



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Measurements of mechanical quantities [S1Lot2-SLiPL>PWM]

Course

Field of study

Aviation

Year/Semester

3/5

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

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr inż. Karolina Perz

karolina.perz@put.poznan.pl

Lecturers

Prerequisites

Has basic knowledge of physics, mechanics and strength of materials

Course objective

Learning methods of measuring mechanical quantities

Course-related learning outcomes

Knowledge:

1. has structured and theoretically based general knowledge of key technical issues and detailed knowledge of selected issues related to air transport, knows 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 design of their components
3. has knowledge of the method of presenting research results in the form of a table and a graph,

performing

measurement uncertainty analysis

4. has extended knowledge of the strength of materials, including the theory of elasticity and plasticity, stress

hypotheses, methods of calculating beams, membranes, shafts, connections and other structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures and also has basic knowledge of the main areas 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

English, integrate them correctly, interpret and critically evaluate them, draw conclusions, and comprehensively justify the opinions he/she formulates

2. is able to properly use information and communication techniques that are used 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 results obtained, and correctly draw conclusions from them

4. is able to organize, cooperate and work in a group, assuming different roles in it and is able to properly define priorities for the implementation of a task defined by himself/herself or others

5. is able to plan and implement the process of his/her own permanent learning and is aware of the possibilities of further education (second and third 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 outdated

2. is aware of the social role of a technical university graduate, in particular understands the need to formulate and convey to society, in an appropriate form, information and opinions on engineering activities, technical achievements, as well as the achievements and traditions of the engineering profession, co-organizing activities for the benefit of the social environment and initiating actions for the public interest

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Credit on the basis of a test of mastery of knowledge from lectures and current control of preparation for laboratory exercises and evaluation of their course and report.

Programme content

Scientific knowledge. Empirical research methodology. Research of machinery and equipment at the stages of construction,

manufacturing and operation. Metrological concepts: magnitude, property, characteristic, value.

Measurements;

definitions, systems of units. General principles of measurement methods of mechanical quantities.

Measurement

of stress, force, torque, and speed. Construction of a measurement system.

Measurement system: sensor, transducer, meter, recorder. Computer software for carry out: analysis of recording and archiving of measurements. Error analysis, processing of results and formulation of conclusions from measurements.

PART - 66 (PRACTICAL - 11.25 hours).

MODULE 7A. MAINTENANCE ACTIVITIES

7.2 Activities in the workshop

Use of tools, care of tools, use of workshop materials;

Sizes, clearances and tolerances, workmanship standards;

Calibration of tools and equipment, calibration standards. [3]

Course topics

In laboratory classes in the subject of measurement of mechanical quantities, the following topics are implemented:

1. Complex state of stress. Static and dynamic measurements.
2. Measurement of time-varying velocities on the example of a spherical articulated coupling.
3. Measurement of torque
4. Determination of critical rotations of shafts
5. Programming of measurements in the Agilent VEE environment
6. Use of a potentiometric displacement transducer for path mapping

Teaching methods

Lecture: multimedia presentation, illustrated by examples given on the blackboard,

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

Bibliography

Basic:

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

Supplementary

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

Additional:

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Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00