



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Organization of airspace and air traffic [S2LiK1>OPPiRL]

Course

Field of study

Aerospace Engineering

Year/Semester

1/1

Area of study (specialization)

Civil Aviation

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr inż. Marta Maciejewska

marta.maciejewska@put.poznan.pl

Lecturers

mgr inż. Kinga Niemier

kinga.niemier@put.poznan.pl

Prerequisites

Knowledge: The student has a basic knowledge of air transport, knowledge about the management and organization of transport processes 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; the ability to formulate a research problem and search for its solution, independence in problem-solving, the ability to cooperate in a group

Course objective

To acquaint students with the structure and functions of selected air traffic management systems

Course-related learning outcomes

Knowledge:

1. has extended knowledge necessary to understand the profile subjects and specialist knowledge about the construction, methods of construction, production, operation, air traffic management, safety systems, impact on the economy, society and the environment in the field of aviation and cosmonautics for selected specialties: Civil Aviation, Unnamed Aerial Vehicle

2. has basic knowledge of aviation organizations and the applicable Polish and European aviation law
3. has basic knowledge of aircraft movement in the air and air traffic services
4. has basic knowledge of law, in particular civil aviation law, copyright and industrial property law and its influence on the development of technology, can use patent information resources

Skills:

1. has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books
2. can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions

Social competences:

1. understands the need for lifelong learning; can inspire and organize the learning process of other people
2. is able to interact and work in a group, assuming various roles in it
3. correctly identifies and resolves dilemmas related to the profession

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: written exam on the content processed in class

Tutorials: final test

Programme content

1. ICAO International Civil Aviation Organization and other aviation organizations (Eurocontrol, EASA, PANSO, CAA). Conventions organizing air navigation. Historical conditions of aviation law and the structure of its functioning.
2. ATFCM air traffic flow management
3. Airspace management - FUA - AFUA, FRA, new surveillance techniques, air traffic management systems (AMS2000, PEGASUS)
4. Modern aircraft positioning systems in RNAV, multilateration in ATM, automatic ADS-B surveillance in ATM
5. New trends in air traffic management in Europe FUA → SES → SESAR → SESAR II
6. Free en route, FUA / FRA in controlled airspace
7. Surveillance techniques: VOR, DME, ILS, MLS, GPS NAVSTAR and GLONASS, LAAS (GBAS), EGNOS in ATM (4), navigation based on the characteristics of PNB RNAV in ATM (2)

Course topics

Lecture 1. Civil aviation organizations – roles and competencies: ICAO, EUROCONTROL, EASA, PAŻP, ULC. Legal foundations of ATM operations.

Lecture 2. Airspace structure – airspace classes (A–G), FIR, TMA, CTR, controlled and uncontrolled airspace, organizational elements of airspace.

Lecture 3. Air traffic services (ATS) – tasks and interdependencies in the organization of air traffic.

Lecture 4. Air traffic flow and capacity management (ATFCM) – capacity management, departure slots, regulations, the role of the Network Manager, sector overloads.

Lecture 5. Airspace management – the FUA concept, flexible use of airspace, ASM levels (strategic, pre-tactical, tactical), civil–military cooperation.

Lecture 6. AFUA and the development of the FUA concept – dynamic airspace management, conditional routes (CDR), efficiency of airspace utilization.

Lecture 7. Free Route Airspace (FRA) – free-route operations, trajectory planning, impact on economics and the environment.

Lecture 8. Organization of air traffic control sectors – sectorization, sector capacity, controller workload, dynamic sectorisation.

Lecture 9. Air traffic management (ATM) systems – ATM system architecture, AMS2000, PEGASUS, integration of operational systems.

Lecture 10. Surveillance systems in air traffic organization – primary surveillance radar (PSR), secondary

surveillance radar (SSR), Mode S, multilateration (MLAT).

Lecture 11. ADS-B and modern surveillance technologies – automatic dependent surveillance, GNSS-based surveillance, data integration.

Lecture 12. Ground-based navigation systems in airspace organization – VOR, DME, ILS, MLS – their role in route structures and procedures.

Lecture 13. Satellite navigation systems in ATM – GPS NAVSTAR, GLONASS, EGNOS, GBAS (LAAS) – impact on airspace organization and approach procedures.

Lecture 14. Performance-Based Navigation (PBN, RNAV) – RNAV route design, SID/STAR, precision and non-precision approaches.

Lecture 15. Evolution of the European ATM system – airspace integration, ATM digitalization, the future of air traffic organization.

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 the acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition)

Bibliography

Basic

Szutowski L., Poradnik pilota samolotowego, Poznań 2007

2.Compa T., Zarządzanie przestrzenią powietrzną, AON, Warszawa 2003

3.Domicz J., Szutowski L., Podręcznik pilota samolotowego, Poznań 2008

Additional

1. Zarządzanie ruchem lotniczym w przestrzeni powietrznej RP, WLOP, Warszawa 2002.

2. Ustawa Prawo Lotnicze.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50