SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and information Technology
1.3 Department	Communication Department
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Telecommunications Technologies and Systems/ Engineer Applied Electronics/Engineer
1.7 Form of education	Full time
1.8 Subject code	TST-E36.00/EA-E107.00

2. Data about the subject

2.1 Subject name	Telephony						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Assoc. Prof. Zsolt Alfred POLGAR – Zsolt.Polgar@com.utcluj.ro						
2.4 Teacher in charge with laboratory	Assoc. Prof. Zsolt Alfred POLGAR – Zsolt.Polgar@com.utcluj.ro Assist. Prof. Zsuzsanna Ilona SUTA – Zsuzsanna.Suta@com.utcluj.ro						
2.5 Year of study	III	2.6 Semester	6	2.7 Assessment	E	2.8 Subject category	DS/DI

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar / laboratory	2
3.4 To Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar / laboratory	28

Distribution of time	hours
Manual, lecture material and notes, bibliography	10
Supplementary study in the library, online specialized platforms and in the field	0
Preparation for seminars / laboratories, homework, reports, portfolios and essays	3
Tutoring	3
Exams and tests	3
Other activities:	0

3.7 Total hours of individual study	19
3.8 Total hours per semester	75
3.9 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1 curriculum	NA
4.2 competence	NA

5. Requirements (where appropriate)

5.1. for the course	Video projector, blackboard
5.2. for laboratories	Computers, telephone exchange and telephone equipment (voice and data), specific clamping and connection equipment.

6. Specific competences

Professional competences	C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information C5. Selecting, installing, configuring and operating fixed or mobile telecommunications equipment. Equipping a site with usual telecommunications networks C6. Solving specific problems of the broadband communications networks: propagation in different environment, circuits and equipment for high frequencies (microwaves and optical).
Transversal competences	N/A

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

7.1 General objective	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	N/A
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. Special functions for telephone calls.		
7. The echo in telephony. Echo control techniques.		
8. Narrow band ISDN. Reference model and access techniques.		
9. DSL digital access techniques.		
10. New generation of DSL digital access techniques.		
11. The PDH digital multiplexing hierarchy. The justification processes.		

12. The digital regenerator. The jitter in digital telephone systems.		
13. The synchronous digital multiplexing mechanism. The SDH hierarchy.		
14. The SDH multiplexing strategy. Pointers and operations with pointers.		

Bibliography:

1. Z. Polgar,*Telefonie digitală. Tehnici de acces. Parametri. Sisteme*, Ed. Risoprint, Cluj-Napoca, 2006, ISBN: 973-751-143-3.
2. Z. I. Kiss, Z. A. Polgar, *Telefonie. Teorie si aplicatii*, Ed. U.T.Press, Cluj Napoca, 2016.
3. S. Zăhan, *Telefonia digitală în reţelele de telecomunicaţii*, Ed. Albastră, Cluj Napoca, 1997.
4. K. Feher, *Comunicaţii digitale avansate, vol. 1*, Ed. Tehnică Bucureşti, 1993.
5. J. C. Bellamy, *Digital Telephony. Third Edition*, John Wiley & Son, 2000.

On-line references: http://users.utcluj.ro/~dtl/TF/index_tf.html

8.2 Laboratory	Teaching methods	Notes
1. Presentation of the laboratory, work protection measures. The architecture of a telephone network. Access network architectures and operations, remote power feeding of telephone terminals, duplexing techniques.	Simulations, experiments, practical exercises, team work	N/A
2. Subscriber loop signaling. Measurement of signals on the subscriber loop.		
3. Analog and digital telephone devices. Block diagrams and connection to the line. Connection equipment and crimping tools used in telephone networks.		
4. Digital encoding of analog signals. A/D and D/A conversions.		
5. PCM coding of the voice signal using uniform and non-uniform quantization.		
6. Delta coding of the voice signal.		
7. Definition of the level and attenuation in telephone networks.		
8. PABX exchanges. Block diagrams, interfaces/ports, configuration/management software.		
9. Special functions of PABX exchanges. Testing and configuration. System phone devices.		
10. Trunk connections between PABX exchanges. Special PABX functions for trunk connections.		
11. Telecommunication cables. Internal structure and parameters. Techniques for measuring the parameters of the cables.		
12. Data transmissions in the telephone band. AT commands for dial-up modems. Configuration of FAX and automatic answering machines.		
13. ADSL access techniques. Configuration and testing of ADSL modems and DSLAM access multiplexers.		
14. Lab recovery and finalization of laboratory activity.		

Bibliography:

1. Z. I. Kiss, Z. A. Polgar, Telefonie. Teorie si aplicatii, Ed. U.T.Press, Cluj Napoca, 2016.
2. L. Pană, Metodologie şi aparatură de măsură a liniilor metalice locale utilizate pentru transmisiuni digitale în tehnologia ADSL, INSCC Bucureşti, 2000.
3. L. Pană, Tehnologii de acces şi sisteme de transmisiuni digitale pe linii bifilare din reţelele locale, INSCC Bucureşti, 1998.

On-line references: http://users.utcluj.ro/~dtl/TF/index_tf.html

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

The discipline content and the acquired skills are in agreement with the expectations of the professional 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. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	- Written exam (theory and problems)	E, 75%
10.5 Seminar/ Laboratory	The level of acquired knowledge and abilities	- 3 lab tests (questions and solving of problems)	T, 25%
10.6 Minimum standard of performance			
0.75E+0.25T ≥ 5; E≥ 5			

Data of filling in:	**Responsible**	**Title First name SURNAME**	**Signature**
20.06.2023	Course	Associate Professor Zsolt Alfred POLGAR, Ph.D.	
	Applications	Associate Professor Zsolt Alfred POLGAR, Ph.D.	
		Assistant Professor Zsuzsanna Ilona SUTA, Ph.D.	

Date of approval in the Council of the Communications Department 11.07.2023	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of the Faculty of Electronics, Telecommunications and Information Technology 12.07.2023	Dean Prof. Ovidiu POP, Ph.D.