

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>IP telephony</b>		Code <b>1010334581010337137</b>
Field of study <b>Information Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 8</b>
Elective path/specialty <b>Security of Information Technology (IT)</b>	Subject offered in: <b>English</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>8</b> Classes: <b>-</b> Laboratory: <b>-</b> Project/seminars: <b>8</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Tomasz Bilski email: tomasz.bilski@put.poznan.pl tel. 061 66 53 554 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	K_W05: Student has organized knowledge with theoretical foundations of basic program constructions, algorithm implementations, paradigms and programming styles, software verification methods, formal languages, compilers, platforms. K_W07: Student has organized knowledge with theoretical foundations of computer networks.
2	<b>Skills</b>	K_U03: Student is able to create engineer work documentation and to prepare text with the work result discussion. K_U10: Student is able to use software platforms and environments for simple programs encoding, running and testing in imperative, object-oriented and declarative programming languages.
3	<b>Social competencies</b>	K_K04: Student understands the responsibility associated to his own work. Student is able to subordinate to team work rules and to take responsibility for cooperative tasks. K_K07: Student understands the importance of stringent accomplishment of a given project with proper notation standards, proper language. Student understands the importance of keeping deadlines.
<b>Assumptions and objectives of the course:</b> Students should obtain knowledge of many issues related to IP telephony.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student has organized knowledge with theoretical foundations of computer networks. - [K_W07] 2. Student has organized knowledge with theoretical foundations of Internet technologies. - [K_W11] 3. Student has organized knowledge with theoretical foundations of teleinformatics, protocols and services in telecommunication networks. - [K_W15]		
<b>Skills:</b>		
1. Student is able to create engineer work documentation and to prepare text with the work result discussion. - [K_U03] 2. Student is able to do critical analysis of computer hardware operations, operating system and computer networks. - [K_U11] 3. Student is able to carry out work with web sites and Internet services. - [K_U15]		
<b>Social competencies:</b>		
1. Student understands the importance of stringent accomplishment of a given project with proper notation standards, proper language. Student understands the importance of keeping deadlines. - [K_K07]		

<b>Assessment methods of study outcomes</b>		
Lecture: test.		
Laboratory: tests before exercises, exercises assesment, reports.		
<b>Course description</b>		
<p>Lecture. VoIP systems: IP/PSTN gateways, signalling gateways, management nodes. VoIP protocols and standards overview: signalling protocols, real time protocols, resource reservation protocols. Optimization: data compression, buffering, QoS, VAD. Voice transmission parametres: jitter, delays, packet loss rate. Voice coding and compression standards: wave codecs, source codecs, hybrid codecs. Linear and nonlinear quantization, PCM, ADPCM, CELP, ACELP, MLQ. Voice quality measurement methods: MOS, PSQM, PAMS, PESQ, MNB, E-model. Signalling protocols: H.323 (H.225, H.245), SIP, IAX, MGCP, H.248/Megaco. Real time protocols: RTP, RTCP, AVP. Resource reservation protocols: RSVP. ENUM: E.164 Number Mapping, ENUM domains, NAPTR. Phone number portability: ACQ, QoR, OR, CD. Security in IP telephony: H.235, SRTP, SRTCP.</p> <p>Laboratory. IP Network parameters (jitter, delay, throughput, loss packet ratio) analysis. Standard signalling protocols (H.323, SIP, SDP) analysis. Real time protocols (RTP, RTCP) analysis. Signalling protocol design and implementation. VoIP systems configuration.</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. J. Davidson, J. Peters, Voice over IP.</li> <li>2. T. Wallingford, Switching to VoIP, O'Reilly Media, Inc. 2005.</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. A. Simmonds, Data Communications and Transmission Principles: An Introduction.</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Lectures	8	
2. Projects	8	
3. Preparation for test	20	
4. Consultations	9	
5. Homework related to projects	30	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	25	1
Practical activities	38	1