



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Alternative energy sources in aviation

Course

Field of study

Aerospace Engineering

Area of study (specialization)

Onboard systems and aircraft propulsion

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

15

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

mgr inż. Paweł Czyżewski

Responsible for the course/lecturer:

e-mail: pawel.czyzewski@put.poznan.pl

+48 61 665 21 35

Wydział Inżynierii Środowiska i Energetyki

Prerequisites

Basic knowledge of thermodynamics, fluid mechanics, environmental protection and construction of energy machines.

Student can solve engineering problems using scientific methods, conduct experiments and formulate final conclusions.

Student knows the limits of his knowledge and skills, understands beyond the technical aspects of engineering activities and their impact on the environment.

Course objective

Acquainting students with theoretical knowledge and practical analytical calculations regarding the use



of alternative fuels in the context of the aviation industry. Getting to know the typical operating parameters of energy machines powered by gas and liquid alternative energy sources

Course-related learning outcomes

Knowledge

Has extended knowledge necessary to understand the issue of alternative fuels for aviation and specialist knowledge about the construction, methods of construction, production, operation, impact on the economy, society and the environment in the field of alternative energy sources

Student has an extended knowledge of the latest scientific discoveries in the field of alternative energy sources in aviation

Student has an ordered and in-depth knowledge of the influence of the aircraft engine power source on their efficiency and on the functioning of on-board systems

Skills

1. Student can use own knowledge to search for the right sources and interpret the information found in order to solve both typical and non-standard problems related to alternative energy sources in aviation

2. Student can solve research and engineering tasks that require the use of engineering standards and norms, scientific publications and the use of technologies appropriate for aircraft power sources powered by alternative energy sources. Can use theoretical knowledge gained during lectures and his own work.

3. Student can use specialized terminology related to alternative energy sources in aviation

Social competences

1. Student is ready to recognize the importance of knowledge in solving environmental problems caused by aviation activities and to consult experts and refer to current scientific publications in the event of difficulties in solving the problem of alternative energy sources in the field on its own

2. Student is ready to fulfill social obligations, inspire and organize activities for the natural environment

3. Student is ready to fulfill professional roles responsibly, taking into account the changing social needs, including:

- developing professional achievements,

- observance and development of the principles of professional ethics and activities for environmental protection in the context of the individuality of the aviation industry

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

lecture: assessment of the student's knowledge and skills on the basis of a written test, questions related to the content presented during classes and discussions during lectures



continuous assessment of skills and competences in each class by discussing current problems related to alternative energy sources in aviation and additional tasks

blackboard exercises: continuous assessment of skills and competences during each class by solving engineering tasks and analysis of special cases, assessment of the student's knowledge and skills on the basis of solving final tasks as part of the final test

project: continuous assessment during each class on the ability to solve practical engineering tasks for an individually selected special case, assessment of knowledge and skills in practical design of systems based on alternative sources based on an extensive design task

Programme content

alternative gaseous energy carriers in aviation, alternative liquid energy carriers in aviation, thermodynamic cycles of transformations of alternative energy carriers in aviation, operational parameters of machines and devices powered by alternative sources used in aviation, global trends in the development of alternative energy sources, emission of toxic compounds, problems facing wide use of alternative energy sources in aviation, trends in the development of alternative energy sources, methods of storage of alternative energy sources in aviation

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board, open discussion of the content presented at the lectures

Exercises: performing theoretical calculations on the blackboard.

Project: execution of an extensive design task with the use of engineering tools

Bibliography

Basic

1. Emily S. Nelson , D.R. Reddy Green Aviation: Reduction of Environmental Impact Through Aircraft Technology and Alternative Fuels (Sustainable Energy Developments) CRC Press 2017
2. C. Chuck Biofuels for Aviation, Academic Press 2016

Additional

Marina Braun-Unkhoff , Uwe Riedel Alternative fuels in aviation CEAS Aeronaut J (2015) 6:83–93, DOI 10.1007/s13272-014-0131-2



Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, making presentations) ¹	40	2,0

¹ delete or add other activities as appropriate