

**COURSE DESCRIPTION****1. Program Information**

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|-----------------------------------|--|
| 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

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|----------------------|---|--------------|---|----------------|----|--------------------|----|
| 2.1 Course Name | Computer Networks | | | | | | |
| 2.2 Course Teacher | Associate Professor Lenuta Alboaie, PHD | | | | | | |
| 2.3 Seminary Teacher | Associate Professor Lenuta Alboaie, PHD | | | | | | |
| 2.4 Study Year | 2 | 2.5 Semester | 2 | 2.6 Evaluation | EC | 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 | | | | | 40 |
| Supplementary Documentation in library, in electronic forums, and on the field | | | | | 0 |
| Seminaries/laboratories preparation, homeworks, reports, portfolios and essays | | | | | 46 |
| Tutoring (not applicable) | | | | | |
| Evaluation (evaluation during the course + final evaluation) | | | | | 4 |
| Other activities (consultations per student) | | | | | 4 |
| 3.7 Total hours individual study [ST + DS + PS] | | | | | 86 |
| 3.8 Total hours per semester [numar credite x 30 = T + E + C + TI] | | | | | 150 |
| 3.9 Credits | | | | | 5 |

Obs. $T = C + S$ **4. Preconditions** (if necessary)

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

5. Conditions (if necessary)

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

**6. Specific Skills Acquired**

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|----------------------------|---|
| 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)

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|--------------------------------|---|
| 7.1 General Objectives | <p>O1. Design and development of network applications using BSD socket interface.</p> |
| 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 |



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| 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, David J. Wetherall, Computer Networks (5th Edition), ISBN-10: 0132126958 , Publication Date: October 7, 2010
- James F. Kurose, Keith W. Ross; Computer Networking: A Top-Down Approach (5th Edition), 2009
- Larry L. Peterson , Bruce S. Davie, Computer Networks, Fifth Edition: A Systems Approach, March 25, 2011
- Tamara Dean, Network +Guide to Networks, ISBN-10: 1-423-90245-9, 2009
- 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
- R.Stevens, B.Fenner, A.Rudoff, *UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API*, Addison Wesley, 2003



- Kshemkalyani, M. Singhal, Distributed Computing. Principles, Algorithms, and Systems, Cambridge University Press, 2008
- **, 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 | 2, see bibliography |



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| | | website. | |
| 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

- Andrew S. Tanenbaum, David J. Wetherall, Computer Networks (5th Edition), ISBN-10: 0132126958 , Publication Date: October 7, 2010
- James F. Kurose, Keith W. Ross; Computer Networking: A Top-Down Approach (5th Edition), 2009
- Larry L. Peterson , Bruce S. Davie, Computer Networks, Fifth Edition: A Systems Approach, March 25, 2011
- Tamara Dean, Network +Guide to Networks, ISBN-10: 1-423-90245-9, 2009
- R. Stevens, B. Fenner, A. Rudoff, *UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API*, Addison Wesley, 2003
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- R.Stevens, B.Fenner, A.Rudoff, *UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API*, Addison Wesley, 2003

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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 in recent years 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 three weeks of the semester. 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 can not be reassessed if the due date expires. There are bonuses to be acquired for additional activities. | 30% |
| | Laboratory Activity (L) | There are two compulsory assignments handed in and presented during the laboratory courses of the running semester. Other topics/problems will be proposed during the laboratory activities. The mark will take into consideration results of other laboratory activities as well. | 20% |
| 10.5 Course | Final Test (T) | The Final Test is a final written exam at | 40% |



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| | | the end of the semester which covers all the courses taught by the lecturer. The final test is scored with a minimum of 0 points and maximum of 10 points. | |
| 10.6 Minimal performance standards | | | |
| The final grade is calculated as it follows: $N = 0.3*P+0.4*T+0.2*L+1$ The obtained mark must be greater than 5. | | | |

Date

Course Teacher
Lenuta AlboaicSeminary/Laboratory Teacher
Lenuta Alboaic

Department Date of Approval

Director of the Department