

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Broadband Networks		Code 1010802131010822906
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 2 / 3
Elective path/specialty Information and Communication	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: 1 Classes: - Laboratory: 1 Project/seminars: -		No. of credits 2
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 %) 2 100% 2 100%
Responsible for subject / lecturer: prof. dr hab. inż. Wojciech Kabaciński email: wojciech.kabacinski@et.put.poznan.pl tel. 061 665 3907 Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań		Responsible for subject / lecturer: dr inż. Janusz Kleban email: janusz.kleban@et.put.poznan.pl tel. +48 61 665 3929 Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Has knowledge of the most important standards, architectures and analysis of telecommunication networks. Has knowledge on structure and operation of telecommunication systems used for provisioning multimedia services. [K2_W01]
2	Skills	Can analyze operation of multimedia systems. Can solve problems connected with multimedia systems. [K2_U03]
3	Social competencies	Can formulate opinion on basic challenges for current electronics and telecommunications. [K1_K04] Knows the limitations of their own knowledge and skills, he understands the need for further education. [K2_K04]
Assumptions and objectives of the course: To make students familiar with the architecture, standards, applications, and evolution of broadband networks. Current solutions in the optical networks will be also presented.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Knows trends in evolution of multimedia services, Future Internet, and technical solutions which are to be used in telecommunication networks to realize such services for all Internet users. - [K2_W01] 2. Knows devices, protocols, and telecommunication techniques, which will be used in the Future Internet. - [K2_W13]		
Skills:		
1. Can critically analyze current solutions of multimedia networks and propose their improvements. - [K2_U03] 2. Can work in the group of several people; can prepare and present report with results of work. - [K2_U02] 3. Can formulate requirements for a network which should realize basic multimedia services; can choose and evaluate a broadband technique which should be used in a network to ensure required QoS. - [K2_U16]		
Social competencies:		
1. Understands the role of Information society in country development. - [K2_K02] 2. Can formulate their own opinion on currently used and available technologies and solutions in broadband networks required for introducing the Future Internet. - [K2_K07]		

Assessment methods of study outcomes		
<p>Forming assessment: In the laboratory: on the basis on activity during projects and the report from the final project Summary assessment: Lectures: the multiple choice test; points for each question: -0,25 p. (wrong answer), 0 p. (no answer), 1 p. (correct answer); test is passed when student receives at least 50% points.</p>		
Course description		
<p>Lectures: Evolution of telecommunication networks towards broadband networks. Multimedia services and their provision through telecommunication networks. ATM - basic terminology, standards, network architecture, interfaces. ATM - ATM layer and adaptation layer, QoS mechanisms, parameters of ATM networks. QoS in IP networks: DiffServe, IntServe, and MPLS models. Integration in IP networks: VoIP, IP/WDM. Broadband access networks and convergent networks. Optical networks.</p> <p>Laboratory: Basic of ATM networks. Configuration of QoS parameters in ATM networks. Routing w sieciach ATM. Routing in ATM networks. Configuration of a VoIP server. Call handling in VoIP.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. K. Ahmad, Sourcebook of ATM and IP Internetworking. IEEE Press, Wiley Interscience, 2002. 2. M. Bromirski, Telefonía VoIP. Multimedialne sieci IP, Wydawnictwo BTC, 2006. 3. B. Mukherjee, Optical WDM Networks, Springer 2006. 4. S.S. Dixt, IP over WDM, J. Wiley & Sons, 2003. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. H. J. Chao, B. Liu: High Performance Switches and Routers, A John Wiley & Sons, 2007. 2. T.E. Stern, K. Bala, Multiwavelength Optical Networks. A layered Approach. Addison-Wesley, 1999. 3. W. D. Simpson, Video over IP: A Practical Guide to Technology and Applications, Focal Press, Elsevier, 2005. 4. K. Wajda, Sieci szerokopasmowe, Wydawnictwo Fundacji Postępu Telekomunikacji, Kraków, 2000. 5. K.H. Liu, IP over WDM, J. Wiley and Sons, 2002. 6. A.S. Tanenbaum, Sieci komputerowe, Helion, Gliwice, 2004. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Lectures	15	
2. Laboratory exercises	15	
3. Preparation for laboratory exercises and completion of the course	15	
4. Consultations	3	
5. Participation in the course completion	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	50	2
Contact hours	35	1
Practical activities	30	1