COURSE DESCRIPTION CARD - SYLLABUS

Course name
Structure and operation of communication network equipment [S1EiT1>BiDUwST]

Course

Field of study
Electronics and Telecommunications

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

The student knows the basic concepts of digital modulation, transmission systems and has basic knowledge of probability theory and graph theory. Can obtain information from literature and databases and other sources in Polish or English; can integrate the obtained information, interpret it, draw conclusions and justify opinions. He can communicate in Polish or English in a professional environment. He knows the limitations of his own knowledge and skills, understands the need for further training.

Course objective

Familiarizing students with the basics of telecommunications networks operation, principles of their analysis, modeling and design and the services provided on these networks.

Course-related learning outcomes

Knowledge:
He knows the terms characterizing telecommunications networks and understands the technical meaning of these terms. Ma structured basic knowledge of the structure, operation and standards of various types telecommunications networks. He knows the basics of traffic engineering, the theory of queues, services, devices, systems management, protocols and telecommunications techniques that are used in the

networks telecommunications.

Skills:
Can obtain information from literature and databases and other sources in Polish or English; can integrate the obtained information, interpret it, draw conclusions and justify opinions. Can communicate in Polish or English in professional environments. He can educate himself.

Social competence:

He knows the limitations of his own knowledge and skills, understands the need for further training. It has awareness of the need for a professional approach to solving technical problems and taking responsibility for the technical solutions they propose. He has a feeling responsible for the designed telecommunications networks and is aware of the potential dangers to other people or society, their inappropriate use. Can formulate opinions on the main challenges faced by modern telecommunications.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lectures is verified during an oral and/or written exam. The oral exam requires the student to provide correct answers to questions asked by leading questions. In the written part, the exam is the final passing test. The test consists consists of 45-60 test questions. Each question has four answers to choose from, one of which is correct. The student receives 1 point for a correct answer and 0 points for an incorrect answer or no response. Passing the test from 50% of the points. For students with a close number of credits an additional oral question is possible.
The knowledge and skills acquired during the classes are verified on the basis of activity in class and the grade obtained on the final test. The test is in the form of tasks to be solved. Passing the final test from 50% of the points obtained.

Programme content

Structures and operation of telecommunications networks, telecommunications services, construction and operation of network devices, basics of traffic theory.

Course topics

The concept of telecommunications systems and networks. Information transfer methods. Types of telecommunications networks. Standardization. Network topologies, models and architectures. Nodes in telecommunications networks - structure, functions, operation. Circuit and packet switching - types, properties, characteristics, control, routing. Basics of traffic theory: telecommunications traffic, models, loss systems, waiting systems. Telecommunications services - types, description methods, quality of service parameters, implementation of services in networks. Handling of connections in telecommunications networks, control systems, signaling. Optical networks.

Exercises: Calculation exercises on the following topics: Network topologies. Graph algorithms in telecommunications networks. Channel switching networks - design, properties, cost assessment. Packet switching networks - design, buffering, packet scheduling for transmission. Call control. Basic concepts of telecommunications traffic. Calculating traffic intensity, determining service quality parameters - probability of losses, waiting times. State diagrams for telecommunications network systems.

Teaching methods

Lectures: Lectures are conducted in the traditional form, with computer presentations that are available earlier to students. Some lectures, or their parts, are led as interactive or problem lectures, where students participate in solving some problems or examples, especially in proving of some mathematical theorems.

Classes: Students get some problems or tasks for solving individually or in groups and then presents solutions to other students.

Bibliography

Basic
[1] A. Jajszczyk: Wstęp do telekomutacji, WNT, 2009.
[2] W. Kabaciński, M. Żal: Sieci telekomunikacyjne, WKŁ, 2008.
[3] R. L. Freeman, Fundamentals of Telecommunications, 2nd ed. John Wiley & Sons, Inc., 2005. (available from PUT network: https://onlinelibrary.wiley.com/doi/book/10.1002/0471720941)
[4] A. Valdar, Understanding telecommunications networks. The Institution of Engineering and Technology, 2006.
[5] T. N. Saasawi, M. H. Ammar, and A. El Hakeem, Fundamendals of Telecommunication Networks. Wiley, 1994.
[6] J. F. Kurose and K. W. Ross, COMPUTER NETWORKING A Top-Down Approach, Sixth. Pearshon, 2013.

Additional
[1] H. Akimaru and K. Kawashima, Teletraffic. Theory and Applications. London Berlin Heidelberg New York Paris Tokyo Hong Kong Barcelona Budapest: Springer-Verlag, 1993.
[2] N. Benvenuto and M. Zorzi, Priniples of Communications Networks and Systems. John Wiley & Sons, Ltd, 2011.
[3] H. J. Chao and B. Liu, High Performance Switches and Routers. John Wiley & Sons, Inc., 2007.
[4] Y.-D. Lin, R.-H. Hwang, and F. Baker, Computer Networks. An Open Source Approach. McGraw-Hill, 2012.
[5] L. L. Peterson and B. S. Davie, Computer Networks. A Systems Approach, 4th ed. Morgan Kaufmann, 2007.
[6] M. Stasiak, M. Głąbowski, P. Zwierzykowski: Modelowanie i wymiarowanie ruchomych sieci bezprzewodowych. Wydawnictwo Komunikacji i Łączności, Warszawa 2009.
[7] M. Stasiak, M. Głąbowski, S. Hanczewski, P. Zwierzykowski: Podstawy inżynierii ruchu i wymiarowania sieci teleinformatycznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2009.
[8] V.B. Iversen(ed.): Teletraffic Engineering, Handbook, ITU, Study Group 2,Question 16/2 Geneva, January 2005, on-line.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,00
Classes requiring direct contact with the teacher	55	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,00