Faculty of Information and Communication Technology/Department of Fundamentals of Computer Science

COURSE CARD

Name of the course in polish	:	**Cyfrowe Przetwarzanie Sygnałów**
Name of the course in english	:	**Digital Signal Processing**
Field of study	:	Algoritmic Computer Science
Specialty (if applicable)	:	
Level and form of studies	:	II degree, stationary
Type of course	:	optional
Course code	:	W04INA-SM4105G
Group of courses	:	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)	2	2			

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, Scientific 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
	Sum of hours	30h

Type of classes - exercises		
Ćw1	Convolution	5h
Ćw2	Fourier analysis. Discrete Fourier transform.	5h
Ćw3	Digital filters.	5h
Ćw4	Image and audio processing techniques.	5h
Ćw5	Neural Networks.	5h
Ćw6	The Laplace Transform.	5h
	Sum of hours	30h

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

MATRIX OF LEARNING OUTCOMES FOR THE SUBJECT
Cyfrowe Przetwarzanie Sygnałów
WITH LEARNING OUTCOMES IN THE FIELD OF ALGORITHMIC COMPUTER SCIENCE

Subject learning effect	Relating the subject effect to the learning outcomes defined for the field of study	Objectives of the course**	Program content**	Teaching tool number**
W1	K2_W01 K2_W03	C1	Wy1-Wy11	1 2 6
W2	K2_W02 K2_W03 K2_W04	C1	Wy1-Wy11	1 2 6
W3	K2_W01 K2_W03 K2_W04 K2_W05	C1	Wy1-Wy11	1 2 6
U1	K2_U02 K2_U03 K2_U04 K2_U06 K2_U08	C2	Ćw1-Ćw6	3 4 5 6
U2	K2_U01 K2_U02 K2_U03 K2_U04 K2_U06	C2	Ćw1-Ćw6	3 4 5 6
U3	K2_U02 K2_U03 K2_U04 K2_U06	C2	Ćw1-Ćw6	3 4 5 6
K1	K2_K03 K2_K07 K2_K10	C1 C2	Wy1-Wy11 Ćw1-Ćw6	1 2 3 4 5 6
K2	K2_K02 K2_K07 K2_K10	C1 C2	Wy1-Wy11 Ćw1-Ćw6	1 2 3 4 5 6