SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Computer science/ Engineer
1.7 Form of education	Full time
1.8 Subject code	39.00

2. Data about the subject

2.1 Subject name	***Computer networks***				
2.2 Course responsible / lecturer	Prof. dr. eng. Vasile Dădârlat - Vasile.Dadarlat@cs.utcluj.ro				
2.3 Teachers in charge of seminars / laboratory / project	Assoc. prof. dr. eng. Peculea Adrian - Adrian.Peculea@cs.utcluj.ro Assoc. prof. dr. eng. Iancu Bogdan - Bogdan.Iancu@cs.utcluj.ro				
2.4 Year of study	III	2.5 Semester	6	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DD
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars	Laboratory	2	Project
3.2 Number of hours per semester	56	of which:	Course	28	Seminars	Laboratory	28	Project
3.3 Individual study:								
(a) Manual, lecture material and notes, bibliography								7
(b) Supplementary study in the library, online and in the field								3
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays								7
(d) Tutoring								
(e) Exams and tests								2
(f) Other activities:								

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	19
3.5 Total hours per semester (3.2+3.4)	75
3.6 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1 Curriculum	N/A
4.2 Competence	Physics (electricity), Basic knowledge in programming languages (C, Java, C#, Python). Computer architecture, Operating systems

5. Requirements (where appropriate)

5.1. For the course	Blackboard, projector, computer
5.2. For the applications	Classroom, PC with internet access, Computer networks equipment and software (simulators, emulators, network analysis tools) Laboratory attendance is mandatory

6. Specific competence

6.1 Professional competences	**C2:** Designing hardware, software and communication components
	• **C2.1:** Describing the structure and functioning of computational, communication and software components and systems
	• **C2.2:** Explaining the role, interaction and functioning of hardware, software and communication components
	• **C2.3:** Building the hardware and software components of some computing systems using algorithms, design methods, protocols, languages, data structures, and technologies
	• **C2.4:** Evaluating the functional and non-functional characteristics of the computing systems using specific metrics
	• **C2.5:** Implementing hardware, software and communication systems
6.2 Cross competences	N/A

7. Discipline objective (as results from the *key competences gained*)

7.1 General objective	The main objective of the course is the introductory presentation of the main types of communication networks, to enable students to analyze, design and implement the interconnection of computers in a network and the interconnection of networks. Teamwork, working with partial and contradicting specifications
7.2 Specific objectives	Each student is able to design LAN's software & hardware architecture. To achieve the main objective, the following specific objectives are pursued: • Basic elements in the theory of data transmission; • The main types of local networks; • Knowledge of Internet architecture; • Knowledge of the main application services on the Internet

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction. Concepts, network types, characteristics, evolution, standards	2	Presentation on the blackboard, presentation of slides, discussions (Q&A), consultations. The use of multimedia means, interactive teaching style, offering programs for self-testing, involvement in research contracts, consultations.	
ISO-OSI Reference model and Internet's TCP/IP protocol stack. OSI abstract model presentation, description of protocol functions for every layer. General presentation for TCP/IP protocol stack	2		
Data transmission techniques. Data transmission concepts, analog and digital transmission techniques, coding, communication channels	2		
Types of computer networks. Architectures, evolution, topologies, physical parameters	2		
Physical level. Transmission media, characteristics, performances, connectors, structured cabling system	2		
Medium access control. Medium access techniques for local (wired and wireless) and wide area networks	2		
Data Link level. Functions, problems, protocols, case study: HDLC	2		
Local Area Computer Networks. Fundamentals, architectures, evolution	2		
Local Area Computer Networks. Systems, performances	2		
Computer Networks Interconnection. Devices for network interconnection; presentation of bridges, switches and routers	2		
Internet access. IP (+ ICMP), IPv6 (+IGMP) protocols. Address resolution protocol. Routing protocols	2		
Transport level protocols. TCP protocol; congestion control. TCP	2		

and UDP sockets			
General introduction to Internet applications. File transfer. Electronic mail, multimedia transmissions, network management	2		
General introduction to Internet applications. Security issues	2		

Bibliography

1. V.Dadarlat, E.Cebuc - Reţele Locale de Calculatoare - de la cablare la interconectare, E (Microinformatica), Cluj, 2006, ISBN 973-650-161-2
2. W. Stallings, *Data and Computer Communications*; Prentice Hall , 2004-2014
3. A. Tanenbaum – *Computer Networks,* Prentice Hall, 2005- 2010 (A. S. Tanenbaum, *Reţele de Calcultoare*; Agora Press)
4. L. Peterson, B. Davie – *Computer Networks, Fifth Edition: A Systems Approach 5th Edition*, Morgan Kaufmann, 2013
5. https://moodle.cs.utcluj.ro/ editura Albastra

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Laboratory presentation; PPE elements; Introduction to computer networks	2	Practical exercises Brief presentation of possible solutions Self testing programmes	
Introduction to Wireshark and Cisco Packet Tracer	2		
Copper based transmission media and UTP cabling	2		
Optical fibers and components	2		
Structured cabling	2		
Network layer – IPv4 fundamentals	2		
Network layer – IPv4 routing and DHCP	2		
Network layer – IPv6	2		
Application layer: network programming with sockets	2		
Ethernet, ARP and NDP	2		
VLANs, trunking and inter-VLAN routing	2		
Layer 2 networks, Spanning tree protocol, link aggregation and Etherchannel	2		
Security threats in computer networks	2		
Laboratory test	2		

Bibliography

1. A. Peculea, B. Iancu, S. Buzura, V. Raţiu, coordinatori: V. Dădârlat, E. Cebuc, *Computer networks. Practical activities*, Ed. U.T. PRESS, 978-606-737-633-3, 2023
2. W. Stallings, *Data and Computer Communications*; Prentice Hall , 2004-2014
3. A. Tanenbaum – *Computer Networks,* Prentice Hall, 2005- 2010 (A. S. Tanenbaum, *Reţele de Calcultoare*; Agora Press)
4. https://moodle.cs.utcluj.ro/

*Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica şi etapele proiectului.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Course content is kept state of the art by using latest protocols and devices available on the market. The discipline is a domain discipline in Computers and Information Technology, its content being both classic and modern, familiarizing students with design principles for computer networks. The content of the discipline was discussed with other universities and important companies from Romania, Europe and the USA and evaluated by Romanian government agencies (CNEAA and ARACIS).

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Interactivity and initial preparation, intermediary and final written examinations	Written exam	60%

Seminar	-	-	-
Laboratory	Quality of practical work, participation	Continuous assessment, final written colloquium	40%
Project	-	-	-

Minimum standard of performance:
Grade calculus: 40% laboratory + 60% final exam
Conditions for participating in the final exam: Laboratory ≥ 5 Conditions
for promotion: grade ≥ 5

Date of filling in: 06.05.2024	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Prof.dr.eng. Vasile Dădârlat	
	Applications	Assoc.prof.dr.eng. Peculea Adrian	
		Assoc.prof.dr.eng. Iancu Bogdan	

Date of approval in the department
20.02.2024

Head of department,
Prof.dr.eng. Rodica Potolea

Date of approval in the Faculty Council
22.02.2024

Dean,
Prof.dr.eng. Mihaela Dînșoreanu