



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Metrology in electromobility

Course

Field of study

Electromobility

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Tutorials

Projects/seminars

Other (e.g. online)

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Prerequisites

The student starting this course should have basic knowledge of mathematics, physics and the basics of electrical engineering.



Course objective

Learning about various measurement methods, the properties of modern measuring instruments, the principles of using analog and digital instruments and the principles of elaborating measurement results.

Course-related learning outcomes

Knowledge

1. Has knowledge of basic measurements of electrical quantities using analog and digital instruments
2. Has knowledge of technical and functional properties of measuring devices
3. Has knowledge of working out the results of the experiment

Skills

1. Knows how to use appropriate methods to measure selected electrical quantities
2. Knows how to use measuring instruments in accordance with the user's manual
3. Can perform an engineering task and assess the accuracy of the results

Social competences

1. Understands that knowledge of the operation of electrical circuits is important in the work of an engineer

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Test composed of accounting questions and tasks. The sheet contains information necessary to perform accounting tasks. The test pass threshold is 50%.

Programme content

Measurement methodology: definitions, concepts, patterns, units of measurement. Planning and implementation of the measurement task. Elements of the theory of errors and uncertainty of measurement results. Measuring converters: AC voltage detectors, measuring amplifiers, A/D converters. Measurement methods, analog and digital measurements of electrical quantities. Balanced and swing bridges. Operation and construction of meters and oscilloscopes, oscilloscope measurements. Measurements of voltage, current, time, frequency, power, energy, RLC. Introduction to the structure and organization of computer measurement systems. Basic principles of occupational health and safety when measuring electrical quantities.

Teaching methods

Multimedia presentation (including: drawings, photos, animations, films) supplemented with examples given on the board. Introducing a new topic, preceded by a reminder of related content, known to students in other subjects.



Bibliography

Basic

1. Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna, WNT, Warszawa 2014
2. Cysewska-Sobusiak A.: Podstawy metrologii i inżynierii pomiarowej, Wyd. Politechniki Poznańskiej, Poznań 2010
3. Zakrzewski J., Kampik M.: Sensory i przetworniki pomiarowe, Wyd. PŚ, Gliwice, 2013
4. Rydzewski J.: Pomiary oscyloskopowe, WNT, Warszawa 2007
5. Dusza J., Gortat G., Leśniewski A.: Podstawy miernictwa, Wyd. PW, Warszawa, 2007
6. Gawędzki W.: Pomiary elektryczne wielkości nieelektrycznych, Wyd. AGH, Kraków, 2010
7. Suchocki K.: Sensory i przetworniki pomiarowe. Przetworniki indukcyjne, przetworniki pojemnościowe, Wyd. PG, Gdańsk, 2015

Additional

1. Miłek M.: Metrologia elektryczna wielkości nieelektrycznych, Wyd. UZ, Zielona góra, 2006
2. Wołk-Łaniewski L., Wittek J.: Niepewność pomiaru w zadaniach rachunkowych z metrologii elektrycznej. Wyd. UTP, Bydgoszcz, 2008
3. Nawrocki W.: Sensory i systemy pomiarowe, Wyd. PP, Poznań, 2006
4. Kitchin Ch., Counts L.: Wzmacniacze operacyjne i pomiarowe: przewodnik projektanta, BTC, 2009
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6. Hulewicz A., Rozwiązania układowe oraz parametry detektorów wartości szczytowej, Elektronika, nr 7 2014, s. 149-153
7. Otomański P., Krawiecki Z.: Wykorzystanie środowiska LabVIEW do oceny niedokładności pomiarów rezystancji, Pomiary Automatyka Kontrola, 2011, vol. 57, nr 12, s. 1561-1563
8. Hulewicz A., Krawiecki Z., Narzędzia statystyczne w procesie normalizacji wyników pomiarów, Poznan University of Technology Academic Journals, Electrical Engineering No 88, Computer Applications in Electrical Engineering 2016, Poznan 2016, s. 251-2608



Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	35	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	15	1,0

¹ delete or add other activities as appropriate