



COURSE SPECIFICATION

Course code	M#1-S1-ME-303
Course title in Polish	Metrologia I
Course title in English	Metrology I
Valid from (academic year)	2019/2020

GENERAL INFORMATION

Programme of study	MECHANICAL ENGINEERING
Level of qualification	first-cycle
Type of education	academic
Mode of study	full-time
Specialism	all
Department responsible	Department of Manufacturing Engineering and Metrology
Course leader	Prof. dr hab. inż. Stanisław Adamczak, dr h. c. multi
Approved by	

COURSE OVERVIEW

Course type	basic
Course status	compulsory
Language of instruction	English
Semester of delivery	semester 3
Pre-requisites	None
Examination required (YES/NO)	NO
ECTS value	2

Mode of instruction	lecture	class	laboratory	project	seminar
No. of hours per semester	15	15			

LEARNING OUTCOMES

Category of outcome	Out-come code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	On completion of the course students will have a fundamental knowledge of metrology; they will know basic principles in the field of probability theory and statistics that can be applied in measurement error calculus. Students will have knowledge of mathematical tools used to calculate errors in direct and indirect measurements.	MiBM1_W01 MiBM1_W16
	W02	On completion of the course students will have basic knowledge of measurement error theory, they will know types of errors and how to eliminate selected types of errors from measurement data. Students will have knowledge of fundamental concepts concerning measurements of physical quantities with a special regard to measurements of geometrical quantities.	MiBM1_W01 MiBM1_W16
Skills	U01	On completion of the course, students will be able to use the tools of analytical mathematics and statistics to calculation of measurement uncertainty. They will be able to recognize types of measurement errors and to apply relevant methods of their compensation	MiBM1_U01 MiBM1_U11
	U02	On completion of the course students will have skills to perform measurement data analysis for various types of distributions of the random variable.	MiBM1_U01 MiBM1_U11
Competence	K01	On completion of the course students will be aware of the importance of objective analysis of measurement data.	MiBM1_K02

COURSE CONTENT

Type of instruction*	Topics covered
lecture	A historical background of metrology. The classification of metrology. Administrative issues regarding metrology. Fits and tolerances. An application of selected problems of probability theory in metrology. An application of selected problems of statistics in metrology. Concepts of quantity and quantity value. Units of measure. SI system of units. The classification of measurement errors. Definition of measurement uncertainty. Methods of calculation of measurement uncertainty.
class	Solving the problems concerning fits and tolerances. Calculation of random variable parameters. Calculation of measurement uncertainty in direct and indirect measurements.

*) Please delete rows in the table above that are not applicable.

ASSESSMENT METHODS

Outcome code	Methods of assessment <i>(Mark with an X where applicable)</i>					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			
U01			X			
U02			X			

K01						X
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ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	non-examination assessment	<i>The pass mark is a minimum of 50% for the final test.</i>
class	non-examination assessment	<i>Regular class attendance. The pass mark is a minimum of 100 points for two in-class-tests.</i>

*) Please delete rows in the table above that are not applicable.

OVERALL STUDENT WORKLOAD

ECTS weighting							
	Activity type	Student workload					Unit
		L	C	Lab	P	S	
1.	Scheduled contact hours	15	15				h
2.	Other contact hours (office hours, examination)	2	2				h
3.	Total number of contact hours	34					h
4.	Number of ECTS credits for contact hours	1,4					ECTS
5.	Number of independent study hours	16					h
6.	Number of ECTS credits for independent study hours	0,6					ECTS
7.	Number of practical hours	32					h
8.	Number of ECTS credits for practical hours	1,3					ECTS
9.	Total study time	50					h
10.	ECTS credits for the course <i>1 ECTS credit = 25-30 hours of study time</i>	2					ECTS

READING LIST

1. Praca zbiorowa pod redakcją Z. Humiennego „Geometrical Product Specifications - Course for Technical Universities” – Oficyna Wydawnicza Politechniki Warszawskiej, 2001.
2. Connie L. Dotson, Fundamentals of dimensional metrology, Cengage Learning, 2016.
3. D. J. Whitehouse: Handbook of Surface and Nanometrology, CRC Press, 20 gru 2010
4. S. Adamczak, W. Makiela, Metrologia w budowie maszyn – zadania z rozwiązaniami, PWN, 2018, Warszawa,