



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Drone applications [S1Lot2-BSP>AD]

Course

Field of study

Aviation

Year/Semester

3/6

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

30

Laboratory classes

30

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

6,00

Coordinators

dr inż. Stanisław Gardecki

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Lecturers

Prerequisites

Knowledge: Basic knowledge of mathematical analysis, programming languages. Skills: To have basic skills in using software to support design, and be able to efficiently obtain additional information from various sources. Social competence: Understands the necessity of improving one's qualifications and shows readiness to work in a team.

Course objective

Getting familiar with a wide range of current applications of drone technology in economic and scientific applications.

Course-related learning outcomes

Knowledge:

1. has structured, theoretically based general knowledge covering key issues in the field of technical thermodynamics, fluid mechanics, in particular aerodynamics
2. has structured, theoretically based knowledge in the field of engineering graphics and machine

Skills:

1. is able to analyze business strategies and interpret their activities and apply in practice basic strategic analysis tools
2. is able to design elements of means of transport using environmental protection data
3. is able to estimate various types of costs, is able to verify and evaluate market phenomena, is able to evaluate economic growth factors and the importance of money for its development, is able to decide on economic choices in the field of consumption and production,

Social competences:

1. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of malfunctioning engineering projects that led to serious financial, social losses or serious loss of health or even life
2. correctly identifies and resolves dilemmas related to the profession of an aerospace engineer

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 or oral test. Bonus activities during the lecture.

Laboratories

Evaluation of progress on the basis of partial grades of the exercises performed.

Programme content

The course programme includes learning about the broad spectrum of drone applications in business and research. Students will be introduced to both the general aspects of UAV use in the field, as well as the technical details and numerous case studies.

Course topics

The topics of the lectures in one part include a number of examples of drone applications, while the second part is monographic and focuses on selected scientific issues in an application context:

1. An overview of the UAV application market, current trends, economic indicators, development barriers and growth prospects.
2. Drone applications in precision agriculture.
3. UAV use in environmental protection and monitoring tasks.
4. Drone applications in civil engineering, surveying and technical inspection.
5. Description of drone applications in the entertainment industry and drone sports.
6. Drone applications in the context of emergency operations and public safety.
7. Nature-inspired drones, including flapping-wing designs.
8. Drone swarm concept, control and management methods.
9. Intelligent diagnostic systems for UAV damage detection.

The laboratory programme includes a series of exercises introducing the student to the tools and methods for operating, programming and diagnostics of miniature multi-rotor drones. The culmination of the laboratory cycle is the completion on a series of practical tasks on topics focused on the application aspect of the UAV.

Teaching methods

Lecture in the form of a series of presentations combined with discussion and practical examples.

Labs: a series of programming exercises performed on miniature UAVs culminating in practical tasks on a topic related to a selected drone technology application.

Bibliography

Basic:

1. W. Giernacki: Drony i bezzałogowe statki powietrzne (UAV), Wydawnictwo Politechniki Poznańskiej, 2018.

Extended:

1. W. Wyszycacz: Drony, Wydawnictwo Poligraf 2020.

Breakdown of average student's workload Hours ECTS

Total workload 150 6,00

Classes requiring direct contact with the teacher 60 2,50

Student's own work (literature studies, preparation for laboratory classes/
tutorials, preparation for tests/exam, project preparation) 90 3,50

Additional:

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Breakdown of average student's workload

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