

Faculty of Fundamental Problems of Technology						
COURSE CARD						
Name in polish	:	<b>Wprowadzenie do Systemów Telekomunikacji Bezprzewodowej</b>				
Name in english	:	<b>Introduction to Wireless Telecommunication Systems</b>				
Field of study	:	Computer Science				
Specialty (if applicable)	:					
Undergraduate degree and form of	:	masters, stationary				
Type of course	:	optional				
Course code	:	E2_W19				
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)		60	120			
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			
<b>PREREQUISITES FOR KNOWLEDGE, SKILLS AND OTHER POWERS</b>						
background in electromagnetics and mathematical analysis						
<b>COURSE OBJECTIVES</b>						
<b>C1</b> presentation of key concepts used in the construction of wireless communication systems						
<b>C2</b> solving optimization problems in the construction of wireless communication networks						

**COURSE LEARNING OUTCOMES**

The scope of the student's knowledge:

- W1** physical background for wireless communication systems
- W2** analytical models for wireless communication
- W3** technologies and systems for reliability and security in wireless communication

The student skills:

- U1** has skills in designing and optimization of wireless networks
- U2** can model and analyze performance of wireless communication systems
- U3** can estimate safety level and identify threats for wireless communication systems

The student's social competence:

- K1** can cooperate with telecommunication engineers
- K2** can use literature and technical documentation regarding telecommunication systems
- K3** can create IT solutions according to the telecommunication engineering

**COURSE CONTENT**

Type of classes - lectures		
Wy1	introduction to contemporary wireless communication systems: WLANs/Bluetooth	2G/3G/4G; 2h
Wy2	radio signal propagation: large scale path loss	2h
Wy3	radio signal propagation: small-scale fading and multipath	2h
Wy4	modulation techniques	2h
Wy5	compensation, diversity, channel encoding	2h
Wy6	voice encoding	2h
Wy7	radio access techniques	2h
Wy8	wireless networking	2h
Wy9	chosen aspects of cellular systems 2G, 3G and 4G	4h
Wy10	network planning and optimization	2h
Wy11	authentication and encryption in wireless systems	4h
Wy12	special purpose wireless systems	4h
Type of classes - exercises		
Ćw1	chosen aspects of physics of radio waves	4h
Ćw2	2G/3G/4G systems	4h
Ćw3	propagation methods	2h
Ćw4	channel allocation, interferences of signals	2h
Ćw5	modulation techniques	2h
Ćw6	multiaccess	2h
Ćw7	error detection and correction codes	2h
Ćw8	access control and handoff	2h
Ćw9	access scheduling	2h
Ćw10	network optimization	4h
Ćw11	security techniques in 2G/3G/4G	4h

Applied learning tools		
<ol style="list-style-type: none"> <li>1. Traditional lecture</li> <li>2. Multimedia lecture</li> <li>3. Solving tasks and problems</li> <li>4. Consultation</li> <li>5. Self-study students</li> </ol>		
EVALUATION OF THE EFFECTS OF EDUCATION ACHIEVEMENTS		
Value	Number of training effect	Way to evaluate the effect of education
F1	W1-W3, K1-K3	written tests
F2	U1-U3, K1-K3	weekly tests, home assignments
$P=50\%*F1+50\%*F2$		
BASIC AND ADDITIONAL READING		
<ol style="list-style-type: none"> <li>1. Mobile wireless communications. Mischa Schwartz, ISBN: 978-0-511-26423-8</li> <li>2. LTE, WiMAX and WLAN network design, optimization and performance analysis. Leonhard Korowajczuk, ISBN: 9780470741498</li> </ol>		
SUPERVISOR OF COURSE		
prof. Mirosław Kutylowski		

**RELATIONSHIP MATRIX EFFECTS OF EDUCATION FOR THE COURSE**  
**Introduction to Wireless Telecommunication Systems**  
**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 K2_W04 K2_W05 K2_W09	C1	Wy1-Wy12	1 2 4 5
W2	K2_W01 K2_W02 K2_W04 K2_W05 K2_W07	C1	Wy1-Wy12	1 2 4 5
W3	K2_W01 K2_W02 K2_W04 K2_W05 K2_W06 K2_W07 K2_W08 K2_W09 K2_W10	C1	Wy1-Wy12	1 2 4 5
U1	K2_U02 K2_U03 K2_U04 K2_U05 K2_U06 K2_U09 K2_U10 K2_U11 K2_U12 K2_U13	C2	Ćw1-Ćw11	3 4 5
U2	K2_U02 K2_U03 K2_U04 K2_U05 K2_U06 K2_U08 K2_U10 K2_U12	C2	Ćw1-Ćw11	3 4 5
U3	K2_U01 K2_U02 K2_U03 K2_U04 K2_U05 K2_U06 K2_U08 K2_U09 K2_U10 K2_U11 K2_U12 K2_U13	C2	Ćw1-Ćw11	3 4 5
K1	K2_K02 K2_K03 K2_K04 K2_K06 K2_K07 K2_K09 K2_K10	C1 C2	Wy1-Wy12 Ćw1-Ćw11	1 2 3 4 5
K2	K2_K03 K2_K06 K2_K07 K2_K09	C1 C2	Wy1-Wy12 Ćw1-Ćw11	1 2 3 4 5
K3	K2_K02 K2_K03 K2_K04 K2_K09 K2_K10	C1 C2	Wy1-Wy12 Ćw1-Ćw11	1 2 3 4 5