Faculty of Fundamental Problems of Technology

COURSE CARD

Name in polish	:	**Cyfrowe Przetwarzanie Sygnałów**
Name in english	:	**Digital Signal Processing**
Field of study	:	Computer Science
Specialty (if applicable)	:	
Undergraduate degree and form of	:	masters, stationary
Type of course	:	optional
Course code	:	E2_W18
Group rate	:	Yes

	Lectures	Exercides	Laboratory	Project	Seminar
Number of classes held in schools (ZZU)	30	30			
The total number of hours of student workload (CNPS)	90	90			
Assesment	pass				
For a group of courses final course mark	X				
Number of ECTS credits	3	3			
including the number of points corresponding to the classes of practical (P)		3			
including the number of points corresponding occupations requiring direct contact (BK)	3	3			

PREREQUISITES FOR KNOWLEDGE, SKILLS AND OTHER POWERS

Knowledge of data structures and algorithms. Programming ability in a chosen programming language. Recommended courses: Introduction to Electronics, Scienti[U+FB01]c Calculations.

COURSE OBJECTIVES

C1 Presentation of the signal processing techniques used in computing and telecommunications.

C2 Mastering practical skills in selected DSP algorithms.

COURSE LEARNING OUTCOMES

The scope of the student's knowledge:

W1 Student knows basics of signal physics. Student knows methods for signal conversion.

W2 Student knows transform and filter algorithms.

W3 Student knows techniques for image and audio analysis and processing.

The student skills:

U1 Student applies a proper mathematical techniques to compute various DSP algorithms.

U2 Student uses a variety of CAS and numerical computing environment in DSP.

U3 Student implements DSP algorithms in a chosen computer language.

The student's social competence:

K1 Student describes signals acquisition and processing for underlying physical processes.

K2 Student arguments the need for developing effective DSP methods.

COURSE CONTENT

Type of classes - lectures		
Wy1	Signal and process. Noise.	2h
Wy2	ADC and DAC conversion. Quantization.	3h
Wy3	Linear Systems.	3h
Wy4	Convolution.	3h
Wy5	Fourier analysis. Discrete Fourier transform.	3h
Wy6	Digital filters.	4h
Wy7	Audio processing.	3h
Wy8	Image processing.	3h
Wy9	Neural Networks	2h
Wy10	Digital Signal Processors	2h
Wy11	The Laplace Transform.	2h
Type of classes - exercises		
Ćw1	Convolution	5h
Ćw2	Fourier analysis. Discrete Fourier transform.	5h
Ćw3	Digital [U+FB01]lters.	5h
Ćw4	Image and audio processing techniques.	5h
Ćw5	Neural Networks.	5h
Ćw6	The Laplace Transform.	5h

Applied learning tools
1. Traditional lecture 2. Multimedia lecture 3. Solving tasks and problems 4. Solving programming tasks 5. Creating multimedia presentations by students 6. Self-study students

EVALUATION OF THE EFFECTS OF EDUCATION ACHIEVEMENTS		
Value	Number of training effect	Way to evaluate the effect of education
F1	W1-W3, K1-K2	written test(s)
F2	U1-U3, K1-K2	points from student assignments
P=50%*F1+50%*F2		

BASIC AND ADDITIONAL READING
1. The Scientist and Engineer's Guide to Digital Signal Processing. Steven W. Smith, Ph.D. http://www.dspguide.com

SUPERVISOR OF COURSE
prof. Mirosław Kutyłowski

RELATIONSHIP MATRIX EFFECTS OF EDUCATION FOR THE COURSE
Digital Signal Processing
WITH EFFECTS OF EDUCATION ON THE DIRECTION OF COMPUTER SCIENCE

Course training effect	Reference to the effect of the learning outcomes defined for the field of study and specialization (if applicable)	Objectives of the course**	The contents of the course**	Number of teaching tools**
W1	K2_W01 K2_W03_A	C1	Wy1-Wy11	1 2 6
W2	K2_W02 K2_W03_A K2_W04_A	C1	Wy1-Wy11	1 2 6
W3	K2_W01 K2_W03_A K2_W04_A K2_W05	C1	Wy1-Wy11	1 2 6
U1	K2_U01_A K2_U02 K2_U07 K2_U09_A K2_U10 K2_U11 K2_U13 K2_U14	C2	Ćw1-Ćw6	3 4 5 6
U2	K2_U01_A K2_U02 K2_U08_A K2_U09_A K2_U11 K2_U13 K2_U14	C2	Ćw1-Ćw6	3 4 5 6
U3	K2_U01_A K2_U11 K2_U12_A K2_U13 K2_U14	C2	Ćw1-Ćw6	3 4 5 6
K1	K2_K01_A K2_K13 K2_K14_A K2_K15 K2_K16	C1 C2	Wy1-Wy11 Ćw1-Ćw6	1 2 3 4 5 6
K2	K2_K12 K2_K13 K2_K14_A K2_K15 K2_K16	C1 C2	Wy1-Wy11 Ćw1-Ćw6	1 2 3 4 5 6