)

Standard time

Standard time and daylight saving time

International Date Line

Sunrise and sunset

Sunrise and sunset times

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board.
2. Exercises: examples given on the board and performance of tasks given by the teacher - practical exercises.
3. Practical exercises at the didactic and laboratory positions.



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

Breakdown of average student's workload

	Hours	ECTS
Total workload	45	1,0
Classes requiring direct contact with the teacher	45	1,0
Student's own work (literature studies, preparation for exercises, preparation for colloquium / credit; preparation for laboratory classes, preparation of report) ¹		

¹ delete or add other activities as appropriate