

SYLLABUS¹

1. Information about the Program

1.1 Higher education institution	Politehnica University of Timisoara
1.2 Faculty ² / Department ³	Automation and Computing / Computer and Software Engineering
1.3 Chair	-
1.4 Domain of study	Computers and Information Technology
1.5 Study level	Bachelor of science
1.6 Study program / Qualification	Computers / engineer

2. Information about the Course

2.1 Course	Digital Telecommunications						
2.2 Lecturer	Prof. Dr. habil. eng. Mihai V. Micea						
2.3 Academic staff for seminars/labs	T.Assist. Dr. eng. Valentin Stângaciu						
2.4 Study year	4	2.5 Semester	7	2.6 Assessment type	E	2.7 Course type	Elective

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

3.1 Hours / week	4	of which: 3.2 lecture hours	2	3.3 seminar/lab hours	2
3.4 Total curriculum hours	120	of which: 3.2 lecture hours	28	3.3 seminar/lab hours	28
Time distribution					hours
Study using manuals, support materials, bibliography and notes					40
Supplementary documentation in library, specialty electronic platforms and on site					9
Supplementary preparation for seminars/labs, homework, reviews, portfolios and essays					15
Tutoring activities					7
Exams					3
Other					
3.7 Total - hours of individual study	64				
3.8 Total - hours per semester	130				
3.9 Credits	5				

4. Prerequisites (if appropriate)

4.1 curriculum related	<ul style="list-style-type: none"> • Not the case
4.2 competence related	<ul style="list-style-type: none"> • Competences and knowledge of digital signal processing and computing network engineering

5. Conditions (if appropriate)

5.1 for lectures	<ul style="list-style-type: none"> • Medium sized room • Support equipment: laptop, video-projector, board
5.2 for seminars/labs	<ul style="list-style-type: none"> • Laboratory with 10-20 workstations • Development modules for digital telecommunications (10-20 buc), corresponding C programming environments, software analysis and debugging tools • Laboratory instrumentation (10-20 pcs): multimeters, stabilized programmable power sources, oscilloscopes, logic analyzers • Hardware development equipments and tools: soldering stations, universal programmers for memory modules, electronic toolkits, connectors and wires

¹ Formularul corespunde Fișei Disciplinei promovată prin OMECTS 5703/18.12.2011 (Anexa3);

² Se înscrie numele facultății care gestionează programul de studiu căruia îi aparține disciplina;

³ Se înscrie numele departamentului căruia i-a fost încredințată susținerea disciplinei și de care aparține titularul cursului;

6. Specific competencies acquired

Professional competencies ⁴	<ul style="list-style-type: none"> • Operating with the scientific, engineering and IT fundamentals • Designing hardware, software and communication components • Problem solving by using computer science and engineering tools • Improving the performance of hardware, software and communication systems • Designing, managing the life cycle, integrating and managing the integrity of hardware, software and communication systems
Transversal competencies	<ul style="list-style-type: none"> • Behaving honorably, responsibly and ethical, according to the law, to ensure problem solving • Identifying, describing and executing the processes of project management, by fulfilling various roles within the team, and describing the results in the field of activity, in a clear and concise manner, verbal and in writing, using the Romanian language and an international language • Proving action and initiative spirit to get current with the knowledge at professional, economic and management levels

7. Objectives of the course (issued from the list of the competencies acquired)

7.1 General goal	<ul style="list-style-type: none"> • Providing the necessary knowledge to cover and understand the principles of transmitting the information, the digital telecommunication standards and building the skills to develop applications in the field
7.2 Specific objectives	<ul style="list-style-type: none"> • Learning the principles of information transmission and switching over analog and digital communication channels • Gaining specialized knowledge on the architecture and operation of land and mobile digital telecommunication standards, with particular examples on Alcatel systems • Developing abilities of designing, implementing, testing and debugging applications based on digital telecommunication systems

8. Content

8.1 Lecture	Hours	Lecturing methods
1. Introduction <ul style="list-style-type: none"> 1.1 General considerations 1.2 General model of a telecommunication channel 1.3 Analog telecommunication channels 1.4 Digital telecommunication channels 1.5 Open Systems Interconnection (OSI) model 1.6 Physical media of communication 	8	Lectures supported by PowerPoint presentations and video-projections, discussions, explanations and examples
2. Mobile digital telecommunications <ul style="list-style-type: none"> 2.1 Introduction 2.2 GSM Standard 2.3 GPRS Standard 2.4 Advanced mobile telecommunication standards: EDGE, UMTS 	14	
3. Land digital telecommunications <ul style="list-style-type: none"> 3.1 Public Switched Telephone Network (PSTN) 3.2 Integrated Services Digital Network (ISDN) 3.3 Intelligent Telecommunication Networks (IN) 	6	
Bibliography <ul style="list-style-type: none"> • M. V. Micea, "Digital Telecommunications: Course Support", 4th Edition, Politehnica University of Timisoara, 2015, http://dsplabs.cs.upt.ro/~micha/courses/TD/support/Sec01%20-%20Introduction.pdf. • I. Poole, "Cellular Communications Explained: From Basics to 3G", Newnes - Elsevier, 2006. • S. Tannenbaum, "Computer Networks", 4th Edition, Prentice Hall, 2004. • Heine, "GSM Networks: Protocols, Terminology, and Implementation", Artech House, Inc., London, 1999. 		
8.2 Seminar/lab	Hours	Instruction methods
1. Introduction to the architecture and programming of the digital telecom application development modules. Presentation of the corresponding hardware and software tools	4	Presentation of the workshop, discussions, questions and answers, implementation of the specifications, testing and debugging
2. Development of communication applications using asynchronous serial interfaces	2	
3. Communication applications with synchronous serial interfaces	2	
4. XBee modules: operating principles and configuration	2	
5. Peer to peer telecommunication applications based on the IEEE 802.15.4 standard	2	

⁴ Aspectul competențelor profesionale va fi tratat cf. Metodologiei OMECTS 5703/18.12.2011. Se vor prelua competențele care sunt precizate în Registrul Național al Calificărilor din Învățământul Superior RNCIS (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) pentru domeniul de studiu de la pct. 1.4 și programul de studii de la pct. 1.6 din această fișă.

6. Design, implementation and testing of an IEEE 802.15.4 based telecommunication network	2	
7. Wireless sensor network - type of applications	4	
8. GSM/GPRS mobile telecom modules: operating principles and general configuration	2	
9. Configuring and using the GSM/GPRS modules for voice communications. Applications	2	
10. Configuring and using the GSM/GPRS modules for short message (SMS) communications. Applications	2	
11. Configuring and using the GSM/GPRS modules for packet switched data communications	2	
12. GPRS data telecom applications	2	
Bibliography		
<ul style="list-style-type: none"> • V. Stangaciu, C.S. Stangaciu, "Digital Telecommunications, Signal Acquisition and Processing: Projects and Practical Applications", Editura Politehnica, Timisoara, Romania, 2016. • M. V. Micea, "Digital Telecommunications: Course Support", 4th Edition, Politehnica University of Timisoara, 2015, http://dsplabs.cs.upt.ro/~micha/courses/TD/support/Sec01%20-%20Introduction.pdf. • I. Poole, "Cellular Communications Explained: From Basics to 3G", Newnes - Elsevier, 2006. 		

9. Correlation between the course content and the requirements of the specialists in the field and the expectations of the main employers

- This course provides fundamental knowledge and skills, required in the fields of digital telecommunication systems, intelligent sensor networks and embedded systems.

10. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in final mark
10.4 Lecture	Solving of a module with questions and problems derived from the examples discussed during the lectures and lab workshops	Written examination; length: 3 hours	66%
10.5 Seminar /labs	Carrying out the lab workshops, according to the specifications	Presentations of the results, questions and answers	29%
	Attendance	Attendees list	5%
10.6 Minimal performance standards (minimal specific knowledge required for passing the exam, the means to assess mastering the specific knowledge)			
<ul style="list-style-type: none"> • Knowing of the main parameters of analog and digital communication channels; General architecture of GSM and GPRS mobile telecom systems; Main message exchanges in the GSM transactions – written examination; • Basic skills of designing, implementing, testing and debugging hardware and software systems for simple digital telecom applications – presentation of the system and results, questions and answers. 			

11. International compatibility

- University of Ottawa, Canada, Faculty of Engineering, Computer Engineering Undergraduate Program: "Wireless Mobile Networks" (CEG4186)
- Carnegie Mellon University, SUA, Department of Electrical and Computer Engineering, Undergraduate Program: "Introduction to Telecommunication Networks" (18-345), "Digital Communication and Signal Processing Systems Design" (18-551)
- California Institute of Technology, SUA, Division of Engineering and Applied Sciences, Undergraduate Program: "Networking" (CS/EE 145 abc)

Date

Signature of the course instructor

Signature of the academic staff for seminars/labs

Prof. Dr. habil. eng. Mihai V. MICEA

T.Assist. Dr. eng. Valentin STĂNGACIU

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Date of approval in the Department

Signature of the Department Director

Prof. Dr. eng. Vladimir CREȚU

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