SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Electronics, Telecommunications and Information Technology
1.3	Department	Communication
1.4	Field of study	Electronics and Telecommunications Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Telecommunications Technologies and Systems/ Engineer
1.7	Form of education	Full time
1.8	Subject code	TST-E38.00

2. Data about the subject

2.1	Subject name	Telephony					
2.2	Subject area	Electronics and Telecommunications Engineering					
2.3	Course responsible/lecturer	Associate Professor Zsolt Alfred POLGAR, PhD					
2.4	Teachers in charge of applications	Assistant Zsuzsanna Ilona KISS, PhD					
2.5	Year of study	III	2.6 Semester	1	2.7 Assessment	Exam	2.8 Subject category	DS/DOB

3. Estimated total time

Year/ Sem.	Subject name	No. of weeks	Course	Applications			Course	Applications			Indiv. study	TOTAL	Credits
			[hours/ week]				[hours/ semester]						
				S	L	P		S	L	P			
III/2	Telephony	14	2		2		28		28		74	130	5

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the curriculum	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	40
Supplementary study in the library, online and in the field	8
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
Tutoring	3
Exams and tests	3
Other activities	0

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	NA
4.2	Competence	Relations and basic theory of filters, amplifiers and oscillators; functioning of digital circuits: counters, multiplexers, A/D and D/A converters; frequency characteristics of circuits/filters, Fourier representation of signals; definition of information, relations for channel capacity, basic theory for base band codes and error correcting codes.

5. Requirements (where appropriate)

5.1	For the course	Cluj-Napoca
5.2	For the applications	Cluj-Napoca

6. Specific competences

Professional competences	C4. To design, implement and operate data, voice, video and multimedia services, based on the understanding and application of fundamental concepts from the field of communications and information transmission.
	C5. To select, install, configure and exploit fixed and mobile telecommunications equipment. To equip a site with common telecommunications networks.
	C6. To solve wide-band telecommunications networks' specific problems: propagation in various transmission media, high frequency circuits and equipment (microwaves and optical).
Cross competences	N.A.

7. Discipline objectives (as results from the key competences gained)

7.1	General objectives	Developing of competences concerning the configuration, testing and design of fixed telephone networks.
7.2	Specific objectives	1. Understanding the theoretical concepts specific to fixed telephone network architectures, digital multiplexing techniques and signal processing used in telephone networks. 2. Obtaining the knowledge and developing the abilities necessary for designing telephone networks. 3. Developing skills and abilities necessary for configuration of voice and data equipment used in fixed telephone networks.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Fixed digital telephone networks. General aspects. Access techniques.	Presentation, discussions, exemplification, problem presentation, case study	Use of .PowerPoint presentation, projector, blackboard
2	Voice coding techniques used in fixed digital telephone networks.		
3	The primary PCM multiplex. Line interfaces of the PCM multiplexers.		
4	CAS and CCS signaling techniques. The SS7 signaling system.		
5	The SS7 protocol stack and CCS signaling mechanisms.		
6	The echo in telephony. Echo control techniques.		
7	Narrow band ISDN. Reference model and access techniques.		
8	DSL digital access techniques.		
9	New generation of DSL digital access techniques.		
10	The PDH digital multiplexing hierarchy. The justification process.		
11	The digital regenerator. The jitter in digital telephone systems.		
12	The synchronous digital multiplexing mechanism. The SDH hierarchy.		
13	The SDH multiplexing strategy. Pointers and operations with pointers.		
14	Mapping techniques of the PDH tributaries in SDH containers.		

8.2. Applications (lab)		Teaching methods	Notes
1	Presentation of the laboratory and of the work protection measures. Connecting/crimping tools for telephone networks.	Simulations, experiments, practical exercises, team work	Use of laboratory instrumentation, computer simulation, configuration of telephone equipment, use of specific measuring equipment.
2	Cabling of an indoor telephone network. PABX interfaces/ports, connecting equipment for telephone networks, telecommunication cables: internal structure and parameters.		
3	Subscriber loop signaling. Measurement of the signals on the subscriber loop.		
4	Digital and analog telephone devices. Block schematics and connection to the line.		
5	PABX exchanges. Block schematics, configuration/administration software.		
6	Special functions of the PABX exchanges. Testing and configuration. System phone devices.		
7	Trunk connections between PABX exchanges. Special functions of the PABX exchanges for trunk connections.		
8	Data transmissions on telephone lines. AT commands for dial-up modems. Configuration of FAX and automatic answering machines.		
9	PCM encoding of the voice signal using uniform and non-uniform quantization.		
10	Delta encoding of the voice signal.		
11	Definition of level and attenuation in telephone networks.		
12	Distortions which affect the telephone transmissions. Emulation/simulation of a telephone channel.		
13	ADSL access techniques. Configuration and testing of ADSL modems and DSLAM access modules.		
14	Lab recovery and finalization of laboratory activity		

Bibliography

1. Zs. Polgar – *Telefonie digitală. Tehnici de acces. Parametri. Sisteme*, Ed. Risoprint, Cluj-Napoca, 2006, ISBN: 973-751-143-3.
2. S. Zăhan - *Telefonia digitală în reţelele de telecomunicaţii*, Ed. Albastră, Cluj Napoca, 1997.
3. K. Feher - *Comunicaţii digitale avansate, vol. 1*, Ed. Tehnică Bucureşti, 1993.
4. L. Pana – *Metodologie şi aparatură de măsură a liniilor metalice locale utilizate pentru transmisiuni digitale în tehnologia ADSL*, INSCC Bucureşti, 2000.
5. L. Pana – *Tehnologii de acces şi sisteme de transmisiuni digitale pe linii bifilare din reţelele locale*, INSCC Bucureşti, 1998.
6. John C. Bellamy - *Digital Telephony. Third Edition*, John Wiley & Son, 2000.

On-line references

Zs. Polgar, Telephony. Lecture notes, Technical University of Cluj Napoca, 2014,
http://users.utcluj.ro/~dtl/

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

10. Evaluations

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The level of acquired theoretical knowledge		- Written exam (theory and problems)		- E, 75%
Applications		The level of acquired practical skills and abilities		- 3 lab tests (questions and solving of simple practical problems)		- L, 25%
10.4 Minimum standard of performance						
$E \geq 5$ and $0.75E + 0.25L \geq 5$						

Date of filling in   Course responsible   Teachers in charge of applications
09.02.2015   Associate Professor   Assistant
                      Zsolt Alfred POLGAR, PhD   Zsuzsanna Ilona KISS, PhD

Date of approval   Head of Communications
in the department   Department
09.02.2015   Professor Virgil DOBROTA, PhD