



COURSE DESCRIPTION

1. Program Information

1.1 University	“Alexandru Ioan Cuza” University of Iași
1.2 Faculty	Faculty of Computer Science
1.3 Department	Computer Science
1.4 Study Domain	Computer Science
1.5 Study Cycle	Bachelor Degree
1.6 Study Program / Qualification	Computer Science

2. Course Information

2.1 Course Name	Computer Networks						
2.2 Course Teacher	Professor Lenuta Alboaie, PhD ; Assoc. Prof. Andrei Panu, PhD						
2.3 Seminary Teacher	Professor Lenuta Alboaie, PhD ; Assoc. Prof. Andrei Panu, PhD						
2.4 Study Year	2	2.5 Semester	1	2.6 Evaluation	EVP	2.7 Course Status*	OB

* OB – Compulsory / OP – Optional

3. Total estimated hours (hours per semester and didactic activities)

3.1 Hours per week	4	in which: 3.2 course	2	3.3 seminary/laboratory	2
3.4 Hours in curriculum	56	in which: 3.5 course	28	3.6 seminary/laboratory	28
Time Distribution					hours
Manual study, Course support, Bibliography, and others					46
Supplementary Documentation in library, in electronic forums, and on the field					0
Seminaries/laboratories preparation, homeworks, reports, portfolios and essays					46
Tutoring					0
Evaluation					1
Other activities					1
3.7 Total hours individual study					92
3.8 Total hours per semester					150
3.9 Credits					6

4. Preconditions (if necessary)

4.1 Of Curriculum	Previous Courses Attended: Operating Systems
4.2 Of Skills	-

5. Conditions (if necessary)

5.1 For Course Operation	-
5.2 For Seminary/Laboratory Operation	-



6. Specific Skills Acquired

Professional Skills	<p>C1. Knowledge of computer networks types.</p> <p>C2. Knowledge of ISO/OSI si TCP/IP protocol stacks.</p> <p>C3. Knowledge of network layer protocols and data routing techniques.</p> <p>C4. Knowledge of transport layer protocols (TCP and UDP).</p> <p>C5. Knowledge of the client/server architectural model and the BSD socket programming interface.</p> <p>C6. Knowledge of Domain Name System (DNS) characteristics.</p> <p>C7. Knowledge of the most widely used application-level protocols that provide basic Internet services and design principles of application-level protocols.</p> <p>C8. Knowledge of protocols that provide remote terminal access, file transfer, and e-mail services.</p> <p>C9. Knowledge of Remote Procedure Call (RPC) paradigm.</p> <p>C10. Knowledge of the peer-to-peer architectural model.</p> <p>C11. Knowledge of technologies and protocols used in wireless networks.</p> <p>C12. Knowledge of general aspects of computer networks security.</p> <p>C13. Ability to design and develop network (Internet) applications.</p>
Transversal Skills	<p>CT1. The ability to communicate and collaborate with colleagues in the team.</p> <p>CT2. The ability to assess previous experiences obtained in the design and the use of various network applications, and the ability to adapt to emerging needs.</p>

7. Course Objectives (from the grid of specific skills acquired)

7.1 General Objectives	O1. Design and development of network applications using BSD socket interface.
7.2 Specific Objectives	<p>O1. Understanding of concepts, principles and technologies used in computer networks design.</p> <p>O2. Understanding of the TCP/IP stack protocols.</p> <p>O3. Understanding of client/server and Peer-to-Peer architectural models.</p> <p>O4. Ability to design and develop network applications.</p>

8. General Description

8.1	Course	Teaching Methods	Observations (hours and bibliographic references)
1.	Basic Concepts. Terminology. Types of computer networks.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
2.	Designing networks. ISO/OSI and TCP/IP protocol stacks.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
3.	Network level. IP, ICMP, ARP, RARP protocols.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
4.	Network programming. The client / server model. BSD socket programming interface.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
5.	Network programming. The client / server model. BSD socket programming interface.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
6.	Network programming. The client / server model. BSD socket programming interface.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography



7.	Transport level. TCP and UDP protocols. Comparisons.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
8.	Domain Name System (DNS).	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
9.	Application level. Designing communication protocols at application level. Basic Internet services.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
10.	P2P (Peer-to-Peer) and RPC (Remote Procedure Call) paradigms. Examples and practical uses.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
11.	Network level. Network routing.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
12.	Wireless networks.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography
13.	Security aspects in computer networks.	Interactive presentations (video). Online access to additional resources via the course website.	2, see bibliography

Bibliography

- Andrew S. Tanenbaum, Nick Feamster, David Wetherall, Computer Networks (6th Edition), ISBN-13: 9780137523214, 2021
- Larry L. Peterson, Bruce S. Davie, Computer Networks, 6th Edition: A Systems Approach, 2020
- Jill West, Jean Andrews, Tamara Dean, Network+ Guide to Networks, ISBN-13: 978-1337569330, 2018
- James F. Kurose, Keith W. Ross; Computer Networking: A Top-Down Approach (6th Edition), 2013
- R. Stevens, B. Fenner, A. Rudoff, *UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API*, Addison Wesley, 2003
- S.Buraga, G.Ciobanu, Atelier de programare în rețele de calculatoare, Polirom, Iași, 2001
- Andrew S. Tanenbaum, Distributed Systems: Principles and Paradigms, Publisher: CreateSpace Independent Publishing Platform; 2nd Edition (February 26, 2016)
- * * *, IETF Request for Comments (RFCs): <http://www.ietf.org/rfc/>

Additional references will be added during each course to the list above. Students have the obligation to consult the bibliography of the resources indicated during the course/ laboratory.

8.2	Seminary / Laboratory	Teaching methods	Observations (hours and bibliographic references)
1.	Knowledge recap regarding operating systems..	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
2.	Process management and inter-process communication using signals.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography



3.	Communication between processes using pipes and FIFOs. Duplication of file descriptors.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
4.	Communication between processes using interconnected socket pairs.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
5.	Using system commands ip, ping, traceroute, netstat. Analyzing packets captured from the network.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
6.	Iterative TCP/IP applications.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
7.	Concurrent TCP/IP applications.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
8.	TCP/IP applications with I/O multiplexing.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
9.	UDP/IP applications.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
10.	TCP/IP and UDP/IP applications that use OOB (out-of-band) data transmission mechanism.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
11.	TCP/IP and UDP/IP applications that use threads.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
12.	TCP/IP and UDP/IP applications that use the DNS services.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography
13.	Develop a project that uses the concepts accumulated in this course.	Direct interaction. Online access to additional resources via the course website.	2, see bibliography

Bibliography

- Larry L. Peterson , Bruce S. Davie, Computer Networks, 6th Edition: A Systems Approach, 2020
- Jill West, Jean Andrews, Tamara Dean, Network +Guide to Networks, ISBN-13: 978-1337569330, 2018
- R. Stevens, B. Fenner, A. Rudoff, *UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API*, Addison Wesley, 2003
- S.Buraga, G.Ciobanu, Atelier de programare în rețele de calculatoare, Polirom, Iași, 2001
- Michael Kerrisk, The Linux Programming Interface: A Linux and UNIX System Programming Handbook, 2010
- Lewis Van Winkle, Hands-On Network Programming with C: Learn socket programming in C and write secure and optimized network code, 1st Edition (May 13, 2019)

Additional references will be added during each course to the list above. Students have the obligation to consult the bibliography of the resources indicated during the course/ laboratory.

**9. Course content synchronization with the expectations of the community representatives, professional associations and employers from the program domain**

The course is in close connection with the current international trends in Computer Networks. The topics covered in the lectures are up to date and present real problems and solutions to them. In this course we can invite specialists belonging to companies having results in the field, and we recall the involvement of Continental or Orange in the proposal and evaluation of projects in the field of Computer Networks.

10. Evaluation

Activity Type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 The weight of each evaluation form (%)
10.4 Seminary/ Laboratory	Final Project (P)	Due date of the Final Project is the last week with didactic activities, before the evaluation session. The project consists of an oral presentation marked with minimum 0 points and maximum 10 points. It is an evaluation test along the way and cannot be reassessed if the due date expires. There are bonuses to be acquired for additional activities.	50%
	Laboratory Activity (L)	There are two compulsory assignments handed in and orally presented in the laboratories during the semester.	40%
10.5 Minimal performance standards			
The final grade is calculated as it follows: $N = 0.5 \cdot P + 0.4 \cdot L + 1$ In order to pass, the obtained marks must be as follows: $P \geq 5, N \geq 5$			