

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Spread Spectrum Systems		Code 1010802121010812893
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty Information and Communication	Subject offered in: Polish / 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: 2 Project/seminars: -		No. of credits 5
Status of the course in the study program (Basic, major, other) major		(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_W06 K1_W09 K1_W14 K1_W15 K1_W16
2	Skills	K1_U10 K1_U13
3	Social competencies	n.a.
Assumptions and objectives of the course: The course aims at introducing spread spectrum techniques applied to wireless communication systems. Important features, generating and reception of spread spectrum signals are discussed. Cellular systems using spread spectrum signals are introduced as well.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Has a systematic, advanced knowledge of contemporary 3G mobile communication systems and wideband CDMA techniques applied in these systems. - [K2_W06]		
Skills: 1. Is able to analyze, design and construct 3G wireless systems and various networks and devices which are part of them - [K2_U16]		
Social competencies: 1. n.a. - [-]		
Assessment methods of study outcomes		
Laboratory exercises. Written exam.		
Course description		

<p>Lectures:</p> <ol style="list-style-type: none"> 1.Introduction to spread spectrum systems. 2.Pseudo-noise sequences. 3.Direct sequence spread spectrum signals and systems. 4.Frequency hopping spread spectrum signals and systems. 5.Ultra wideband and MC-CDMA systems. 6.RAKE receiver. 7.Joint detection receivers. 8.CDMA system capacity. 9.Synchronization in spread spectrum systems. 10.IS-95 system architecture and operation (physical layer). 11.UMTS system architecture and operation (physical layer). <p>Laboratory exercises:</p> <ol style="list-style-type: none"> 1.Generation and properties of pseudo-noise sequences. 2.Single-user DS-CDMA system in AWGN environment. 3.Multi-user DS-CDMA system in AWGN environment. 4.Single-user DS-CDMA system in multi-path environment. 5.Multi-user DS-CDMA system in multi-path environment. 		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. J. G. Proakis, Digital Communications, McGraw-Hill, Inc., New York 1995 2. J. S. Lee, L. E. Miller, CDMA Systems Engineering Handbook, Artech House Publishers, Boston-London 1998 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. R. C. Dixon, Spread Spectrum Systems with Commercial Applications, John Wiley & Sons, Inc., New York 1994 2. R. Prasad, CDMA for Wireless Personal Communications, Artech House Publishers, Boston-London 1996 		
<p>Result of average student's workload</p>		
<p>Activity</p>		<p>Time (working hours)</p>
1. Participation in lectures.		30
2. Laboratory exercises.		30
3. Preparation of reports.		20
4. Literature studies		20
5. Preparation to examination		20
6. Consulting with teachers		3
7. Exam		2
<p>Student's workload</p>		
<p>Source of workload</p>	<p>hours</p>	<p>ECTS</p>
Total workload	125	5
Contact hours	65	3
Practical activities	50	2