COURSE DESCRIPTION CARD - SYLLABUS

Course name
Flight Simulation Training Devices

Course

Field of study
Aerospace Engineering

Year/Semester
2/3

Area of study (specialization)
Safety and Management of Aviation

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Knowledge: Basic knowledge of safety in transport, basic knowledge of air transport

Skills ability to solve research problems using scientific methods the ability to find causal relationships based on your knowledge.

Social competencies: the ability to precisely formulate questions; ability to determine priorities important in solving tasks set before him; ability to formulate a research problem and seek its solution, independence in solving problems, ability to cooperate in a group

Course objective

1. Familiarizing students with the classification of flight simulation training devices

2. Presentation of the construction of devices and their components

3. Familiarizing students with the principles of software development for simulators

4. Discussing the basics of human physiology important from the point of view of the use of simulators

5. An approximation of the possibility of using simulators for conducting scientific research, training new skills as well as learning behaviors in atypical situations.

Course-related learning outcomes

Knowledge

1. Has extended knowledge necessary to understand the profile subjects and specialist knowledge about the construction, operation, air traffic management, safety systems, impact on the economy, society and the environment in the field of aviation and aerospace [K2A_W01]

2. Has detailed knowledge related to selected issues in the field of human capabilities and limitations in aviation and aerospace [K2A_W16]

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]

4. Has ordered, theoretically founded general knowledge covering key issues in the field of flight safety and risk risk assessment [K2A_W22]

Skills

1. Can analyze objects and technical solutions, can search in catalogs and on manufacturers' websites ready components of machines and devices, including means and devices for transport and storage, assess their suitability for use in own technical and organizational projects - [[K2A_U09]]

2. Can plan and conduct a research experiment using measuring equipment, computer simulations, can perform measurements such as temperature measurements using liquid, thermistor, thermocouple thermometers, speed and flow rate using turbine, laser and ultrasonic flow meters, interpret the results and draw conclusions - [[K2A_U10]]

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 the possessed 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 its own [[K2A_K02]

3. Can interact and work in a group, taking different roles in it - [[K1_K04]]

4. Is aware of the social role of a technical university graduate, and especially understands the need to formulate and convey 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 [[K1_K08]]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE: Assessment of knowledge and skills on a written or oral exam based on an explanation of selected issues

LABORATORY: Preparation of reports on the implementation of individual laboratory exercises. Optional assessment of students' knowledge prior to the implementation of classes.

Programme content

LECTURE:

1. Introduction. Basic concepts. Definitions of flight simulator and training device. History of flight simulators.

2. Advantages and disadvantages of flight simulation devices: impact on training efficiency, reduction of training time, environmental protection, cost reduction and safety.

3. Legal regulations for aviation training devices and flight crew licensing (CS-FSTD (A) - Certifacation Specifications for Aeroplane Flight Simulation Training Devices, CS-FSTD (H) - Certification of Flight Helicopter Flight Simulation Training Devices)

4. The use of flight simulation devices in the training of pilots. Characteristics of pilot training. Possibilities of using simulators at various stages of education. Other simulation devices (centrifuge, simulators, mission simulators). Review of existing solutions (air, car, anti-crisis)

5. Construction of devices and components of simulators. Simulator motion systems: division and construction, principles of construction and control basics. Visualization systems: image presentation systems, image generation systems, helmet systems. Image generators. Real-time computer graphics. Computer database of terrain and 3D objects. Imitators of instruments and on-board indicators. Imitation aircraft flight control system.

6. Simulator sickness. Factors conducive to the occurrence of the disease, methods of diagnosing it. Causes and symptoms of simulaton sickness. Analysis of the design of simulators used for research purposes at the Poznan University of Technology.

7. Summary of the messages received - passing the material

LABORATORY:

1. Introduction and discussion of health and safety rules.

2. Simulation capabilities. Presentation and discussion of the scope and purposefulness of simulating selected factors: change of atmospheric conditions, possibilities of simulating the geographical location of the airport, infrastructure, altitude).

3. Simulation possibilities. Presentation and discussion of the scope and advisability of simulation of selected factors: simulation of component failure, change of the drive system

4. Certification of Flight Simulation Training Devices: Validation Tests

5. Certification of Flight Simulation Training Devices: Functional and subjective tests

6. Simulator sickness. Discussion of the phenomenon and the reasons for its occurrence. Examination of the symptoms of the disease using the SSQ (Simulator Sickness Questionaire).

7. Laboratory pass

Teaching methods

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

Laboratory (experiment) method (students conduct experiments independently)

Bibliography

Basic

1. Bartnik R., Grenda B., Galej P., Flight simulators and air traffic control simulators in aviation training, Wyd. National Defense University, Warsaw, 2014

2. Lozia Z .: Driving simulators, WKŁ, Warsaw 2008

3. Leski J., Simulation and simulators, Wyd. MON, Warsaw, 1971

4. Szczepański C., Flight simulators, Wyd. Warsaw University of Technology, 1990

5. Zagdański Z .: Emergency states of aircraft, Wyd. ITWL, Warsaw, 1995

6. Kearns S., Marvin T., Hodge S .: Competency-Based Education in Aviation: Exploring Alternate Training Pathways, 2016

7. J. M. Rolfe, K. J. Staples: Flight Simulation

8. Peter A. Hancock, Dennis A. Vincenzi, John A. Wise, Mustapha Mouloua: Human Factors in Simulation and Training

9. Lewitowicz J., Kustroń K., Fundamentals of aircraft operation, Aircraft properties and operational properties, Wyd. ITWL, Warsaw, 2003

Additional

1. Safety Management Manual, ICAO Doc 9859 International Civil Aviation Organization, 1st edition 2006

2. Makarowski R., Smolicz T., Human factor in aviation operations, ADRIANA AVIATION, Kosowizna, 2012

3. Lewitowicz J., Kustroń K., Fundamentals of aircraft operation, Aircraft properties and operational properties, Wyd. ITWL, Warsaw, 2003

4. Lewitowicz J. (ed.) Fundamentals of Aircraft Operation, Aircraft Operation Research, Wyd. ITWL, Warsaw, 2007

5. Makarowski R., Risk and stress in sport aviation, Wyd. Difin, Warsaw, 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	20	1,0

[1] delete or add other activities as appropriate