

# 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/COM
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>	NETWORK ARCHITECTURES AND INTERNET /DD						
2.2 Coordinator (holder) of course activities	Sl. Dr. Ing. Cristina-Laura STOLOJESCU-CRISAN						
2.3 Coordinator (holder) of applied activities <sup>5</sup>	Sl. Dr. Ing. Cristina-Laura STOLOJESCU-CRISAN						
2.4 Year of study <sup>6</sup>	2	2.5 Semester	4	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	of which:	3.5 training		3.6 hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	3.5* training		3.6* hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	3.14 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1.14
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	44 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			16
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			14
3.8 Total hours / week <sup>9</sup>	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

## 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>• Signal and systems, Signal processing</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>• Classroom with projector, blackboard</li> </ul>
5.2 to conduct practical activities	<ul style="list-style-type: none"> <li>• Laboratory with computers connected to the Internet, Windows, LINUX/UNIX test servers</li> </ul>

### 6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none"> <li>• Use of fundamental elements related to communication networks, network architecture, layers, IP addressing, transport protocols</li> </ul>
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> <li>• Application of knowledge, concepts and basic methods related to computer system architecture, microprocessors, microcontrollers, programming languages and techniques.</li> <li>• Selection, installation, configuration and operation of fixed and mobile equipment and equipping the site with common telecommunication networks.</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> <li>• Definition of activity stages and their distribution to subordinates in terms of responsibilities, providing effective exchange of information and interpersonal communication.</li> <li>• Adaptation to new technologies, professional and personal development through continuous training, using printed documentation sources, specialized software and electronic resources in Romanian and at least one foreign language</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 course examines the conceptual framework for specifying a computer network - the network architecture and investigates the set of rules and procedures that mediate the exchange of information between two communicating processes - the network protocols.</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• Students will acquire fundamental notions related to communications and information transmission, the analysis and modeling of the elementary systems that compose a network and even subnetworks of small dimensions. The accent is put on the analysis of the traffic that takes place within those networks.</li> </ul>

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

8.1 Course	Number of hours	Teaching methods <sup>11</sup>
1. INTRODUCTION TO COMPUTER NETWORKING; Uses of Computer Networks, Network hardware, Network software, Reference models.	4	The course is organized as exposure based on Power Point material available for students on Intranet an
2. LAYERS IN TCP/IP PROTOCOL SUITE; Communication at each layer, addressing: Phy Add, IP Add, Port Add, App Add, The physical layer: The theoretical basis for data communication, Guided transmission media, Wireless transmission.	4	
3. UNDERLYING TECHNOLOGIES; LAN: Ethernet, Mac Frame,	4	

<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 "(\*)".

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

CSMA/CD, Fast Ethernet, Gigabit Ethernet, Wireless LANs, Point-to-Point WANs, PPP, Switched WANs, Connecting Devices: Repeaters, Bridges, Routers.		Virtual Campus.
4. NETWORK LAYER; Packet Switching at Network Layer: Connectionless Service, Connection Oriented Service, Network Layer Services: At Source Computer, At Each Router, At Destination Computer, Error Control	4	
5. IPV4 ADDRESSES; Classful Addressing: Classes, Two-Level Addressing, Three-level Addressing: Subnetting, Classless Addressing: Extracting Information in a Block, Subnetting, Address Aggregation, Special Addresses, NAT Technology	3	
6. Delivering and Forwarding IP Packets; Direct Delivery, Indirect Delivery, Forwarding: Forwarding based on Destination Address: Next Hop Method, Network Specific Method, Host-Specific Method, Forwarding with Classful Addressing, Forwarding with Classless Addressing, Address Aggregation, Hierarchical Routing, Structure of a Router.	3	
7. Internet Protocol V4; IP Datagram Format, Fragmentation, ICMP, Routing Protocols: IRP, ERP-BGP	3	
8. Transport Protocols; Transport Layer Services, Multiplexing and Demultiplexing, Flow control, Error Control, Segmentation, TCP Segment Format, TCP Connection, UDP: UDP Datagrams, UDP Services.	3	

Bibliography <sup>12</sup> [1] S. Tanenbaum Andrew, J. Wetherall David, Computer Networks, 5th edition, ISBN-10: 9332518742, 2013  
[2] Stallings W. Data and Computer Communications, Pearson; 9th edition, 2010  
[3] Behrouz A. Forouzan, TCP/IP Protocol Suite Fourth Edition, Mc. Graw Hill, Higher Education, 2010  
[4] G. Budura [https://intranet.etc.upt.ro/~COMP\\_NET\\_ARCH/](https://intranet.etc.upt.ro/~COMP_NET_ARCH/), 2019

**8.2 Applied activities <sup>13</sup>**

	Number of hours	Teaching methods
Lab 1: Internet services. Telnet (SSH), E-mail, FTP	2	Exercises, homework, simulations
Lab 2: Monitoring Internet Connections (TCP/IP)	2	
Lab 3: Configuring Ethernet Networks	2	
Lab 4: MAC and IP Addresses	2	
Lab 5: IP Subnetting	4	
Lab 6: VLSM	4	
Lab 7: Introduction to Cisco Packet Tracer	2	
Lab 8: Implementing the VLAN concept using Cisco Packet Tracer	4	
Lab 9: Study and implementation of wireless topology in Packet Tracer	2	

Bibliography <sup>14</sup> [1] S. Tanenbaum Andrew, J. Wetherall David, Computer Networks, 5th edition, ISBN-10: 9332518742, 2013  
[2] Stallings W. Data and Computer Communications, Pearson; 9th edition, 2010  
[3] Behrouz A. Forouzan, TCP/IP Protocol Suite Fourth Edition, Mc. Graw Hill, Higher Education, 2010  
[4] G. Budura [https://intranet.etc.upt.ro/~COMP\\_NET\\_ARCH/](https://intranet.etc.upt.ro/~COMP_NET_ARCH/), 2019

**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**

- Students will acquire appropriate skills for the needs of current qualifications, a scientific and technical training corresponding to the bachelor's level, which will allow them to quickly get a job in the engineering domain after graduation, but also the possibility of continuing their studies through Master and PhD programs

**10. Evaluation**

<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".

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

Type of activity	10.1 Evaluation criteria <sup>15</sup>	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Evaluation of the understanding of fundamental network architecture concepts and how to apply them to solve practical applications	Exam	66%
10.5 Applied activities	<b>S:</b>		
	<b>L:</b>	Two tests, homework, every lab evaluation	33%
	<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>• 5 for the exam and 5 for laboratory work</li> </ul>			

**Date of completion**

18.07.2023

**Course coordinator  
(signature)**

**Coordinator of applied activities  
(signature)**

**Head of Department  
(signature)**

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

14.09.2023

**Dean  
(signature)**

<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.