DESCRIPTION OF THE COURSE OF STUDY

Course code	0541.6.MAT2.D.AS	
Name of the course in	Polish	**Analiza sygnałów**
	English	**Signals Analysis**

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

1.1. Field of study	mathematics
1.2. Mode of study	full-time studies
1.3. Level of study	Graduate (Master)
1.4. Profile of study*	general academic profile of studies
1.5. Person/s preparing the course description	Dr hab. Grzegorz Łysik
1.6. Contact	glysik@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	Polish and English
2.2. Prerequisites*	Mathematical Analysis III, Linear Algebra and Geometry

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes		lectures and classes
3.2. Place of classes		classes in the UJK teaching room
3.3. Form of assessment		Graded credit
3.4. Teaching methods		Lectures – information lecture Classes - discusions, solving problems
3.5. Bibliography	**Required reading**	Ronald L. Allen, Duncan W. Mills; *Signal Analysis Time, Frequency, Scale, and Structure*; A John Wiley & Sons, Inc., Publication, (2004).
	Further reading	Steven B. Damelin; Willard Miller, Jr; *The Mathematics of Signal Processing;* Cambridge University Press, (2012).

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1. Course objectives *(including form of classes)*

Lectures

C1 – basic knowledge on signals and methods of their transformations
C2 – recognition of methods of modeling of analog signals
C3 – recognition of methods of time-frequency analysis of signals

Classes

C1 – acquirement of abilities of application of mathematical knowledge to analysis of signals
C2 – acquirement of abilities of application of knowledge in practice

4.2. Detailed syllabus *(including form of classes)*

Lectures:

Definitions, classifications of signals and their mathematical models. Signals parameters and relations between them. Signals spaces: norm, distance and scalar product. Representation of signals in a form of functional series. Fourier transformation and its generalization. Frequency analysis of signals. Local spectral analysis of signals: windows, Gabor and wavelet transformations.

Classes:

Fourier series expansion of signals. Computation of Fourier transforms of some determined signals. Spectral analysis of discrete signals. Computing a time and frequency convolution. Z-transform and its properties. Determination of characteristics of linear discrete systems.

4.3. Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of **KNOWLEDGE:**		
W01	Explains and characterizes methods of modeling analog signals	MAT2A_W17
W02	Explains and characterizes methods of time-frequency analysis of signals	MAT2A_W17
W03	Has a knowledge in the field of theory of signals and information and methods of their transformation in time and frequency	MAT2A_W17
within the scope of **ABILITIES:**		
U01	Uses methods of time and frequency transformations and analysis of signals to obtain information about signals	MAT2A_U04 MAT2A_U11
U02	Computes representation of signals in a form of functional series	MAT2A_U04 MAT2A_U11
U03	Carries out frequency analysis of signals	MAT2A_U04 MAT2A_U11

U04	Uses the knowledge for modeling physical phenomena	MAT2A_U05
within the scope of **SOCIAL COMPETENCE:**		
K01	Understand the need of continuous extending his own professional competencies	MAT2A_K02

4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes *(code)*	**Method of assessment (+/-)**					
	Test*			**Effort in class***		
	Form of classes			***Form of classes***		
	L	*C*	*...*	*L*	*C*	*...*
W01	+					
W02	+					
W03	+					
U01		+				
U02		+				
U03		+				
K01					+	

**** delete as appropriate***

4.5. Criteria of assessment of the intended learning outcomes

Form of classes	**Grade**	**Criterion of assessment**
lectures (L)	**3**	at least 50% and no more than 60% of the total number of points possible
	3,5	more than 60% and no more than 70% of the total number of points possible
	4	more than 70% and no more than 80% of the total number of points possible
	4,5	more than 80% and no more than 90% of the total number of points possible
	5	more than 90% of the total number of points possible
classes (C)*	**3**	at least 50% and no more than 60% of the total number of points possible
	3,5	more than 60% and no more than 70% of the total number of points possible
	4	more than 70% and no more than 80% of the total number of points possible
	4,5	more than 80% and no more than 90% of the total number of points possible
	5	more than 90% of the total number of points possible

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/	***47***	
*Participation in lectures**	15	
*Participation in classes, ~~seminars, laboratories~~**	30	
*Preparation in the ~~exam/~~ final test**	2	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	***28***	
*Preparation for the lecture**	6	
*Preparation for the classes, seminars, laboratories**	12	
*Preparation for the ~~exam~~/test**	10	
TOTAL NUMBER OF HOURS	***75***	
ECTS credits for the course of study	**3**	

**** delete as appropriate***

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

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