



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Science of mechanics

Course

Field of study

Aviation

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

dr inż. Robert Kłosowiak

Responsible for the course/lecturer:

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Maszyn Roboczych i Transportu

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Prerequisites

basic knowledge of general mechanics, physics, technical drawing. Logical and creative thinking, Internet use and library resources. Understands the need for continuous learning and acquiring new knowledge. Has general knowledge about the construction of machines, in particular energy machines.

Course objective

The role of machines in energy conversion. Machine classification. Characteristic parameters of the machines. Mastering technical vocabulary, understanding the principles of operation of machines and devices.

Course-related learning outcomes

Knowledge



1. has extended and in-depth knowledge of mathematics including algebra, analysis, theory of differential equations, probability, analytical geometry as well as physics covering the basics of classical mechanics, optics, electricity and magnetism, solid state physics, thermodynamics, useful for formulating and solving complex technical tasks related to engineering aeronautical and modeling
2. has ordered and theoretically founded general knowledge in the field of key technical issues and detailed knowledge of selected issues related to air transport, knows the basic techniques, methods and tools used in the process of solving tasks related to air transport, mainly of an engineering nature
3. has knowledge of the method of presenting test results in the form of tables and graphs, performing the analysis of measurement uncertainties
4. has basic knowledge of research methods and how to prepare and conduct research, and knows the rules of editing a scientific work
5. has basic knowledge of metal, non-metal and composite materials used in machine construction, in particular about their structure, properties, methods of production, heat and thermo-chemical treatment and the influence of plastic processing on their strength, as well as fuels, lubricants, technical gases, refrigerants e.t.c.
6. has basic knowledge of environmental protection in transport, is aware of the risks associated with environmental protection and understands the specificity of the impact of mainly air transport on the environment as well as social, economic, legal and other non-technical conditions of engineering activities
7. has the ability to self-study with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books

Skills

1. 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
2. is able to properly use information and communication techniques, applicable at various stages of the implementation of aviation projects
3. is able to properly plan and perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions from them
4. can, when formulating and solving tasks related to civil aviation, apply appropriately selected methods, including analytical, simulation or experimental methods
5. is able to properly select materials for simple aviation structures, and can indicate the differences between the fuels used in aviation



6. 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
7. is able to design elements of means of transport with the use of data on environmental protection
8. student can use theoretical probability distributions. Student is able to analyze and interpret statistical data. Student is able to use the methods and tools of mathematical statistics in engineering practice
9. can use the language of mathematics (differential and integral calculus) to describe simple engineering problems.
10. Student is able to make a comprehensive assessment of the ecological parameters of an aircraft propulsion unit based on the values of emission factors for harmful gaseous compounds and particulate matter
11. is able to prepare a short research paper while maintaining the basic editorial rules. He can choose appropriate methods for the conducted research and is able to carry out a basic analysis of the results.
12. is able to organize, cooperate and work in a group, assuming various roles in it, and is able to properly define priorities for the implementation of a task set by himself or others
13. is able to plan and implement the process of own permanent learning and knows the possibilities of further education (2nd and 3rd degree studies, postgraduate studies, courses and exams conducted by universities, companies and professional organizations)

Social competences

1. understands that in technology, knowledge and skills very quickly become obsolete
2. 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
3. is aware of the social role of a technical university graduate, in particular understands the need to formulate and provide the society, in an appropriate form, with information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession
4. 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:
written final test

Programme content



Simplified machine design records. Hulls and bearing structures. Propulsion systems. Machine working bodies. Jet, turbine and rocket engines. Turbines, types, the essence of action. Pumps, division, construction, principle of operation. Gyms - division, function of elements. Unconventional energy machines. Heat pumps - operating principle, application.

PART - 66 (THEORY - 11.25 hours)

MODULE 3. BASIC INFORMATION ON ELECTRICITY

3.18 AC motor

Construction, principles of operation and properties of AC synchronous and induction motors, single and polyphase;

Methods of controlling the speed and direction of rotation;

Manufacturing methods of a rotating field capacitor, inductor, shaded and split pole [2]

Teaching methods

lecture

Bibliography

Basic

Gnutek, Z., and W. Kordylewski. "Maszynoznawstwo energetyczne." Oficyna Wyd. PWr, Wrocław (2003).

Jan Kijewski, Andrzej Miller -Maszynoznawstwo

J. Gronowicz - Maszynoznawstwo ogólne

J. Łęgiewicz - Poznaj samochód

Additional

Z. Tomaszewski - Wprowadzenie do techniki

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,5
Student's own work (literature studies, preparation for tests) ¹	10	0,5

¹ delete or add other activities as appropriate