



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Measurements of mechanical quantities

### Course

Field of study

Aviation

Area of study (specialization)

Aircraft engines and airframes

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

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

PhD Karolina Perz

Responsible for the course/lecturer:

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Institute of Working Machines and Motor

Vehicles

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### Prerequisites

Has basic knowledge of physics, mechanics and strength of materials.

### Course objective

Understanding the methods of measuring mechanical quantities.

### Course-related learning outcomes

Knowledge

1. 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



2. 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
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 extended knowledge in the field of material strength, including the theory of elasticity and plasticity, stress hypotheses, methods of calculating beams, membranes, shafts, joints and other structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures, and has basic knowledge of the main departments of technical mechanics: statics, kinematics and dynamics of a material point and a rigid body

#### 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. 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
5. 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 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

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Credit based on the test of mastering the knowledge of lectures and ongoing control of preparation for laboratory exercises and assessment of their course and report.

#### Programme content



Scientific knowledge. Methodology of empirical research. Tests of machines and devices at the stages of construction, manufacture and operation. Metrological concepts: size, property, property, value. Measurement; definitions, unit systems. General principles of measuring methods of mechanical quantities. Measurement of stress, force, torque and rotational speed. Construction of the measuring system. Measurement system: sensor, transducer, meter, recorder. Computer software for conducting: analysis of recording and archiving measurements. Analysis of errors, preparation of results and formulation of conclusions from measurements.

PART - 66 (PRACTICE - 11.25 hours)

MODULE 7A. MAINTENANCE ACTIVITIES

7.2 Workshop Activities

Handling tools, caring for tools, using workshop materials; Sizes, clearances and tolerances, quality standards; Calibration of tools and equipment, calibration standards. [3]

### Teaching methods

Lecture: multimedia presentation, illustrated with examples given on a board,

Laboratory exercises: performance of tasks given by the teacher - practical exercises.

### Bibliography

Basic

1. Hagel R., Zakrzewski J.: Miernictwo dynamiczne, WNT Warszawa 1984
2. Nawrocki W.: Komputerowe systemy pomiarowe, WKŁ Warszawa 2002

Additional

3. Piotrowski J.: Podstawy miernictwa, WNT Warszawa 2002

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	20	0,5

<sup>1</sup> delete or add other activities as appropriate