COURSE DESCRIPTION CARD - SYLLABUS

Course name
Science of mechanics II [S1Lot2-SLiPL>Masz2]

Course

Field of study
Aviation

Year/Semester
2/3

Area of study (specialization)
Aircraft Engines and Airframes

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
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

dr inż. Robert Kłosowiak
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Lecturers

Prerequisites

basic knowledge of general mechanics, physics, technical drawing. Logical and creative thinking, using the Internet and library resources. Understands the need for continuous education and acquiring new knowledge. Has general knowledge of machine construction, in particular power machines.

Course objective

The role of machines in energy conversion. Classification of machines. Characteristic parameters of 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 supporting structures. Drive systems. Machine working organs. Jet, turbine and rocket engines. Turbines, types, essence of operation. Pumps, classification, construction, operating principle. Power plants - classification, function of elements. Unconventional energy machines. Heat pumps - operating principle, application.
PART - 66 (THEORY - 11.25 hrs.)
MODULE 3. BASIC KNOWLEDGE FROM THE FIELD OF ELECTRICS
3.18 AC motor
Construction, operating principles and properties of synchronous and induction AC motor, single- and multi-phase;
Methods of controlling speed and direction of rotation;
Methods of manufacturing a rotating field capacitor, induction coil, shaded and split pole [2]

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Teaching methods

lecture

Bibliography

Basic:
Gnutek, Z., and W. Kordylewski. "Energy Machine Science." PWr Publishing House, Wrocław (2003).
Jan Kijewski, Andrzej Miller - Machine Science
J. Gronowicz - General Machine Science
J. Łęgiewicz - Get to know the car
Supplementary
Z. Tomaszewski - Introduction to technology

Additional:

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Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50