

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Fundamentals of Radiocommunications</b>		Code <b>1010811161010810097</b>
Field of study <b>Electronics and Telecommunications</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>3 / 6</b>
Elective path/specialty <b>Radio Communications</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>2</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>major</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>		
Dr hab. inż. Hanna Bogucka email: hbogucka@et.put.poznan.pl tel. 61 6653911 Elektroniki i Telekomunikacji ul. Piotrowo 3A, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
<b>1</b>	<b>Knowledge</b>	A student knows the basics of digital communication systems, baseband transmission, digital modulation, signal transmission over the channel, reception techniques, spectrum shaping and techniques for combating channel distortions (K1_W15); A student has detailed knowledge and mathematical foundations in the area of telecommunication theory, necessary for understanding, analysis and testing of the analogue and digital telecommunication systems (K1_W17)
<b>2</b>	<b>Skills</b>	A student can draw information from the literature, databases and other sources in Polish and in English; A student can integrate information, interpret it, draw conclusions and provide reasoning for his/her opinions (K1_U01); A student can solve problems in the area of electronics and telecommunications using mathematical tools: mathematical analysis, algebra and probability theory (K1_U07)
<b>3</b>	<b>Social competencies</b>	A student knows the limitations of his/her knowledge and competences, understands the necessity of further learning (K1_K01); A student is aware of the necessity of professional approach to technical problems and responsibility for his/her proposed technical solutions (K1_K02)
<b>Assumptions and objectives of the course:</b>		
Knowing and understanding the fundamental problems of radio communication in various radio propagation environments and the basics of contemporary wireless communication systems.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. A student has detailed knowledge and mathematical foundations in the area of teorii pola elektromagnetycznego, propagacji fal elektromagnetycznych oraz budowy i własności anten - [K1_W07] 2. A student has basic knowledge and mathematical foundations in the area of radio communications, has basic knowledge of the 2G, 3G and 4G mobile systems; A student has basic knowledge concerning the architecture and maintainance of radio communication systems and elements of tele-informtion networks, including wireless networks - [K1_W14]		
<b>Skills:</b>		
1. A student is able to solve basic problems in the area of electromagnetic fields, radio propagation, antenna design - [K1_U11] 2. A student is able to compare radio communication systems and standartds, and to select advantageous radio transmission technique or wireless standard in the given propagation and users mobility conditions. - [K1_U23]		
<b>Social competencies:</b>		

1. A student is aware of the necessity of professional approach to technical problems and responsibility for his/her proposed technical solutions - [K1\_K02]
2. A student feels responsibility the designed electronic and telecommunication systems and is aware of the potential threats for other persons or society of improper use of these systems and designs - [K1\_K03]
3. A student is able to formulate opinions concerning challenges of contemporary radio communications; A student is aware of the impact of radio systems and networks on the information society. - [K1\_K04]

<b>Assessment methods of study outcomes</b>		
Written exam from theory and content of the lectures (test with open questions)		
Classes passing based on solved problems and written test.		
<b>Course description</b>		
Lectures:		
<ol style="list-style-type: none"> <li>1. Classification of radio communication systems</li> <li>2. Signal propagation in radio communication channels</li> <li>3. Radio channel models</li> <li>4. Basic physical layer techniques i radio communication</li> <li>5. Multiple access techniques in radio communication networks</li> <li>6. The concept of cellular systems</li> <li>7. Cellular systems design and capacity-increasing methods</li> <li>8. Basics of GSM: architecture, physical layer and higher OSI layers</li> <li>9. Data transmission in GSM (GPRS and EDGE)</li> <li>10. 3G mobile communication system using CDMA: UMTS</li> <li>11. Perspectives of future wireless communications</li> </ol>		
Classes:		
<ol style="list-style-type: none"> <li>1. Radio signal propagation, multipath fading</li> <li>2. Power budget in radio communication links</li> <li>3. Stochastic radio channel models</li> <li>4. Power loss calculations using deterministic propagation models</li> <li>5. Traffic load calculations in cellular systems based on Erlang models</li> <li>6. Signal to interference power ratio calculations for various cell configurations</li> </ol>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Krzysztof Wesołowski, Systemy radiokomunikacji ruchomej, Wydawnictwa Komunikacji i Łączności WKŁ, Warszawa 2003</li> <li>2. H. Bogucka, Projektowanie i obliczenia w radiokomunikacji, Wyd. II, Wydawnictwo Politechniki Poznańskiej, Poznań 2005</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. A. Molisch, Wireless Communication Systems, John Wiley and Sons, 2005</li> <li>2. G. Stueber, Principles of Mobile Communication Systems, Kluwer Academic Publishers, 2003</li> <li>3. T. S. Rappaport, Wireless Communications, Principles and Practice, Prentice Hall PTR, USA 1996</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Participation in classes	15	
3. Individual literature studies	10	
4. Preparation for the exam	10	
5. Individual work on solving problems	10	
6. Preparation for the test	10	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	85	3
Contact hours	50	2
Practical activities	30	1

