COURSE DESCRIPTION CARD - SYLLABUS

Course name
Elements of heat transfer theory and deck equipment

Course

Field of study
Aviation and Astronautics

Year/Semester
4/7

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
30

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Faculty of Environmental Engineering and Energy

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Responsible for the course/lecturer:
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Prerequisites

1 Knowledge: Basic knowledge in the field of mechanics, airframe construction, metrology, strength of materials, non-destructive testing.

Basic knowledge of selected heat flow processes in heat-flow machines and equipment.

2 Skills: He can apply the scientific method in solving problems, carrying out experiments

and gain conclusions

The ability to describe and calculate complex heat flow processes. The ability to effectively self-study in a field related to the chosen field of study.

3 Competence: He knows the limits of his knowledge and skills; can precisely formulate questions, understands the need for further education

Course objective

- Knowledge of the purpose, construction and principles of operation of the basic technical parameters of devices and systems. Ability to read and interpret indications of on-board equipment.

Basic knowledge of selected heat flow processes in heat-flow machines and equipment. The ability to describe and calculate complex heat flow processes. The ability to effectively self-study in a field related to the chosen field of study.

Course-related learning outcomes

Knowledge

1. has ordered, theoretically founded general knowledge covering key issues in the field of on-board equipment, as well as on-board and ground electronic communication systems

2. has ordered, theoretically founded general knowledge covering key issues in the field of technical thermodynamics, i.e. the theory of thermodynamic changes, heat flow, heat and cooling machines

3. has detailed knowledge related to selected issues related to the construction of manned and unmanned aircraft, including on-board equipment and their main components

Skills

1. knows how to use native and international languages to the extent that it is possible to understand technical texts and to write using technical dictionaries machine descriptions in the field of aviation and astronautics (knowledge of technical terminology)

2. is able to communicate using various techniques in a professional environment and other environments using the formal record of construction, technical drawing, concepts and definitions of the scope of the studied field of study

3. can obtain information from literature, the Internet, databases and other sources. Is able to integrate the information obtained, interpret and draw conclusions from them as well as create and justify opinions

4. is able to create a system diagram, select elements and perform basic calculations of the electrical and electronic systems of aircraft machines or devices

5. is able to analyze objects and technical solutions, is able to search in the catalogs and on the manufacturers' websites ready components of machines and devices, including means of transport and storage, assess their suitability for use in own technical and organizational projects

6. is able to carry out elementary technical calculations in the field of fluid mechanics and thermodynamics, such as e.g. heat and mass balances, pressure losses in flows around technical flying

objects and their modules, select the parameters of fans, compressors and turbines for flow systems, as well as calculate thermodynamic waveforms in heat machines

Social competences

1. understands the need for lifelong learning; can inspire and organize the learning process of others

2. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the associated responsibility for the decisions taken

3. is able to interact and work in a group, taking on various roles in it

4. is able to think and act in an entrepreneurial manner

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- Written test

- Oral test

Programme content

- Pilot and navigation equipment. Power, electric, hydraulic and pneumatic equipment. Diagnostic, communication and location equipment. Specialized equipment: human safety, safety of the flying vessel.

Introduction to methods for describing heat transfer processes. Conduction in typical geometric configurations. Dimensional analysis and similarity conditions. Introduction to numerical methods. Heat convection - differential equation, turbulence models. Convection in closed channels. Convection by flowing around the surface. Convection in gaps. Thermal radiation. Heat transfer at boiling and condensation. Heat exchangers. Fundamentals of mass diffusion and convection

Teaching methods

Lecture

continuous assessment in every class, rewarding activity and quality of perception.

written final exam

Project

reports and rewarding knowledge necessary to implement the problems posed in a given area

Bibliography

Basic

Basic literature:

1. Bilski J., Polak Z., Rypulak A., „Awionika, przyrządy i systemy pokładowe", WSOSP, Dęblin 2001

2. Gosiewski Z., Ortyl A., „Inercjalny, bezkardanowy system orientacji przestrzennej i nawigacji – zasada

3. działania", Wyd. Instytut Lotnictwa, 1999

4. Grabiec R., „Lotnicze systemy zobrazowania informacji", skrypt WAT, 1996

5. Kazana J, Lipski J., „Budowa i eksploatacja pokładowych przyrządów pokładowych", Wydawnictwa Komunikacji i Łączności, Warszawa 1983

6. Brodowicz K.: Teoria wymienników ciepła i masy, PWN 1982

7. Hobler T.: Ruch ciepła i wymienniki, WNT 1979

8. Kostowski E.: Przepływ ciepła, Wyd. P. Śl. 1991

9. Kostowski E.: Zbiór zadań z przepływu ciepła, Wyd. P. Śl. 1988

10. Staniszewski B. Red.: Wymiana ciepła ? zadania i przykłady, PWN 1965

Additional

1. Technical Order, F-16, C-130 Herkules, B737, ERJ-145, G550

2. Madejski J.: Teoria wymiany ciepła, Szczecin, WUPSz 1998

3. Bejan A.: Heat Transfer, John Wiley & Sons, Inc., New York 1993

4. Cengel Y.A.: Heat and Mass Transfer, Mc Graw Hill, New York 2006

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	5,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests, preparation for project) [1]	90	3,0

[1] delete or add other activities as appropriate