SYLLABUS

1. Program Information

1.1 Higher education institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Department of Automation
1.4 Field of study	Automation, Applied Informatics and Intelligent Systems
1.5 Cycle of studies	Bachelor
1.6 Study Programme/Qualification	Intelligent Automation Systems (dual, in English language)
1.7 Form of education	IF – full-time education
1.8 Course code	40.00

2. Course information

2.1 Course title	**Computer Networks**				
2.2 Course lecturer	*Sl.Dr.Ing. Ioan Valentin Sita – Valentin.Sita@aut.utcluj.ro*				
2.3 Seminar / Laboratory / Project Lecturer	*Dr.Ing. Sergiu Pascu (Emerson)*				
2.4 Year of study	3	2.5 Semester	2	2.6 Type of assessment	E
2.7 Course status	Formative category *(DF, DS, DC)*				DF
	Optionality *(DOB, DOP, DFac)*				DOB

3. Total estimated time

3.1 Number of hours per week	4	of which:	HEI	Lecture	2	Seminar	0	Laboratory	0	Project	0
			CO		0		0		2		0
3.2 Number of hours per semester	56	of which:	HEI	Lecture	28	Seminar	0	Laboratory	0	Project	0
			CO		0		0		28		0

3.3 Distribution of time allocation (hours per semester) for:	HEI	CO
(a) Study based on textbook, course support, bibliography, and notes	10	10
(b) Additional documentation in library, specialized electronic platforms, and fieldwork	9	5
(c) Preparation of seminars/laboratories, assignments, papers, portfolios and essays	0	5
(d) Tutoring	0	0
(e) Examinations	3	2
(f) Other activities:	0	0
3.4 Total individual study hours (sum (3.3(a)... 3.3(f)))	22	22
3.5 Total hours per semester (3.2+3.4)	50	50
3.6 Number of credits per semester	2	2

(HEI = Higher Education Institution, CO = Company)

4. Prerequisites (where applicable)-28

4.1 Curriculum Prerequisites	• Computer Architecture, Operating Systems and Fundamentals of Computer Networking
4.2 Competency Prerequisites	• Solve common problems in Computer Architecture, Operating Systems and Fundamentals of Computer Networking by identifying techniques, principles, and applying appropriate methods.

5. Conditions (where applicable)

5.1. Course Organization Conditions	• Blackboard, Multimedia projector, PC
5.2. Seminar / Laboratory / Project organization conditions	• Mandatory attendance

6. Specific Competencies Acquired

Professional Competencies	• PC01 Adjust engineering designs • PC06 Define technical requirements • PC07 Demonstrate disciplinary expertise • PC08 Design automation components • PC12 Gather technical information • PC15 Manage research data • PC26 Use information technology tools • PC30 Design control systems • PC31 Use remote control equipment
Transversal Competencies	• TC01 Apply knowledge of science, technology and engineering • TC02 Think analitically

7. Learning outcomes

Knowledge:	• Describe fundamental networking concepts, including network types, topologies, and communication protocol (TCP/IP). • Explain the structure and functionality of local and wide area network (LAN), including the roles of switches, routers, and hubs. • Understand IP addressing schemes, subnetting, and routing principles used in modern networks. • Configure and manage essential network services such as DHCP, DNS. • Describe network cabling standards, media types, and the physical setup of wired networks. • Understand wireless networking technologies, including security protocols and configuration methods. • Analyze and troubleshoot network connectivity issues using diagnostic tools and methodologies. • Explain the architecture and services of Windows • Configure and manage directory services, including Active Directory. • Understand the security challenges in network environments and apply appropriate protective measures. • Describe the TCP/IP protocol suite in detail, including the functionality of each layer. • Explain the impact and implementation of network virtualization and cloud-based networking solutions. • Understand the role of firewalls, intrusion detection systems, and encryption in securing networks. • Demonstrate the ability to plan, implement, and maintain small to medium-scale enterprise networks.
Skills:	• Basic IT knowledge • Understanding what a computer is, how an operating system works and file and folder structures. • Familiarity with binary and number systems, especially useful for IP addressing and subnetting. • Basic experience with operating systems (Windows and/or Linux) • Navigating the interface and using command-line tools (CMD, Terminal). • Ability to understand technical English terminology, as most tools, documentation, and interfaces are in English.

Responsibility and autonomy:	• Independently install, configure, and secure network infrastructure components (e.g., switches, routers, firewalls) in both physical and virtual environments. • Take initiative in diagnosing network issues and proposing effective solutions for connectivity, performance, or security problems. • Collaborate in a team to design, implement, and document a complete network solution or improvement project. • Demonstrate responsible use of networking tools (e.g., packet analyzers, config utilities), ensuring ethical standards and system security. • Critically evaluate the impact of network design decisions (e.g., topology, IP planning, virtualization) on scalability, security, and performance.

8. Course Objectives

8.1 General objective of the course	• To provide learners with a solid foundation in computer networking by introducing key concepts, technologies, protocols, and practical skills necessary to design, implement, manage, and secure modern network infrastructures in both local and enterprise environments.
8.2 Specific objectives	• Understand core networking concepts, models, and terminology. • Identify and describe the function of networking devices such as routers, switches, hubs, and access points. • Configure and manage IP addressing, subnetting, and basic routing. • Set up and troubleshoot local and wireless networks. • Collaborate in small teams to design and document a complete network solution. • Evaluate the impact of networking decisions on system performance, security, and scalability.

9. Contents

9.1 Lectures	No. of hours	Teaching methods	Obs.
Networking Fundamentals: Technologies, Topologies, and Protocols--TCP/IP Tutorial and Technical Overview	2	Teaching using laptop and projector, interactive course, debate / or online on Teams platform	-
TCP/IP Models: The Basics of Network Communication	2		
LAN and WAN Network Administration	2		
Networking Devices: Switches, Routers	2		
IP Addressing and Subnetting	2		
TCP/IP Protocol	2		
Network Services: DHCP, DNS	2		
Network Security: Principles, Threats, and Protective Measures	2		
Network Cabling: Standards, Types, and Physical Layouts	2		
Wireless Networking: Technologies, Security, and Configuration	2		
Network Troubleshooting and Diagnostics	2		
Implementing and Managing Windows	2		
Directory Services: Active Directory	2		
Modern Trends in Networking: Cloud Networking and Virtualization	2		

Bibliography

[1] Peter Norton, Dave Kearns, Peter Norton's complete guide to networking, Indianapolis, Ind.: Sams, 1999

[2] Andrew S. Tanenbaum, Nick Feamster, David Wetherall, Computer networks, PEARSON Education Limited, 2021

[3] Larry L. Peterson and Bruce S. Davie, Computer networks: a systems approach, Morgan Kaufmann, 2022

[4] Muftic Sead, Security mechanisms for computer networks, Halsted Press, 1989

[5] Patel, Naresh M., Harrison, Peter G., Performance modelling of communication networks and computer architectures, Addison-Wesley Longman Ltd, 1994

[6] James Martin, Computer networks and distributed processing: software, techniques, and architecture, Prentice Hall,1981

9.2 Seminar / laboratory / project	Hours HEI	Hours CO	Teaching methods	Obs.
Networking Fundamentals: Technologies, Topologies, and Protocols--TCP/IP Tutorial and Technical Overview		2	Presentation of examples, demonstrations, discussions, practical applications / or online on Teams platform	-
TCP/IP Models: The Basics of Network Communication		2		
LAN and WAN Network Administration		2		
Networking Devices: Switches, Routers		2		
IP Addressing and Subnetting		2		
TCP/IP Protocol		2		
Network Services: DHCP, DNS		2		
Network Security: Principles, Threats, and Protective Measures		2		
Network Cabling: Standards, Types, and Physical Layouts		2		
Wireless Networking: Technologies, Security, and Configuration		2		
Network Troubleshooting and Diagnostics		2		
Implementing and Managing Windows		2		
Directory Services: Active Directory		2		
Modern Trends in Networking: Cloud Networking and Virtualization		2		

Bibliography

[1] Adolfo Rodriguez John Gatrell John Karas Roland Peschke, TCP/IP Tutorial and Technical Overview, Seventh Edition, IBM, 2001

[2] HCI_Virtualization_Planning_and_Installation_v4_3_2 (Emerson internal document)

[3] Active Directory Configuration in the DeltaV System (Emerson internal document)

[4] Backup and Recovery Installation and User Guide (Emerson internal document)

10. Correlation of course content with the expectations of the epistemic community representatives, professional associations, and major employers in the field related to the program

The course content is aligned with other technical universities programs and provides the necessary knowledge to deal with industry and employers requirements for computer architecture and operating systems.

11. Evaluation

Activity Type	Evaluation criteria	Evaluation methods	Weight in final grade
11.1 Lecture	Conceptual understanding, applied knowledge, problem-solving, analysis	Written exam	50%

11.2 Seminar/ Laboratory/Project	Practical execution skills, conceptual explanation, troubleshooting and debugging, use of tools and commands	Written tests and practical applications	50%
11.3 Minimum Performance Standard			
Minimum standard of performance: Written exam rank > 5 and practical assessment rank > 5			

Date of completion: 18.09.2025	Lecturers		Signature
	Course	Sl.Dr.Ing. Ioan Valentin Sita	
	Applications		

Date of approval by the Department of Automation Council	Director of the Department of Automation
24.11.2025 _____	Prof.dr.ing. Honoriu VĂLEAN
Date of approval by the Faculty of Automation and Computer Science Council	Dean
28.11.2025 _____	Prof.dr.ing. Vlad MUREŞAN