



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

IP Telephony

### Course

Field of study

Electronics and Telecommunications

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

English

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

30

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

prof. dr hab. inż. Grzegorz Danilewicz,

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Responsible for the course/lecturer:

### Prerequisites

Knowledge of computer networks, IP protocol, IP addresses, UDP and TCP protocols, concept of integrated services digital network. Ability to work in a group. Ability to prepare presentations and to participate in discussion.

### Course objective

Presentation of the concept of using packet-switched networks (including IP-based) for the implementation of multimedia services, mainly audio and video. Indication of the similarities and differences in Internet telephony systems over previous solutions, such as mobile telephony, analog and ISDN. Presentation of the issues related to ensuring the quality of service (QoS) for real-time services implemented in packet switched networks.

### Course-related learning outcomes

Knowledge

1. Student has a knowledge of the equipment performing signaling functions and data transfer in packet switching networks used to provide multimedia services, knows the signaling systems used in networks



based on IP protocol that provide establish, maintenance and disconnection of communication sessions to support real-time services.

2. Student has knowledge about the functioning of packet switching networks in practical applications for implementing multimedia services, knows the important parameters for assessing the quality of service in circuit switching and packet switching networks.

3. Student has the necessary knowledge to determine the functionality of the devices that need and / or can be used to create packet switching networks used to provide multimedia services, knows services and equipment to design a VoIP telephony network at least for a small business.

#### Skills

1. Student is able to collect and analyze technical information needed for VoIP network design, is able to present these issues in the form of short paper and presentation (in Polish or English), and participate in the discussion.

2. Student can use the knowledge base accumulating norms and standards for telecommunications.

3. Student can practically implement the selected tasks for building a VoIP network.

#### Social competences

1. Student understands the importance of communication for the development of individuals and societies, understands the evolutionary development of networks and telecommunications systems.

2. Student demonstrates responsibility and professionalism in solving technical problems.

3. Student is aware of the limitations of his/her current knowledge and skills; is committed to lifelong learning.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In the laboratory a grade is based on: the basis of preliminary questions, answers to questions about the material from the previous laboratory, the basis of written reports of laboratory and the tests.

The final grade is the result of component grades, with each component grade being positive. The rating scale from 2 (insufficient - negative) to 5 (very good) is used for component grades and for the final grade.

In respect of lectures a grade is based on test and/or oral examination. Test is composed of 10-15 closed and open questions. A positive test grade is issued when the number of points exceeds 50%. The rating scale from 2 (insufficient - negative) to 5 (very good) is used for an exam grade.

#### Programme content

Laboratory: configuration of different components of small enterprise VoIP system, VoIP signaling analysis.



Lectures: Introduction to the Internet telephony. Methods for switching signals (messages, circuits, channels, packets, datagrams, cells). The importance of signaling in telecommunication networks. Fundamentals of Voice over IP network solutions based on the H.323 protocol family. Functions of H.323 devices in the domain. Signaling protocols in the system based on the H.323 protocol family. Fundamentals of VoIP network solutions based on SIP. Device features in VoIP network based on SIP protocol. SIP signaling procedures. Cooperation of solutions based on H.323 and SIP. Related and new solutions in packet switching networks for the implementation of multimedia services. QoS parameters for VoIP.

### Teaching methods

Laboratory experiments, lecture using a board and / or projector, seminar lecture with small discussion.

### Bibliography

#### Basic

1. International Telecommunication Union (ITU-T), Packet-based multimedia communications systems, H.323 Recommendation.
2. J. Rosenberg et. al. SIP: Session Initiation Protocol, RFC 3261.

#### Additional

1. Samrat Ganguly, Sedeept Bhatnagar: VoIP. Wireless, P2P and New Enterprise Voice over IP, Wiley, 2008
2. Olivier Hersent, Jean-Pierre Petit, David Gurle: IP Telephony, Wiley, 2005
3. Olivier Hersent, Jean-Pierre Petit, David Gurle: Beyond VoIP Protocols, Wiley, 2005
4. Sivannarayana Nagireddi: VoIP Voice and Fax Signal Processing, Wiley, 2008
5. Marek Bromirski: Telefonía VoIP, Wydawnictwo BTC, Warszawa 2006 (in Polish)

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) <sup>1</sup>	45	2,0

<sup>1</sup> delete or add other activities as appropriate