

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Radio network planning		Code 1010812121010812440
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty Radio Communications	Subject offered in: English	Course (compulsory, elective) elective
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: 1 Project/seminars: -		No. of credits 5
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 5 100% 5 100%
Responsible for subject / lecturer: dr inż. Rafał Krenz email: rafal.krenz@put.poznan.pl tel. +48.61.6653912 Wydział Elektroniki i Telekomunikacji ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	K1_W07 K1_W14 K1_W17
2	Skills	K1_U11 K1_U15 K1_U17 K1_U19
3	Social competencies	n.a.
Assumptions and objectives of the course: The main purpose of the course is to acquaint students with 2G/3G radio network planning and optimization process. During the run of the course the methodology, planning tools and measurement equipment used in radiocommunication is introduced.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has a systematic knowledge, with the necessary theoretical background, of optimization methods used in radio network planning. - [K2_W03]		
2. Has a systematic, advanced knowledge of contemporary mobile communication systems and state-of-the-art techniques applied in these systems. - [K2_W06]		
Skills:		
1. Is able to use various measurement techniques applied to wireless communications. - [K2_U13]		
2. Is able to analyze, design, construct and exploit mobile communication systems and devices which are part of them. - [K2_U16]		
Social competencies:		
1. Is aware of the necessity to approach solving technical problems in mobile communication systems with responsibility and professionalism. - [K2_K05]		
Assessment methods of study outcomes		

Laboratory exercises. Written exam.		
Course description		
<p>Lectures:</p> <ol style="list-style-type: none"> 1. UMTS system basics (physical layer). 2. Radio channel modeling. 3. Theoretical models of UMTS radio access network. 4. UMTS radio network planning. 5. Electromagnetic compatibility of UMTS system. 6. Radio network optimization. 7. GSM radio network planning - differences and similarities. 8. Indoor radio network planning. <p>Lab exercises:</p> <ol style="list-style-type: none"> 1. Radio link budget. 2. UTRAN coverage planning in macro-cell environment. 3. UTRAN capacity planning. 4. Channel modeling for indoor planning. 5. Measurements in wireless communication systems. 		
Basic bibliography:		
1. M. J. Nawrocki, M. Dochler, A. H. Aghvami, Understanding UMTS Radio Network, Wiley, 2006		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Ar. R. Mishra, Advanced Cellular Network Planning and Optimisation, Wiley, 2007 2. J. Laiho, A. Wacker, T. Novosad, Radio Network Planning and Optimisation for UMTS, Wiley, 2002 3. M. Tolstrup, Indoor Radio Planning, Wiley, 2008 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures.	30	
2. Laboratory exercises.	30	
3. Preparation to lab exercises.	15	
4. Preparation of reports.	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	125	5
Contact hours	65	3
Practical activities	70	2