

DESCRIPTION OF THE COURSE OF STUDY

Course code	0719-2ID-C21-TP	
Name of the course in	Polish	Techniki pomiarowe
	English	Measuring techniques

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	Data engineering
1.2. Mode of study	full-time study
1.3. Level of study	engineering studies
1.4. Profile of study*	general academic
1.5. Person/s preparing the course description	dr hab. Dariusz Banaś, prof. UJK
1.6. Contact	d.banas@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English
2.2. Prerequisites*	none

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes	Lecture 15h, Laboratory 30h. Project 15h	
3.2. Place of classes	Courses in the teaching rooms of UJK	
3.3. Form of assessment	Credit with grade	
3.4. Teaching methods	Information lecture, Laboratory method (experiment)	
3.5. Bibliography	Required reading	Rosario Bartiromo, Mario De Vincenzi, Electrical Measurements in the Laboratory Practice (Undergraduate Lecture Notes in Physics), Springer
	Further reading	John G. Webster and Halit Eren, Measurement, Instrumentation, and Sensors Handbook, Second Edition: Electromagnetic, Optical, Radiation, Chemical, and Biomedical Measurement, CRC Press William D. Cooper, Albert D. Helfrick, Electronic Instrumentation and Measurement Techniques, Prentice Hall

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED TEACHING OUTCOMES

4.1. Course objectives C1 - Familiarizing with the basic concepts of electrical metrology C3 - Acquainting with the principle of operation and construction of basic measuring instruments C3 - Understanding the principles of analog signal processing C4 - Acquiring the ability to recognize and operate simple measuring instruments C5 - Acquiring the ability to design and build simple measurement systems
4.2. Detailed syllabus Basic concepts of electrical metrology, the most important measurement methods. Basics of error theory and measurement uncertainty. Standards of electrical units (electrical standards based on the definition of a physical phenomenon, material patterns of electrical quantities, reference multimeters and calibrators). Electromechanical measuring instruments (magnetolectric and electromagnetic meters, electrodynamic wattmeters, induction meters). Recording devices (oscilloscopes). Bridge systems balanced and unbalanced. Compensation and comparison methods. Measurement signals and their processing. Conditioning of resistance, capacitance and inductance. AC / DC conversion. Voltage conversion to frequency. Amplification of signal (amplifiers). Feedback in measuring transducers. The quality of analog signal processing. Analog-to-digital conversion

4.3 Intended learning outcomes

	A student, who passed the course	Relation to teaching outcomes
within the scope of KNOWLEDGE:		
W01	describes the physical basis of the operation of simple measuring instruments	ID1A_W03 ID1A_W04 ID1A_W05
W02	recognizes basic measuring instruments, explains their construction and operating principle	ID1A_W03 ID1A_W04 ID1A_W05
W03	explains the basic concepts of analog signal processing	ID1A_W03 ID1A_W04 ID1A_W05
W04	explains the structure, principle of operation and application of basic amplification systems	ID1A_W03 ID1A_W04 ID1A_W05
within the scope of ABILITIES:		
U01	can build a measuring system based on the presented diagram and make measurements	ID1A_U03 ID1A_U04
U02	can verify laws based on measurements, assess the reliability of results, estimate and calculate errors and measurement uncertainties.	ID1A_U03 ID1A_U04
within the scope of SOCIAL COMPETENCE:		
K01	is aware of the need to cooperate in order to effectively carry out the task entrusted	ID1A_K01

4.4. Methods of assessment of the intended teaching outcomes

Teaching outcomes (code)	Method of assessment (+/-)																				
	Test oral/written*			Test*			Project*			Effort in class*			Self-study*			Group work*			Others*		
	Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes		
	W	L	P	W	L	P	W	L	P	W	L	P	W	L	P	W	L	P	W	L	P
W01-W04	+				+																
U01-U02									+		+						+				
K01									+		+							+			

*delete as appropriate

4.5. Criteria of assessment of the intended teaching outcomes

Form of classes	Grade	Criterion of assessment
Lecture (W)	3	Achievement of <50–60)% of the requirements used in assessment methods
	3,5	Achievement of <60–70)% of the requirements used in assessment methods
	4	Achievement of <70–80)% of the requirements used in assessment methods
	4,5	Achievement of <80–90)% of the requirements used in assessment methods
	5	Achievement of <90–100)% of the requirements used in assessment methods
Laboratory(L)	3	Achievement of <50–60)% of the requirements used in assessment methods
	3,5	Achievement of <60–70)% of the requirements used in assessment methods
	4	Achievement of <70–80)% of the requirements used in assessment methods
	4,5	Achievement of <80–90)% of the requirements used in assessment methods
	5	Achievement of <90–100)% of the requirements used in assessment methods

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	Student's workload	
	Full-time studies	Extramural studies
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	45	

Participation in lectures*	15	
Participation in classes, seminars, laboratories*	30	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	55	
Preparation for the classes, seminars, laboratories*	10	
Preparation for the exam/test*	15	
Gathering materials for the project/Internet query*	10	
Others*	20	
TOTAL NUMBER OF HOURS	100	
ECTS credits for the course of study	4	

Accepted for execution (date and signatures of the teachers running the course in the given academic year)

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