# SYLLABUS[1]

## 1. Information about the program

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| **1.1** Higher education institution | POLITEHNICA UNIVERSITY TIMISOARA |
| **1.2** Faculty[2] / Department[3] | FACULTY OF ELECTRONICS AND TELECOMMUNICATIONS / COMMUNICATIONS |
| **1.3** Chair | — |
| **1.4** Field of study (name/code[4]) | ELECTRONIC AND TELECOMMUNICATIONS ENGINEERING / 100 |
| **1.5** Study cycle | BACHELOR |
| **1.6** Study program (name/code)/Qualification | TECHNOLOGY AND TELECOMMUNICATIONS SYSTEMS / 20202010020 /Technologies and telecommunication systems |

## 2. Information about the discipline

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|---|---|---|---|---|---|---|---|
| **2.1** Name of discipline | | | Digital Telephony | | | | |
| **2.2** Coordinator (holder) of course activities | | | Prof. dr. ing. Marius Oteșteanu | | | | |
| **2.3** Coordinator (holder) of applied activities [5] | | | Asist. dr. ing. Gheorghe Daniel Popa | | | | |
| **2.4** Year of study[6] | 3 | **2.5** Semester | 6 | **2.6** Type of evaluation | E | **2.7** Type of discipline | |

## 3. Total estimated time (hours / semester of didactic activities)

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|---|---|---|---|---|---|
| **3.1** No. of hrs. / week | 4 , of which: | **3.2** course | 2 | **3.3** seminar/laboratory/ project/training | 2 |
| **3.4** Total no. of hrs. in the education curricula | 56 , of which: | **3.5** course | 28 | **3.6** applied activities | 28 |
| **3.7** Distribution of time for individual activities related to the discipline | | | | | hrs. |
| Study using a manual, course materials, bibliography and lecture notes | | | | | 14 |
| Additional documentation in the library, on specialized electronic platforms and on the field | | | | | 4 |
| Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays | | | | | 12 |
| Tutoring | | | | | 2 |
| Examinations | | | | | 3 |
| Other activities | | | | | |
| **Total hrs. of individual activities** | | | | | 35 |
| **3.8 Total hrs. / semester[7]** | 91 | | | | |
| **3.9 No. of credits** | 4 | | | | |

[1] The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).
[2] The name of the faculty which manages the educational curriculum to which the discipline belongs.
[3] The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.
[4] Fill in the code provided in GD no. 493/17.07.2013.
[5] The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] The year of study to which the discipline is provided in the curriculum.
[7] It is obtained by summing up the number of hrs. from 3.4 and 3.7.

## 4. **Prerequisites** (where applicable)

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| **4.1** Curriculum | • Signals and systems<br>• Signal processing<br>• Electronic circuits<br>• Digital integrated circuits<br>• Analog integrated circuits |
| **4.2** Competencies | • |

## 5. **Conditions** (where applicable)

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| **5.1** of the course | • |
| **5.2** to conduct practical activities | • |

## 6. **Specific competencies acquired**

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| Professional competencies[8] | • C1 Using basic elements of electronic devices, circuits, systems, instruments and technology<br>• C2 Applying basic methods for signal acquisition and processing<br>• C4 The design, implementation and operation of data, voice, video and multimedia services, based on the understanding and the ability to apply the basic concepts in the fields of communications and data transmissions |
| Transversal competencies | • CT1 The methodical analysis of problems encountered in activity, identifying elements for which there are dedicated solutions, thus ensuring the fulfilling of professional tasks |

## 7. **Objectives of the discipline** (based on the grid of specific competencies acquired)

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| **7.1** General objective of the discipline | • 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. |
| **7.2** Specific objectives | • Analog and digital companding and multiplexing techniques for telephony signals are analyzed.<br>• Techniques and line termination equipments are studied within a digital telephony network framework.<br>• Introduction to xDSL technologies |

## 8. **Content**

| **8.1** Course | No. of hours | Teaching methods |
|---|---|---|

8 The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Naţional al Calificărilor din Învăţământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

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|---|---|---|
| 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 intranet https://intranet.etc.upt.ro/~DT/ |
| 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, cuantization, 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 | |
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| Bibliography[9] 1. J. Bellamy, Digital Telephony, Third Edition, John Wiley & Sons, 2000<br>2. Philip Golden, Hervé Dedieu, Krista S. Jacobsen, Fundamentals of DSL Technology, Taylor & Francis, 2005<br>3. https://intranet.etc.upt.ro/~DT/Course/ | | |
| **8.2** Applied activities[10] | No. of hours | Teaching methods |
| The voice signal, telephone signal level<br>Amplitude modulation | 2<br>2 | The theoretical principles presented initially at the course |

[9] At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.

[10] The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:", „Laboratory:", „Project:" and/or „Practice/Training:".

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|---|---|---|
| AMSC modulator/demodulator<br>Multiplexing techniques<br>Hybrid systems. The 2-wires transmission<br>The sampling of the voice signal<br>Time division multiplexing and PCM<br>The A-law compression<br>Companding<br>PCM framing and Channel Associated Signaling (CAS)<br>Line coding<br>Signal regeneration and line decoding<br>Power feeding systems<br>PABX system | 2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2 | 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 intranet https://intranet.etc.upt.ro/~DT/ |
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| Bibliography [11] 1. https://intranet.etc.upt.ro/~DT/Laboratory/ | | |

## 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

- The content of the discipline was agreed by representatives of important local employers in the field like Alcatel-Lucent, Continental Automotive etc.

## 10. Evaluation

| Type of activity | **10.1** Evaluation criteria | **10.2** Evaluation methods | **10.3** Share of the final grade |
|---|---|---|---|
| **10.4** Course | Understanding the presented principles, methods and technologies | Written tests and homeworks (6-8 during the semester).<br>Exam (written) | 10%<br>60% |
| **10.5** Applied activities | **S:** | | |

[11] At least one title must belong to the staff teaching the discipline.

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|---|---|---|---|
| | **L:** The ability to understand and apply the presented principles | Weekly testing (written or oral) | 30% |
| | **P:** | | |
| | **Pr:** | | |

**10.6** Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)

- 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)

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| **Date of completion** | **Course coordinator** | **Coordinator of applied activities** |
| | **(signature)** | **(signature)** |
| 25.02.2015 | | |
| | ..... | ..... |
| **Head of Department** | **Date of approval in the Faculty Council**[12] | **Dean** |
| **(signature)** | | **(signature)** |
| ..... | | ..... |

[12] Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparţine programul de studiu cu privire la fişa disciplinei.