



### COURSE SPECIFICATION

Course code	<b>M#1-S1-ME-701</b>
Course title in Polish	<b>Inżynieria Jakości</b>
Course title in English	<b>Quality Engineering</b>
Valid from (academic year)	<b>2019/2020</b>

### GENERAL INFORMATION

Programme of study	<b>MECHANICAL ENGINEERING</b>
Level of qualification	<b>first-cycle</b>
Type of education	<b>academic</b>
Mode of study	<b>full-time</b>
Specialism	<b>all</b>
Department responsible	<b>Department of Manufacturing Engineering and Metrol- ogy</b>
Course leader	<b>Dr hab. inż. Włodzimierz Makiela prof. PŚk</b>
Approved by	

### COURSE OVERVIEW

Course type	<b>programme-specific</b>
Course status	<b>compulsory</b>
Language of instruction	English
Semester of delivery	<b>semester 7</b>
Pre-requisites	<b>None</b>
Examination required (YES/NO)	NO
ECTS value	<b>2</b>

Mode of instruction	lecture	class	laboratory	project	seminar
No. of hours per semester	<b>15</b>			<b>15</b>	

## LEARNING OUTCOMES

Category of outcome	Out-come code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	The student have knowledge of measurement systems, analysis of experimental results in relation to quality	MiBM1_W16 MiBM1_W17
	W02	The student have knowledge of production process management and manufacturing techniques with regard to quality management issues	MiBM1_W16 MiBM1_W17
Skills	U01	The student is able to plan and carry out experiments, critically interprets the results and draws correct conclusions	MiBM1_U11 MiBM1_U12
	U02	The student knows how to formulate and solve engineering tasks using properly selected analytical, simulation and experimental methods.	MiBM1_U12 MiBM1_U15
Competence	K01	The student is aware of the need to supplement specialist knowledge through life and is able to select proper sources of knowledge and methods of teaching for himself as well as for others	MiBM1_K01 MiBM1_K06
	K02	The student is aware of the responsibility related to decisions made in engineering and managerial activities, especially in terms of own and others' safety	MiBM1_K02 MiBM1_K04

## COURSE CONTENT

Type of instruction*	Topics covered
lecture	Concept of quality. Requirements for product quality. Quality symbols. Reliability of Products. Reliability structures. Basic concepts of mathematical statistics. Statistical control of production quality. Shewhart control charts. Alternative control. Methods and tools used in quality management systems. FMEA and QFD methods. Statistical Process Control (SPC). Indicators of quality capability of processes, machines and measuring systems. Methods of calculating the gage R&R of repeatability and reproducibility of measuring instruments. Evolution of organizational systems of a production company from classical methods of quality control through quality assurance systems to quality management systems. Integrated quality management systems. Process approach to organization management. Principles of creating and content of the quality system documentation. Equipment for measurement, control and research. Legal metrology. Requirements of PN-ISO 10012-1:1998 and PN-EN ISO 1012:2004. Principles of calibration of measuring equipment. Methods and techniques for performing quality audits. Requirements of PN-ISO 19011 standard.
project	Perform six projects on the following topics: Reliability systems. Statistical methods - construction of Shewhart cards. Verification of repeatability and reproducibility of measuring instruments. Quality policy and company organization. System procedures. Management and calibration of measuring equipment Quality system audit

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

## ASSESSMENT METHODS

Outcome code	Methods of assessment (Mark with an X where applicable)					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			

U01				X		
U02				X		
K01						X
K02						X

## ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	non-examination assessment	The pass mark is a minimum to gain 3 out of a possible 6 points
project	non-examination assessment	The pass mark for each pre-lab tests and all six post-lab report, each with a minimum mark of 3.0

\*) 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.	<b>Total number of contact hours</b>	<b>34</b>					h
4.	<b>Number of ECTS credits for contact hours</b>	<b>1,4</b>					ECTS
5.	<b>Number of independent study hours</b>	<b>16</b>					h
6.	<b>Number of ECTS credits for independent study hours</b>	<b>0,6</b>					ECTS
7.	<b>Number of practical hours</b>	<b>32</b>					h
8.	<b>Number of ECTS credits for practical hours</b>	<b>1,3</b>					ECTS
9.	<b>Total study time</b>	<b>50</b>					h
10.	<b>ECTS credits for the course</b> <i>1 ECTS credit = 25-30 hours of study time</i>	<b>2</b>					ECTS

## READING LIST

1. Adamczak S. Makiela W. Podstawy metrologii i inżynierii jakości dla mechaników. Ćwiczenia praktyczne. WNT Warszawa 2010, wydanie I
2. Sikora T. i inni „Zarządzanie jakością według norm ISO serii 9000:2000 Wydawnictwo Akademii Ekonomicznej w Krakowie Kraków 2005
3. Hamrol A. „Zarządzanie jakością z przykładami” Wydawnictwo Naukowe PWN 2017
4. Dietrich E., Schulze A. „Metody statystyczne w kwalifikacji środków pomiarowych, maszyn i procesów produkcyjnych” Wydawnictwo Notika System Warszawa 2000
5. Wawak T. „Zarządzanie przez jakość” Wydawnictwo Informacji Ekonomicznej, Kraków 1997
6. Tabor A., Zajac A., Rączka M.- praca zbiorowa „Zarządzanie jakością” tom I-VI Wydawnictwo Politechniki Krakowskiej, Kraków 1999-2000
7. Polskie Normy (PN-ISO serii 9000, PN-ISO serii 10000, PN-ISO serii 14000, PN-EN ISO 19011)
8. Problemy Jakości – miesięcznik

## 9. ABC Jakości - kwartalnik