

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Telecommunication networks design		Code 1010822121010820096
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty Computer Networks and Internet	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: 1 Laboratory: - Project/seminars: -		No. of credits 4
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 %) 4 100% 4 100%
Responsible for subject / lecturer: prof. dr hab. inż. Maciej Stasiak email: stasiak@et.put.poznan.pl tel. +48 61 665 39 06 Wydział Elektroniki i Telekomunikacji ul. Piotrowo 3A 60-965 Poznań		Responsible for subject / lecturer: prof. dr hab. inż. Maciej Stasiak email: stasiak@et.put.poznan.pl tel. +48 61 665 39 06 Wydział Elektroniki i Telekomunikacji ul. Piotrowo 3A 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Knows the basics of traffic engineering, queuing theory, services, devices, management systems, network protocols and telecommunication techniques used in telecommunication and computer networks [K1_W22].
2	Skills	Is able to use known mathematical analysis, algebra and theory of probability concepts to solve basic problems in electronics and telecommunication [K1_U07]. Is able to solve standard/typical problems related to traffic engineering and parametrization of network elements [K1_U26].
3	Social competencies	Demonstrates responsibility and professionalism in solving technical problems [K1_K02].
Assumptions and objectives of the course: Familiarizing the students with the fundamentals of analysis, dimensioning, optimization and design of network systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. . Has a systematic knowledge, with necessary mathematical background, of traffic theory and traffic engineering; of design, dimensioning and optimization of networks and network systems. - [K2_W11]		
2. Has a systematic practical knowledge of designing ICT networks. - [K2_W14]		
Skills:		
1. . Is able to use already known mathematical models and methods to analyze and design telecommunication devices and systems. - [K2_U18]		
2. Is able to analyze, design, construct and exploit advanced telecommunications systems and various networks and devices which are part of them, ensuring that the designed systems and networks will have required technical parameters. - [K2_U16]		
Social competencies:		
1. Is aware of the limitations of his/her current knowledge and skills; is committed to lifelong learning. - [K2_K04]		
2. Demonstrates responsibility for designed telecommunication systems. Is aware of the hazards they pose for individuals and communities if they are improperly designed or produced. - [K2_K06]		
Assessment methods of study outcomes		

Written exercises credit. Final written exam.		
Course description		
<ol style="list-style-type: none"> 1. Basic concepts of traffic engineering. 2. The mathematical basis for modelling and optimization of traffic systems. 3. Modelling and dimensioning of single-service systems. 4. Overflow theory, hierarchical network dimensioning. 5. Mathematical foundations of multidimensional systems modelling. 6. Modelling and dimensioning of multi-service systems. 7. Modelling and dimensioning of state-dependent multi-service systems. 8. Basic models of queuing systems, delay analysis, basics of queuing network dimensioning. 9. Equivalent bandwidth, packet traffic sources, models of packet flows. 10. Bandwidth discretization and dimensioning of the Internet. 		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Stasiak M., Głabowski M., Hanczewski S., Zwierzykowski P.: Podstawy inżynierii ruchu i wymiarowania sieci teleinformatycznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2009. 2. Stasiak M., Głabowski M., Zwierzykowski P.: Modelowanie i wymiarowanie ruchomych sieci bezprzewodowych. Wydawnictwo Komunikacji i Łączności, Warszawa 2009. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Czachórski T., Modele kolejkowe w ocenie efektywności sieci i systemów komputerowych, Wydawnictwo PKJS, Gliwice 1999. 2. Iversen V.B., ed., Teletraffic Engineering, Handbook, ITU, Study Group 2, Question 16/2 Geneva, January 2005, published on-line. 3. Stasiak M., Głabowski M., Zwierzykowski P.: Modeling and Dimensioning of Mobile Networks: from GSM to LTE, John Wiley and sons Ltd., January 2011. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Lectures	30	
2. Exercises	15	
3. Preparation for the lectures	15	
4. Preparation for the exercises	20	
5. Preparation for the exam	15	
6. Consultations	3	
7. Exam	2	
8. Discussion of the results of the exam	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	50	2
Practical activities	35	1