

**SYLLABUS / FIȘA DISCIPLINEI**
**1. Information on the study programme / Date despre programul de studii**

1.1. Institution / Instituția de învățământ superior	Universitatea de Vest din Timișoara
1.2. Faculty / Facultatea	Matematică și Informatică
1.3. Department / Departamentul	Computer Science (Informatică)
1.4. Study program field	Computer Science (Informatică)
1.5. Study cycle/ Ciclul de studii	Bachelor / licență
1.6. Study programme / Programul de studii / calificarea*	Computer Science / Informatică în limba engleză - <i>Computer networks administrator / Administrator de rețea de calculatoare - 252301; Analyst / Analist - 251201; Research assistant in computer science / Asistent de cercetare în informatică - 214918; Teacher in secondary schools / Profesor în învățământul gimnazial - 233002; Programmer / Programator - 251202; Software systems designers / Proiectant sisteme informatice - 251101</i>

**2. Information on the course / Date despre disciplină**

2.1. Title of the course / Denumirea disciplinei		Computer Networks					
2.2. Teacher in charge of the course / Titularul activităților de curs		Stelian Mihalas					
2.3. Teacher in charge of the seminar / Titularul activităților de seminar		Doru Coroban					
2.4. Study year / Anul de studii	2	2.5. Semester / Semestrul	2	2.6. Examination type / Tipul de evaluare: E(xam)/C(olloquim)	E	2.7. Course type / Regimul disciplinei: M(andatory)/ E(lective)/ F(acultative)	M

**3. Estimated study time (number of hours per semester) /Timpul total estimat (ore pe semestru al activităților didactice)**

3.1. Attendance hours per week / Număr de ore pe săptămână	4	out of which din care: 3.2 lecture/ curs	2	3.3. seminar/laborator	2
3.4. Attendance hours per semester / Total ore din planul de învățământ	56	out of which: 3.5 lecture / curs	28	3.6. seminar/laborator	28
<b>Distribution of the allocated amount of time / Distribuția fondului de timp*</b>					<b>hours/ore</b>
Individual study /Studiu după manual, suport de curs, bibliografie și notițe					14
Supplementary documentation at library or using electronic repositories / Documentare suplimentară în bibliotecă, pe platformele electronice de specialitate					10
Preparing for laboratories, homework, reports etc. /Pregătire seminarii/laboratoare, teme, referate, portofolii și eseuri					28
Exams / Examinări					14
Tutoring / Tutorat					6

3.7. Total number of hours of individual study / Total ore studiu individual	72
3.8. Total number of hours per semester / Total ore pe semestru	128
3.9. Number of credits (ECTS) / Număr de credite	5

#### 4. Prerequisites (if it is the case) / Preconțiții (acolo unde e cazul)

4.1. curriculum / de curriculum	Programming I, Graph Theory and Combinatorics
4.2. skills / de competențe	

#### 5. Requirements (if it is the case) / Condiții (acolo unde e cazul)

5.1. for the lecture / de desfășurare a cursului	Internet connection, Google Classroom code: zouefsx Meet link: <a href="https://meet.google.com/lookup/erxwfcyvbr">https://meet.google.com/lookup/erxwfcyvbr</a>
5.2. for the seminar, laboratory / de desfășurare a seminarului / laboratorului	Wireshark installed on student's machine, internet connection

#### 6. Acquired skills / Competențe specifice acumulate

Professional skills / Competențe profesionale	<ul style="list-style-type: none"> <li>• Basic understanding of network topology</li> <li>• Understanding the communication process using IP sockets</li> <li>• The ability to recognize the message encapsulation process and its successive layers and wrappers</li> <li>• Ability to recognize classes of networks</li> <li>• Ability to configure a local network, assign a network mask, configure the other elements of the network – gateway, DNS and DHCP server</li> <li>• Skills in using network emulation tools, package sniffers, route tracing</li> </ul>
Transversal skills / Competențe transversale	<ul style="list-style-type: none"> <li>• Getting to know the importance of the layered approach in the OSI model and its usability in different areas of life</li> <li>• Understanding the importance of backward compatibility in the structural evolution of a system or of a technology</li> </ul>

#### 7. Objectives of the course / Obiectivele disciplinei (reieșind din grila competențelor specifice acumulate)

7.1. General objective / Obiectivul general al disciplinei	Getting to know and use networking concepts – network topology, network elements, communication protocols, message encapsulation and delivery, protocol data units, network classes, subnetting, routing algorithms, router configuration, traffic analysis
7.2. Specific objectives / Obiectivele specifice	<p><i>Knowledge objectives (KO):</i> (1) Good understanding of the global network evolution; (2) Knowing the main network elements and their working principles (3) Understanding the encapsulation and de-encapsulation process of messages sent across the network (4) Good knowledge of the subnetting process</p> <p><i>Ability objectives (AO):</i> (1) Understanding the structure of different protocol data units (2) Recognizing and understanding different routing algorithms and protocols.</p> <p><i>Skills wise objectives (SO):</i> (1) Acquiring basic network design and configuration skills; (2) Ability to perform basic configuration of routers</p>

**8. Content / Conținuturi\***

<b>8.1. Lecture / Curs</b>	<b>Teaching strategies / Metode de predare</b>	<b>Remarks, details / Observații</b>
01 - Network elements	Lecture, class discussion, informal debate	
02 - Networks classification, domains	Lecture, class discussion, informal debate	
03 - Communication protocols, the OSI model	Lecture, class discussion, informal debate	
04 – Sockets	Lecture, class discussion, programs examples	
05 - The Application layer, main protocols	Lecture, class discussion, informal debate	
06 - The Transport layer, TCP and UDP	Lecture, class discussion, informal debate	
07 - The Network layer	Lecture, class discussion, informal debate	
08 - IP addresses, classes	Lecture, class discussion, practical examples	
09 – Subnetting	Lecture, class discussion, practical examples	
10 – Routing	Lecture, class discussion, exemplification	
11 - The Data Link layer	Lecture, class discussion, informal debate	
12 - The Physical layer - Ethernet	Lecture, class discussion, informal debate	
13 - Wireless networks	Lecture, class discussion, informal debate	
14 - IoT - the Internet of Things	Lecture, class discussion, informal debate	
<b>Recommended bibliography / Bibliografie:</b> <ol style="list-style-type: none"> <li>1. Course Notes – <a href="https://staff.fmi.uvt.ro/~stelian.mihalas/com_net/courses/comnet.pdf">https://staff.fmi.uvt.ro/~stelian.mihalas/com_net/courses/comnet.pdf</a></li> <li>2. A. Tanenbaum, D. Wetherall - Computer Networks, 5-th edition - Pearson Education, 2011</li> <li>3. Todd Lamle - CCNA study guide, 6-th edition, Wiley Publishing Inc., 2007</li> <li>4. Richard Stevens - The protocols (TCP/IP illustrated), vol. 1,(2), Addison Wesley Professional, 1993, (1995)</li> <li>5. J. Kurose, K. Ross - Computer networking: A top-down approach , 7-th edition, Pearson Education, 2016</li> <li>6. The internet mapping project - <a href="http://cheswick.com/ches/map/">http://cheswick.com/ches/map/</a></li> <li>7. Communication protocol specifications - <a href="http://www.networksorcery.com/enp/default.htm">http://www.networksorcery.com/enp/default.htm</a></li> <li>8. Tim Chown - How IPv6 will work as IPv4 wanes, <a href="http://www.zdnet.com/article/how-ipv6-will-work-as-ipv4-wanes/">http://www.zdnet.com/article/how-ipv6-will-work-as-ipv4-wanes/</a></li> <li>9. Stevens R., Fenner B., Rudolf A. – Unix Networking Programming, Vol. 1: The Sockets Networking API 3<sup>rd</sup> edition, Addison Wesley Professional, 2003</li> <li>10. Introduction to wireless networks - <a href="https://hpbn.co/introduction-to-wireless-networks/">https://hpbn.co/introduction-to-wireless-networks/</a></li> </ol>		

<b>8.2. Seminar, lab / Seminar, laborator</b>	<b>Teaching/learning strategies / Metode de predare/ învățare</b>	<b>Remarks, details / Observații</b>
01 - Posix sockets, poll() and select() functions	Socket communication principles lecture, implementation examples	
02 - Client and server implementation	Implementation skeleton provided, specific functions coding	
03 - Client/server project delivery and assessment	Students present their implementations, examination on details knowledge	
04 - Network topologies, network elements	CCNA study guide parsing, informal discussions, examples	CCNA study guide, ed. 5, chapter 1
05 - OSI layers	CCNA study guide parsing, informal discussions, examples	same as above
06 - Written test 1	Written test for topics in chapter 1 of the CCNA study guide	
07 - Protocol Data Units IP address classes	Protocol Data Units for main communication protocols	CCNA study guide, ed. 5, chapter 2
08 - IP address classes	IP addresses classification	same as above
09 - Practical Subnetting	Subnetting principles presented, practical subnetting examples	CCNA study guide, ed. 5, chapter 3
10 - Written test 2-3	Written test for topics in chapters 2-3 of the CCNA study guide	
11 - Wireshark, traffic analyzers	Download, install and learn how to use Wireshark	Wireshark lab v7.0
12 - Network traffic structure, PDUs	Practical steps in Cisco routers configuration	same as above
13 - Practical lab 4 – Wireshark traffic analysis	Traffic analysis using Wireshark	
14 – Network tools	traceroute, network emulators, SolarWinds, NetScanTools Pro	
<b>Recommended bibliography / Bibliografie:</b>		
1. Todd Lamle - CCNA study guide, 5-th edition, Wiley Publishing Inc., 2005 2. Mitchell M., Oldham J., Samuel A. - Advanced Linux Programming, NewRiders, 2001 3. Stevens R., Fenner B., Rudolf A. - Unix Networking Programming, Vol. 1: The Sockets Networking API 3 <sup>rd</sup> edition, Addison Wesley Professional, 2003 4. The OSI model explained - <a href="https://support.microsoft.com/ro-ro/kb/103884">https://support.microsoft.com/ro-ro/kb/103884</a> 5. Computer Networking - A Top-Down Approach, 7th Edition, J. Kurose & K. Ross, Pearson, 2016 6. Wireshark User Guide - <a href="https://www.wireshark.org/download/docs/user-guide-a4.pdf">https://www.wireshark.org/download/docs/user-guide-a4.pdf</a> 7. Wireshark lab v7.0 - <a href="https://www-net.cs.umass.edu/wireshark-labs/Wireshark_Intro_v7.0.pdf">https://www-net.cs.umass.edu/wireshark-labs/Wireshark_Intro_v7.0.pdf</a> 8. Traffic Generator for Network Stress Tests - WAN Killer - <a href="https://www.solarwinds.com/engineers-toolset/use-cases/traffic-generator-wan-killer">https://www.solarwinds.com/engineers-toolset/use-cases/traffic-generator-wan-killer</a> 9. NetScanTools Pro - <a href="https://www.netscantools.com/nstpromain.html">https://www.netscantools.com/nstpromain.html</a> 10. GNS3 network emulator - <a href="https://www.netscantools.com/nstpromain.html">https://www.netscantools.com/nstpromain.html</a>		

**9. Correlations between the content of the course and the requirements of the IT field / Coroborarea conținuturilor disciplinei cu așteptările reprezentanților comunității epistemice, asociațiilor profesionale și angajatorilor reprezentativi din domeniul aferent programului**

Course content is typical for teaching Computer Networks in colleges across the world. Network administration positions are in high demand and this course is a first important step in achieving the knowledge, ability and skills required by this kind of jobs. Most of the laboratory activity represent practical steps towards CCNA (Cisco Certified Network Associate) certification.

**10. Evaluation / Evaluare\***

Activity / Tip de activitate	10.1. Evaluation criteria / Criterii de evaluare**	10.2. Evaluation methods / Metode de evaluare***	10.3. Weight in the averaged mark / Pondere din nota finală
10.4. Lecture / Curs	Knowledge levels in these areas: <ul style="list-style-type: none"> <li>• Network topology</li> <li>• Network elements</li> <li>• OSI layers</li> <li>• Data encapsulation</li> <li>• Communication protocols</li> <li>• Routing algorithms</li> <li>• Subnetting</li> </ul>	Online written exam	50%
10.5. Seminar/ lab	Client- server implementation	Execution, questioning	10%
	Computer networks administration knowledge	Online written tests	30%
	Network utilities usage	Practical task performing	10%
10.6. Minimal knowledge for passing / Standard minim de performanță			
Acquire a combined passing grade (5) in written examination and labs. The final grade is computed by dividing the total number of points (100 max) by 10 and applying the ceil() function.			

Date/ Data completării

Signature (lecture) /  
Semnătura titularului de curs

Signature (seminar)  
Semnătura titularului de seminar

Signature (director of the department)  
Semnătura directorului de departament