Code 101084117101082008         Profile of study (general academic, practical) general academic, practical academic, pracendi academic, practical) general academic, pr		
Electronics and Telecommunications       (general academic, practical) general academic       4 /         Elective path/specialty Multimedia and Consumer Electronics       Subject offered in: Polish       Course (compulsor), elective elective         Cycle of study:       First-cycle studies       Form of study (full-time, part-time)       Image: Cycle of study:         No. of hours       Electronics       full-time       No. of credits         Lecture:       2       Classes:       -       Laboratory:       1       Project/seminars:       -       3         Status of the course in the study program (Basic, major, other)       (university-wide, from another field)       ECTS distribution (number and %)         Education areas and fields of science and attribution areas and fields of sciences       a 100%       3       100%         Responsible for subject / lecturer:       prof. dr hab. in2. Wojciech. Kabacinski email: wojciech. kabacinski @put.poznan.pl       sciences       3       100%         I.el. 061 665 3907       Electronications       understands technical aspects of these terminology (K1_W22]       1       Knowledge       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology (K1_W22]       2       Skills       He knows the basic terminology in telecommunication and bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws co		
Elective path/speciality Multimedia and Consumer Electronics       Subject offered in: Polish       Course (compulsory, elec- elective         Cycle of study:       First-cycle studies       Form of study (full-time, part-time)       Course (compulsory, elec- elective         No. of hours       Lecture:       2       Classes:       -       Laboratory:       1       Project/seminars:       -       3         Status of the course in the study program (Basic, major, other) major       (university-wide, from another field)       ECTS distribution (number and %)         Education areas and fields of science and att       ECTS distribution (number and %)       3       100%         Responsible for subject / lecturer:       prof. dr hab. in2. Wojciech Kabaciński email: wojciech. kabaciński email: wojciech. kabaciński email: wojciech kabaciński email: wojciech kabaciński email: wojciech kabaciński email: wojciech kabaciński email: wojciech kabaciński email: wojciech. kabaciński email: wojciech. kabaciński email: wojciech. kabaciński email: wojciech. kabaciński email: wojciech. kabaciński       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         1       Knowledge       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills       He is able to find information in literature and data bases, as well as other reference source and justifies opinions [K1_U01]. He is able to communicate with other profe		
Multimedia and Consumer Electronics       Polish       elective         Cycle of study:       Form of study (full-time,part-time)       Form of study (full-time,part-time)         No. of hours:       Image: Status of the course in the study program (Basic, major, other)       No. of credits         Status of the course in the study program (Basic, major, other)       (university-wide, from another field)       3         Education areas and fields of science and art       ECTS distribution (number and %)       3       100%         technical sciences       Technical sciences       3       100%       3       100%         Prevention of study (full-time,part-time)         prof, dr hab. in2. Wojciech Kabaciński       email: wojciech.kabaciński@put.poznan.pl       1       100%       3       100%         Preveruisites in terms of knowledge, skills and social competencies:         1       Knowledge       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]       2         2       Skills       He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01].         3       Social competencies       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1		
First-cycle studies       full-time         No. of hours       No. of credits         Lecture:       2       Classes:       -       Laboratory:       1       Project/seminars:       -       3         Status of the course in the study program (Basic, major, other)       (university-wide, from another filed)       Image: Constraint of the course in the study program (Basic, major, other)       (university-wide, from another filed)         Education areas and fields of science and art       ECTS distribution (number and %)       3       100%         technical sciences       3       100%       3       100%         Technical sciences       3       100%         prof. dr hab. inż. Wojciech Kabaciński eput.poznan.pl tel. 061 665 3907         Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań         Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills       He is able to find information in literature and data bases, as well as other reference source Polish or English, is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01].         3       Social competencies       He knows the limitations of their own knowledge and ski		
No. of hours       No. of credits         Lecture:       2       Classes:       -       Laboratory:       1       Project/seminars:       -       3         Status of the course in the study program (Basic, major, other)       (university-wide, from another field)       from field         Education areas and fields of science and art       (university-wide, from another field)       ECTS distribution (number and %)         technical sciences       3       100%       3       100%         Technical sciences       3       100%       3       100%         Responsible for subject / lecturer:       prof. dr hab. inż. Wojciech Kabaciński       a       3       100%         Prerequisites in terms of knowledge, skills and social competencies:       I       Knowledge       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]       I         2       Skills       He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01].         3       Social competencies       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
Lecture:       2       Classes:       -       Laboratory:       1       Project/seminars:       -       3         Status of the course in the study program (Basic, major, other)       (university-wide, from another field)       from field         Education areas and fields of science and att       from field       ECTS distribution (number and %)         technical sciences       3       100%       3       100%         Responsible for subject / lecturer:       prof. dr hab. inž. Wojciech Kabaciński email: wojciech.kabaciński @put.poznan.pl tel. 061 665 3907       3       100%         Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]          2       Skills       He knows the basic terminology in telecommunication (numeration, draws conclusions and justifies opinions [K1_U01].       He is able to find information in literature and data bases, as well as other reference source Polish or English is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01].         3       Social competencies       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
Status of the course in the study program (Basic, major, other)       (university-wide, from another field)         Bitaus of the course in the study program (Basic, major, other)       (university-wide, from another field)         Education areas and fields of science and art       ECTS distribution (numbe and %)         technical sciences       3 100%         Technical sciences       3 100%         Responsible for subject / lecturer:       3 100%         prof. dr hab. in2. Wojciech Kabaciński       email: wojciech.kabacinski@put.poznan.pl         tel. off le65 3907       Electronics and Telecommunications         ul. Polanka 3, 60-965 Poznań       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills       He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01].         3       Social competencies         3       Social competencies		
major       from field         Education areas and fields of science and art       ECTS distribution (number and %)         technical sciences       3 100%         Technical sciences       3 100%         Responsible for subject / lecturer:       3 100%         prof. dr hab. inż. Wojciech Kabaciński       email: wojciech.kabaciński@put.poznan.pl         tel. o61 665 3907       Electronics and Telecommunications         ul. Polanka 3, 60-965 Poznań       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills       He is able to find information in literature and data bases, as well as other reference source polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01].         3       Social competencies         3       He is able to communicate with other professionals in Polish or English [K1_U02].         3       Social competencies         4       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
Education areas and fields of science and art       ECTS distribution (number and %)         technical sciences       3 100%         Technical sciences       3 100%         Responsible for subject / lecturer:       3 100%         prof. dr hab. inż. Wojciech Kabaciński       email: wojciech.kabacinski@put.poznan.pl         tel. 061 665 3907       Electronics and Telecommunications         ul. Polanka 3, 60-965 Poznań       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills       He is able to find information in literature and data bases, as well as other reference source and justifies opinions [K1_U01].         3       Social competencies       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
technical sciences       3 100%         Responsible for subject / lecturer:       3 100%         prof. dr hab. inž. Wojciech Kabaciński       email: wojciech.kabaciński         email: wojciech.kabaciński       email: wojciech.kabaciński		
Technical sciences       3 100%         Responsible for subject / lecturer:         prof. dr hab. inż. Wojciech Kabaciński email: wojciech.kabacinski@put.poznan.pl tel. 061 665 3907 Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań       Image: Colspan="2">Image: Colspan="2" Image: Colspan="2" Imad		
Responsible for subject / lecturer:         prof. dr hab. inż. Wojciech Kabaciński         email: wojciech.kabacinski@put.poznan.pl         tel. 061 665 3907         Electronics and Telecommunications         ul. Polanka 3, 60-965 Poznań         Prereuisites in terms of knowledge, skills and social competencies:         1       Knowledge         1       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills         3       Social competencies		
prof. dr hab. inż. Wojciech Kabaciński email: wojciech.kabacinski@put.poznan.pl tel. 061 665 3907 Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań         Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge         He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills         He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01]. He is able to communicate with other professionals in Polish or English [K1_U02].         3       Social competencies		
prof. dr hab. inż. Wojciech Kabaciński email: wojciech.kabacinski@put.poznan.pl tel. 061 665 3907 Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań         Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge         He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills         He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01]. He is able to communicate with other professionals in Polish or English [K1_U02].         3       Social competencies		
tel. 061 665 3907         Electronics and Telecommunications         ul. Polanka 3, 60-965 Poznań         Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge         He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills         Bills       He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01]. He is able to communicate with other professionals in Polish or English [K1_U02].         3       Social competencies		
Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge         2       Knowledge         3       Social competencies		
1       Knowledge       He knows the basic terminology in telecommunication and computer networks and understands technical aspects of these terminology [K1_W22]         2       Skills       He is able to find information in literature and data bases, as well as other reference source Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01]. He is able to communicate with other professionals in Polish or English [K1_U02].         3       Social competencies       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
2       Skills       Polish or English; is able to integrate and interpret obtained information, draws conclusions and justifies opinions [K1_U01]. He is able to communicate with other professionals in Polish or English [K1_U02].         3       Social competencies       He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
3 Social He knows the limitations of their own knowledge and skills, he understands the need for fur education [K1_K01].		
competencies education [K1_K01].		
Assumptions and objectives of the course:		
To make students familiar with the structure, function and operation of integrated networks and services offered in these networks.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He has a well-ordered knowledge in integrated networks architectures and structures - [K1_W22]		
2. He has a well-ordered knowledge in current standards concerning integrated networks - [K1_W22]		
3. He knows directions of telecommunication networks evolution - [K1_W24]		
3. The knows directions of teleconfinantication networks evolution - [K1_W24]		
3. He knows directions of telecommunication networks evolution - [K1_VV24] Skills:		
Skills:		
Skills:         1. He is able to indetify problems in access networks operation - [K1_U25]		
Skills:         1. He is able to indetify problems in access networks operation - [K1_U25]         2. He is able to check correctness of network devices operation in access networks - [K1_U25]		
Skills:         1. He is able to indetify problems in access networks operation - [K1_U25]         2. He is able to check correctness of network devices operation in access networks - [K1_U25]         3. He is abble to assest usefulness of certain solutions according to requirements of users - [K1_U21]		
Skills:         1. He is able to indetify problems in access networks operation - [K1_U25]         2. He is able to check correctness of network devices operation in access networks - [K1_U25]         3. He is abble to assest usefulness of certain solutions according to requirements of users - [K1_U21]         Social competencies:		

# Assessment methods of study outcomes

#### Forming assessment:

In the laboratory: on the basis of short questions before exercises and written reports from the laboratory exercises.

Summary assessment:

Lectures: Written exam in the form of the multiple choice test; points for each question: -0,25 p. (wrong answer), 0 p. (no answer), 1 p. (correct answer); exam is passed when student receives at least 50% points. Exam can be taken after the completion of laboratory.

### **Course description**

#### Lectures:

Telecommunication networks and information transfer methods. ISDN: an introduction and reference configuration, interfaces, the structure of the interfaces. Reference Model. Services: definitions, attributes, types of attributes, the attribute values in different networks, classification of services. Services in different networks. Layers 2 and 3. Example of call handling. SS7: Types of signaling, CCS and CAS, SS7 protocols, Layer 1 and 2, MTP, SCCP, TC, ISUP, INAP, MAP, B-ISUP. Classification of switching networks. ATM technology: general principle, the model and layers, ATM cell. Construction of ATM nodes. The use of ATM in UMTS networks. ATM switching nodes. ATM switching fabrics.

Laboratory: Internal and external connections in PABX systems. Basic terminology in DSS1 and SS7. Signalling messages. Exchange of signalling messages in DSS1 and SS7. Operation of space, time, and time-space switching elements. Configuration of devices in ATM networks. Routing in ATM networks.

#### **Basic bibliography:**

1. W. Kabaciński, Standaryzacja w sieciach ISDN, Wydawnictwo Politechniki Poznańskiej, 2001

- 2. W. Kabaciński, M. Żal: Sieci Telekomunikacyjne, WKŁ, 2008.
- 3. G. Danilewicz, W. Kabaciński: System sygnalizacji nr 7, WKŁ, 2005.

#### Additional bibliography:

- 1. A. Jajszczyk: Wstęp do telekomutacji, WNT, 2000
- 2. M.A. Rahman: Guide to ATM Systems and Technology, 1998

## Result of average student's workload

Activity		Time (working hours)
1. Lectures		30
2. Laboratory		15
3. Preparation for laboratory		15
4. Preparation for the exam		10
5. Exam		2
6. Discussion of exam otucomes		2
Student's wo	orkload	
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	50	2
Practical activities	30	1