COURSE DESCRIPTION CARD - SYLLABUS

Course name
Introduction to Telecommunications' [S1Teleinf1>WdT]

Course

Field of study
Teleinformatics

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

A student starting this subject should have basic knowledge of mathematics and physics at the secondary school level. He/She should have the ability to perform calculations using the basic mathematical apparatus and obtain information from indicated sources. He should also understand the need to expand his knowledge and skills. In the field of social competence, the student should present such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

The aim of the course is to provide students with knowledge about the basics of telecommunications, to develop students' ability to solve basic computational problems related to modulation techniques, telecommunications systems and telecommunications networks used to transport information over long distances, to shape students' ability to acquire knowledge about currently implemented solutions in the field of telecommunications and ICT.

Course-related learning outcomes

Knowledge

1. Has an orderly, mathematically underpinned, detailed knowledge of the basics of telecommunications theory and information theory, necessary to understand, analyze and evaluate the operation of modern telecommunications systems.
2. Knows the features of analog and digital transmissions, methods of converting analog signals into digital ones and methods of information transport in telecommunications networks.
3. Knows the basic hierarchies of digital transmission systems used to transport information over long distances.
Skills
1. Can determine the basic parameters and properties of signals and telecommunications systems, compare transmission media and ways of transmission and encoding of signals in different links.
2. Can solve typical tasks related to the analysis of deterministic signals in the time and frequency domain and correctly interpret the obtained results.
Social competences
1. Recognizes the changes resulting from technological progress and understands the need to learn new standards in the field of telecommunications.
2. Knows the limitations of their own knowledge and understands the need to update it. It is open to the possibility of continuous education and improvement of professional, personal and social competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired as part of the lecture is verified on the basis of a written exam, consisting of at least 5 open questions, identically scored. The passing threshold is 50% of the points. The distribution of thresholds for grades 2 to 5 is even. A set of questions is drawn individually from a set of issues. Credit issues, on the basis of which open questions are developed, are sent to students by e-mail using university e-mail.
The assessment from the laboratory is the arithmetic mean of the grades from two tests verifying knowledge and skilis

Programme content

Students will learn about the concept of telecommunications, its importance in the modern world, areas of interest (transmission, commutation, cellular communication, information theory) and the limitations of telecommunications. The program content includes basic concepts used in telecommunications such as signal, time and frequency model and their parameters, basic units, derived units, the concept of modulation, signal band, the concept of telecommunications channel, telecommunications system, analog modulations, basic digital modulations, methods of converting analog signal into digital signals, PCM system, telecommunications network concept, network layered model, basic transport principles of a user signal in the telecommunications network, basic features of PDH, SDH, NG-SDH, OTH (OTN) transmission systems and basic concepts from information theory and coding. They are also introduced to regulatory organizations in the field of telecommunications and to the role of international and regional standards.
Students will learn about the basic areas of interest in telecommunications (transmission, commutation, cellular communications, information theory), the services provided (historically), models of telecommunications systems, the limitations of telecommunications, and basic units and laws. The programmatic content includes basic concepts such as signal, time and frequency model and their parameters, basic units, derived units, the concept of modulation, signal bands, sampling phenomenon, Nyquist's theorem, the concept of a telecommunications channel, a telecommunications system, the bandwidth of a telecommunications channel, the uncertainty principle in telecommunications, and Claude Elwood Shannon's theorems. Information transport in the telecommunications system, layered model, HRX connection, network topologies, access networks - types and features, transport layer and transmission media in telecommunications and ICT are discussed. As part of the coursework, students will learn about analog modulations AM, FM, PM, ASK, FSK, PSK, QAM modulation, PCM modulation, multiple access systems; multiplexing, systems with distributed spectrum, linear coding methods, source coding, detection and correction coding, channel coding, encryption coding, transmission systems and digital hierarchies in telecommunications networks PDH, SDH, SDH improvements (NG-SDH), OTH (OTN), ways of transferring IP traffic in telecommunications networks, methods of ensuring resistance to damage. They are familiarized with regulatory organizations in the field of telecommunications and with the

role of international and regional standards.
The laboratory covers the following practice topics: signal and its parameters, Fourier series and spectrum of telecommunications signal, analog modulations, control test with discussion of tasks, analog-to-digital conversion with linear coding, digital modulations and a passing test with a discussion of tasks.

Course topics

none

Teaching methods

1. Lecture: a multimedia presentation, illustrated with examples given on the board.
2. Laboratory: classic problem.

Bibliography

Basic
1. S. Haykin, Systemy telekomunikacyjne, t1 i t2, WKŁ, Warszawa 2004.
2. A. Valder, Understanding Telecommunications Networks, IEiT, 2006.
3. A. Jajszczyk, Wstęp do telekomutacji, WNT, Warszawa 2009, wyd. IV (dodruk).
Additional
1. B. P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press, 2010.
2. Sławomir Kula, Systemy Teletransmisyjne, WKŁ, Warszawa, 2004.
3. R. K. Jain „Principles of Synchronous Digital Hierarchy”, CRC Press, Boca Raton, 2013.
4. Zalecenia ITU-T, standardy ETSI, czasopisma, np. IEEE Communications Magazine, Przegląd Telekomunikacyjny, IEEE Transactions on Communications, IEEE Journal on Selected Areas in Communications, IEEE/ACM Transactions on Networking, Optical Switching and Networking.

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	5,00
Classes requiring direct contact with the teacher	64	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	56	2,00