

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Miernictwo elektryczne 1**
 Name in English: **Electrical Metrology 1**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable):
 Level and form of studies: **1st level, part-time**
 Kind of subject: **obligatory**
 Subject code: **ELR053372**
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	10				
Number of hours of total student workload (CNPS):	60				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	2				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of mathematical functions properties, derivative calculations.
2. Has a basic knowledge of physics.

SUBJECT OBJECTIVES

- C1. Introduction student with basic knowledge of metrology terms, error and uncertainty theory and basis information about standards.
- C2. Awareness student possibilities of using measurement circuits realizing different measurement methods to measure basic electrical quantities.

SUBJECT LEARNING OUTCOMES*relating to knowledge:*

- PEU_W01 Has a knowledge of measurement uncertainties calculations for analogue and digital instruments.
- PEU_W02 Has a knowledge of uncertainties calculation in indirect measurements and has a knowledge of passive elements standards.

*relating to skills:**relating to social competences:*

- PEU_K01 Searches information, and can do critical analysis.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Basic terms of metrology. Metrological services organization in Poland.	2
Lec 2	Analogue and digital instruments measurements errors. Classes and errors of measurement tools. Systematic, random errors and mistakes.	2
Lec 3	Uncertainty theory. Uncertainty type A and B. Total uncertainty. Statistical distributions: Gauss and t-Student.	2
Lec 4	Direct measures uncertainty. Indirect measures uncertainty.	2
Lec 5	Resistance, inductance and capacitance standards.	1
Lec 6	Test.	1
Total hours:		10

TEACHING TOOLS USED

N1. Traditional lecture, multimedia presentations.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEU_W01 PEU_W02 PEU_K01	Test.
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE**PRIMARY LITERATURE:**

- [1] Chwaleba A., Poniński M., Siedlecki A., Metrologia elektryczna, WNT, Warszawa 2010.
- [2] Miernictwo elektryczne – ćwiczenia laboratoryjne, praca zbiorowa pod redakcją D. Koczeli, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001
- [3] Tumański S., Technika pomiarowa, WNT, Warszawa, 2007
- [4] Piotrowski J., Podstawy metrologii, WNT, Warszawa, 2003
- [5] www.imnipe.pwr.edu.pl

SECONDARY LITERATURE:

- [1] Kwiatkowski W.: Miernictwo elektryczne. Analogowa technika pomiarowa, OW Pol. Warszawskiej, Warszawa, 1998
- [2] Lisowski M., Podstawy metrologii, Of. Wyd. Pol. Wrocławskiej, Wrocław, 2011
- [3] Marcyniuk A., Pasecki E., Pluciński M., Szadkowski B., Podstawy Metrologii Elektrycznej, Warszawa, WNT, 1984.
- [4] Orzeszkowski Z.: Podstawy metrologii elektrycznej, Wyd. Pol. Wrocławskiej, Wrocław 1981.
- [5] Szumielewicz B., Słomski B., Styburski W., Pomiary elektroniczne w technice, Warszawa, WNT, 1982.
- [6] Badźmirowski K., Karkowska H., Karkowski Z., Cyfrowe systemy pomiarowe, Warszawa, WNT, 1979.

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