## STUDY MODULE DESCRIPTION FORM

| Name of the module/subject **Broadband Networks** | Code **1010822131010820261** |
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| Field of study **Electronics and Telecommunications** | Profile of study (general academic, practical) **general academic** | Year /Semester **2 / 3** |
|---|---|---|

| Elective path/specialty **Computer Networks and Internet** | Subject offered in: **Polish** | Course (compulsory, elective) **elective** |
|---|---|---|

| Cycle of study: **Second-cycle studies** | Form of study (full-time,part-time) **full-time** |
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| No. of hours | | | | No. of credits **2** |
|---|---|---|---|---|
| Lecture: **2** | Classes: **-** | Laboratory: **1** | Project/seminars: **-** | |

| Status of the course in the study program (Basic, major, other) **other** | (university-wide, from another field) **from field** |
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| Education areas and fields of science and art **technical sciences**      **Technical sciences** | ECTS distribution (number and %**)** **2  100%**      **2   100%** |
|---|---|

| Responsible for subject / lecturer: | 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 | 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 chalanges 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 wich are to be used in telecommunication networks to realize such servicesfor 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 requrements for a network which should realize basic multimedia services; can chose 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 currenty used and available technologies and solutions in broadband networks reguried for introducing the Future Internet.  - [K2_K07]

**Faculty of Electronics and Telecommunications**

| Assessment methods of study outcomes |
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Ocena formująca:

W zakresie laboratorium:

Sprawdziany i sprawozdania indywidualne na laboratorium

Ocena podsumowująca:

W zakresie wykładów: Zaliczenie w formie testu wyboru i pytaniami otwartymi z punktacją pytań testu wyboru w skali -0,25 pkt (odpowiedź nieprawidłowa), 0 pkt (brak odpowiedzi), 1 pkt (odpowiedź prawidłowa) i punktacją pytań otwartych w przedziale 0-2 pkt.; zdanie egzaminu przy uzyskaniu minimum 50% pkt.

| Course description |
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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. QQoS in IP networks: DiffServe, IntServe, and MPLS models. Integration in IP networks: VoIP, IP/WDM.        Broadband access networks and convergent networks. Optical networks.


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.

### Basic bibliography:

1. K. Ahmad, Sourcebook of ATM and IP Internetworking. IEEE Press, Wiley Interscience, 2002.

2. M. Bromirski, Telefonia VoIP. Multimedialne sieci IP, Wydawnictwo BTC, 2006.

3. B. Mukherjee, Optical WDM Networks, Springer 2006.

4. S.S. Dixt, IP over WDM, J. Wiley &#38; Sons, 2003.

### Additional bibliography:

1. H. J. Chao, B. Liu: High Performance Switches and Routers, A John Wiley &#38; 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 | |
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| Activity | Time (working hours) |
|---|---|
| 1. Wykład | 30 |
| 2. Ćwiczenia laboratoryjne | 15 |
| 3. Przygotowanie do ćwiczeń laboratoryjnych | 15 |

| Student's workload | | |
|---|---|---|

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 60 | 2 |
| Contact hours | 50 | 2 |
| Practical activities | 25 | 1 |