

# SYLLABUS

## 1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA OF TIMISOARA
1.2 Faculty <sup>1</sup> / Department <sup>2</sup>	ELECTRONICS, TELECOMUNICATON AND INFORMATION TECHNOLOGIES/Communications
1.3 Field of study (name/code <sup>3</sup> )	ELECTRONIC ENGINEERING, TELECOMUNICATION AND INFORMATION TECHNOLOGIES
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	TST-ENG/20/20/10/100/10/TST-ENG

## 2. Information about the discipline

2.1 Name of discipline/ formative category <sup>4</sup>	Digital Telephony/DS						
2.2 Coordinator (holder) of course activities	S.L. Dr. Ing. Valentin-Adrian Nita						
2.3 Coordinator (holder) of applied activities <sup>5</sup>	S.L. Dr. Ing. Valentin-Adrian Nita						
2.4 Year of study <sup>6</sup>	3	2.5 Semester	6	2.6 Type of evaluation	E	2.7 Regime of discipline <sup>7</sup>	DI

## 3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) <sup>8</sup>

3.1 Number of fully assisted hours / week	4 of which:	3.2 course	2	3.3 seminar / laboratory / project	0/2/0
3.1* Total number of fully assisted hours / semester	56 of which:	3.2* course	28	3.3* seminar / laboratory / project	0/28/0
3.4 Number of hours partially assisted / week	0 of which:	3.5 training	0	3.6 hours for diploma project elaboration	0
3.4* Total number of hours partially assisted / semester	0 of which:	3.5* training	0	3.6* hours for diploma project elaboration	0
3.7 Number of hours of unassisted activities / week	1.36 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			0.68
		hours of individual study after manual, course support, bibliography and notes			0.3
		training seminars / laboratories, homework and papers, portfolios and essays			0.38
3.7* Number of hours of unassisted activities / semester	19 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			9.52
		hours of individual study after manual, course support, bibliography and notes			4.2
		training seminars / laboratories, homework and papers, portfolios and essays			5.32
3.8 Total hours / week <sup>9</sup>	5.36				
3.8* Total hours /semester	75				
3.9 Number of credits	3				

## 4. Prerequisites (where applicable)

<sup>1</sup> The name of the faculty which manages the educational curriculum to which the discipline belongs

<sup>2</sup> The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.

<sup>3</sup> The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.

<sup>4</sup> Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).

<sup>5</sup> Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

<sup>6</sup> Year of studies in which the discipline is provided in the curriculum.

<sup>7</sup> Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).

<sup>8</sup> The number of hours in the headings 3.1 \*, 3.2 \*, ..., 3.8 \* is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.

<sup>9</sup> The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.1 Curriculum	<ul style="list-style-type: none"> <li>• Signals and systems</li> <li>• Signal processing</li> <li>• Electronic circuits</li> <li>• Digital integrated circuits</li> <li>• Analog integrated circuits</li> </ul>
4.2 Competencies	<ul style="list-style-type: none"> <li>•</li> </ul>

### 5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> <li>•</li> </ul>
5.2 to conduct practical activities	<ul style="list-style-type: none"> <li>•</li> </ul>

### 6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none"> <li>• S1 Understanding the radio spectrum and using it for multiplex access</li> </ul>
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> <li>• Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology.</li> <li>• Application of basic methods for signal acquisition and processing.</li> <li>• Application of knowledge, concepts and basic methods related to computer system architecture, microprocessors, microcontrollers, programming languages and techniques..</li> </ul>
Transversal competencies ascribed to the specific competencies	<ul style="list-style-type: none"> <li>• Methodical analysis of field-related problems aimed at identifying acknowledged solutions, thus ensuring the accomplishment of professional tasks</li> </ul>

### 7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	<ul style="list-style-type: none"> <li>• The main objective is the introduction to speech signal for telephony and its conversion to digital format. The final goal is the understanding of the fundamental principles and technologies used for the transmission of speech signals in modern communication networks.</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• Analog and digital companding and multiplexing techniques for telephony signals are analyzed.</li> <li>• Techniques and line termination equipments are studied within a digital telephony network framework.</li> <li>• Introduction to xDSL technologies</li> </ul>

### 8. Content <sup>10</sup>

<sup>10</sup> It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(\*)".

8.1 Course	Number of hours	Teaching methods <sup>11</sup>
Introduction - The telephone network, the voice signal	1	An idea is initially introduced at the course: the theoretical principle is explained first, followed by interactive discussions on practical examples. In order to encourage individual study, homeworks are proposed with particular data for each student. Multiple types of study materials are available. The course presentation slides are available on the CV.upt.ro platform
The transmission of the voice signal - Parameters, 4-wires and 2-wires transmission, the line equipment	4	
Multiplexing - Techniques, standards, hierarchical multiplexing	2	
Voice digitization - Sampling, quantization, companding laws	6	
Discrete time multiplexing - PCM CODEC, PCM frame, signaling multiframe	6	
Line interface - Line coding, AMI, HDB-3, 8BZS, 2B1Q, signal regeneration	6	
Digital subscriber line – xDSL modulation techniques, xDSL technologies	3	
Bibliography <sup>12</sup> 1. J. Bellamy, Digital Telephony, Third Edition, John Wiley & Sons, 2000		
2. Philip Golden, Hervé Dedieu, Krista S. Jacobsen, Fundamentals of DSL Technology, Taylor & Francis, 2005		
3. www.cv.upt.ro		
8.2 Applied activities <sup>13</sup>	Number of hours	Teaching methods
The voice signal, telephone signal level	2	The theoretical principles presented initially at the course are illustrated in a practical framework at the laboratory using simulations and training kits. The results are assessed at the end of each laboratory. The teaching materials for the laboratory are available on the cv.upt.ro platform
Amplitude modulation	2	
AMSC modulator/demodulator	2	
Multiplexing techniques	2	
Hybrid systems. The 2-wires transmission	2	
The sampling of the voice signal	2	
Time division multiplexing and PCM	2	
The A-law compression	2	
Companding	2	
PCM framing and Channel Associated Signaling (CAS)	2	
Line coding	2	
Signal regeneration and line decoding	2	
Power feeding	2	
PABX system	2	

<sup>11</sup> Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

<sup>12</sup> At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.

<sup>13</sup> Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".

Bibliography <sup>14</sup> . D. Popa, Digital telephony - laboratory applications, Editura Politehnica, Timisoara, 2017	
2. www.cv.upt.ro	

**9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program**

<ul style="list-style-type: none"> <li>The content of the discipline was agreed by representatives of important local employers in the field like Alcatel-Lucent, Continental Automotive etc.</li> </ul>
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**10. Evaluation**

Type of activity	10.1 Evaluation criteria <sup>15</sup>	10.2 Evaluation methods	10.3 Share of the final grade
<b>10.4</b> Course	Understanding the presented principles, methods and technologies	Written tests and homeworks (6-8 during the semester).	10%
		Exam (written)	60%
<b>10.5</b> Applied activities	<b>S:</b>		
	<b>L:</b> The ability to understand and apply the presented principles		30%
	<b>P<sup>16</sup>:</b>		
	<b>Pr:</b>		
<b>10.6</b> Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified <sup>17</sup> )			
<ul style="list-style-type: none"> <li>In order to pass the discipline the student must prove the understanding of the basic principles presented during the semester and to apply them in practical applications. The written exam consists of 6-8 major subjects, each with 3-4 specific requirements (some theoretical, other applications)</li> </ul>			

**Date of completion**

10.06.2023

**Course coordinator  
(signature)**

**Coordinator of applied activities  
(signature)**

**Head of Department  
(signature)**

**Date of approval in the Faculty Council <sup>18</sup>**

**Dean  
(signature)**

14.09.2023

<sup>14</sup> At least one title must belong to the discipline team.

<sup>15</sup> Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

<sup>16</sup> In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.

<sup>17</sup> It will not explain how the promotion mark is awarded.

<sup>18</sup> The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.