



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Workshop metrology

Course

Field of study

Construction and Exploitation of Means of Transport

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

PhD. Eng. Karol GROCHALSKI

Responsible for the course/lecturer:

Prerequisites

Information on mathematical analysis and statistics, technical drawing and machine parts

Skills: Logical thinking, using information obtained from the library and the Internet

Social competences: Understands the needs of learning and acquiring new knowledge

Course objective

Learning the basic concepts of measurement techniques. Getting to know the instruments and measuring methods used in machine building. Acquiring the ability to calculate and select a tolerance and fit symbol for holes, shafts and threads. Gaining knowledge about measurement methods, error calculus and calculating the uncertainty of direct and indirect measurement.

Course-related learning outcomes

Knowledge

He has ordered a basic knowledge of the main branches of technical mechanics: statics, kinematics and dynamics of material point and rigid body.



He has basic knowledge in the basics of machine design and the theory of machines and mechanisms, including mechanical vibration.

Skills

Can properly use modern equipment for measuring the main physical quantities used in machine research and production control.

Social competences

He is ready to critically assess his knowledge and received content.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Final test

Laboratory: Credit based on an oral or written answer regarding the content of each performed laboratory exercise and a written report. To obtain a credit, all exercises must be passed.

Programme content

Lecture

Measurement theory, measurement and its essence, measurement result, methods, types and methods of measurement, SI system of measurement units, definition of a meter, etalons, standards of length and angle measurements, gauge blocks, measuring rolls and balls, angle plates, angles, pattern hierarchy measurement errors, definition and classification, systematic, random and excessive errors, elimination and estimation of errors, determination of measurement uncertainty, statistical analysis of measurement results, measurement tools, their division and characteristics, measurement methods, errors of indirect methods, caliper, micrometric instruments, sensors, length gauges, altimeters, microscopes, projectors, systems of tolerances and fits of machine parts, measurements of angles and cones, measurements of shape and position deviations, measurements of basic parameters of gears, surface roughness measurements. Basics of the coordinate technique.

Laboratory

Checking measuring instruments. Indirect measurements, angle measurements. Statistical analysis of the measurement results. Measurements of external and internal dimensions. Thread measurements. Gear wheel measurements. Shape error measurements.

Teaching methods

Information and problem lecture,

Laboratories



Bibliography

Basic

1. Jakubiec W., Malinowski J.: Metrologia wielkości geometrycznych. WNT, Warszawa, 2018
2. Białas S. Humienny Z, Kiszka K.: Metrologia z podstawami specyfikacji geometrii wyrobu (GPS), Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2014
3. Paczyński P.: Metrologia Techniczna. Przewodnik do wykładów, ćwiczeń i laboratoriów, wyd. Politechniki Poznańskiej, Poznań 2003
4. Humienny Z. i inni: Specyfikacje geometrii wyrobów (GPS), Wydawnictwa Naukowo-Techniczne, Warszawa, 2004.

Additional

1. Piotrowski J., Podstawy metrologii, PWN, Warszawa, 1979
2. Sydenham P.H., Podręcznik metrologii, t1, Wyd. Kił, Warszawa, 1988
3. Arendarski J. Niepewność pomiarów Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2003
4. Hagel R., Zakrzewski J., Miernictwo dynamiczne, WNT, Warszawa, 1984.

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	50	2

¹ delete or add other activities as appropriate