COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electric aircraft propulsion systems [S1Lot2-BSP>ENSP]

Course

Field of study
Aviation

Year/Semester
2/4

Area of study (specialization)
Unmanned Aerial Vehicles

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Basic knowledge of mathematical analysis, electrical engineering, electronics and metrology. Skills: He uses the laws of electrical engineering to analyze electric and electronic circuits of direct and alternating current. Have basic skills in the use of simulation software, as well as efficiently obtain additional information from various sources. Social competence: understands the need to improve one's qualifications and is ready to work in a team.

Course objective

Familiarizing the student with the issue of electric propulsion of aircraft (e.g. design features, operational features, disadvantages, advantages, application)

Course-related learning outcomes

Knowledge:
has detailed knowledge related to selected issues in the field of manned and unmanned aircraft construction, in the field of on-board equipment, control systems, communication and recording systems, automation of individual systems, has basic knowledge of flight simulation training devices and simulation methods used to solve air transport issues

has detailed knowledge related to selected issues in the field of construction of aircraft propulsion systems and the design of their components as well as their life cycles and principles of technical description
has basic knowledge of the generation and processing of signals in the form of currents, electric voltages and electromagnetic fields

Skills:
is able to obtain information from various sources, including literature and databases, both in Polish and in English, integrate them properly, interpret them and make a critical evaluation, draw conclusions and exhaustively justify the opinions they formulate
is able to properly plan and perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions from them
is able to communicate using various techniques in the professional environment and other environments using the formal notation of construction, technical drawing, concepts and definitions of the scope of the study field of study

Social competences:
is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life
is able to think and act in an entrepreneurial way, incl. finding commercial applications for the created system, bearing in mind not only the business benefits, but also the social benefits of the activity

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture
Assessment of knowledge and skills demonstrated in a written test of a test and accounting nature (the written test sheet contains information necessary to perform accounting tasks). Test passing threshold 50%. Rewarding grades from laboratory classes as well as attendance and activity during the lecture.
Laboratory classes
Entrance tests and bonuses for the knowledge necessary to implement the problems set in the area of laboratory tasks. Evaluation of skills related to the implementation of the measurement task. Evaluation of reports on exercises performed during and after the classes. Evaluation of the knowledge demonstrated in the written test in the field of the content of laboratory classes (test questions and calculation tasks).

Programme content

Application of electric drive in unmanned flying vehicles
Multi-criteria evaluation of the selection of new generation aircraft drives using energy methods

Course topics

1. Requirements for aircraft propulsion systems.
2. Elements of the electric drive system.
3. Systematics and prospects for the development of electricity storage systems.
4. Designing the required features of the electric drive system.

Teaching methods

Information lecture (conventional) (transmission of information in a systematic way) - can be of a course (propedeutic) or monographic (specialist) nature
Laboratory exercises in the form of practical tasks

Bibliography

Basic:
1. M. Kuźniar:Wielokryterialna ocena doboru napędów lotniczych nowej generacji z wykorzystaniem metod energetycznych. Rozprawa doktorska, Rzeszów 2020.

Additional:
1. R. Jakubowski, T. Wołoszyn: Zastosowanie napędu elektrycznego w bezzałogowych aparatach latających. Technika transportu szynowego 12/2015.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00