

SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Communications
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Master of Science
1.6 Program of study / Qualification	Telecommunications / Master
1.7 Form of education	Full time
1.8 Subject code	TC-E01.00

2. Data about the subject

2.1 Subject name	Security in Telecommunications Networks						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Assoc. Professor Daniel ZINCA, Ph.D. Daniel.Zinca@com.utcluj.ro						
2.4 Teacher in charge with seminar / laboratory / project	Assoc. Professor Daniel ZINCA, Ph.D. Daniel.Zinca@com.utcluj.ro						
2.5 Year of study	1	2.6 Semester	1	2.7 Assessment	E	2.8 Subject category	DA/DI

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	1	3.3 laboratory	2
3.4 To Total hours in the curriculum	42	of which: 3.5 course	14	3.6 laboratory	28
Distribution of time					hours
Manual, lecture material and notes, bibliography					20
Supplementary study in the library, online specialized platforms and in the field					12
Preparation for seminars / laboratories, homework, reports, portfolios and essays					20
Tutoring					3
Exams and tests					3
Other activities:					
3.7 Total hours of individual study	58				
3.8 Total hours per semester	100				
3.9 Number of credit points	4				

4. Pre-requisites (where appropriate)

4.1 curriculum	N. A.
4.2 competence	N. A.

5. Requirements (where appropriate)

5.1. for the course	Amphitheatre, Cluj-Napoca
5.2. for the seminars / laboratories / projects	Laboratory, Cluj-Napoca

6. Specific competences

Professional competences	<p>C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming techniques</p> <p>C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information</p> <p>C5. Selecting, installing, configuring and operating fixed or mobile telecommunications equipment. Equipping a site with usual telecommunications networks</p> <p>C6. Solving specific problems of the broadband communications networks: propagation in different environment, circuits and equipment for high frequencies (microwaves and optical).</p>
Cross competences	N.A.

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

7.1 General objective	Development of competencies regarding security in telecommunications networks (LAN, WAN, WLAN, MAN, PAN).
7.2 Specific objectives	<ol style="list-style-type: none"> 1. Understanding the basic concepts regarding security in telecommunication networks 2. Development of skills and abilities necessary for the use of methods and principles for securing telecommunications networks 3. Develop the skills and abilities necessary for network security using mainly course support from Cisco CCNA Security.

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1. Introductory notions. Security in computer networks	The discipline content and the acquired skills are in agreement with the expectations of the professional	The discipline content and the acquired skills are in agreement with the expectations of the professional
2. Security policies. Security planning in computer networks.		
3. Equipment for ensuring security in computer networks		
4. AAA mechanisms. AAA implementations using the RADIUS protocol		
5. Firewall equipment. Role, features, facilities. Zone-based firewall		
6. Intrusion Detection (IDS) and Prevention Equipment (IPS). Cisco Implementation.		
7. Securing computer networks on the Data Link Layer		
8. Security in WLAN networks. Threats, standards, implementation methods.		

9. VPN (Virtual Private Networks). Configuration with digital certificates. IPSec component.		
10. Remote access to resources using VPN		
11. Site-to-site VPN implementation. Implementing remote-access VPN		
12. Multipoint VPN implementations (DMVPN, GET VPN).		
13. Data Link Layer in IEEE 802.11 WLAN. Advanced notions.		
14. WDS (Wireless Distribution System) architectures in WLAN.		
Bibliography <ol style="list-style-type: none"> 1. D. Zinca, Computer Networks (in Romanian). Editura Risoprint, Cluj-Napoca 2006 2. A.S. Tanenbaum, D.J. Wetherall, <i>Computer Networks. Sixth Edition</i>, Pearson 2021 3. Cisco Press – CCNA Security Official Exam Certification Guide, 2024 4. Cisco Press – CCNA Cyber Operations Official Exam Certification Guide, 2024 		
Online references <ol style="list-style-type: none"> 1. Cisco Networking Academy, 2024, https://www.netacad.com 		
8.2 Laboratory	Teaching methods	Notes
1. Presentation of Cisco 1812W, Cisco 2800 equipment. Presentation and use of SDM. Configuration of firewall facilities on routers with integrated services using SDM.	Practical demonstration, lab experiments, applications	Use of emulators, mobile phones and devices computers
2. Configure stateful firewall, CBAC, ip inspect.		
3. Implement RADIUS protocol using WinRadius. Configure authentication on the router.		
4. Install and configure Snort. Writing rules and applying them.		
5. Configure Layer 2 security options using Cisco Catalyst 2960 switches.		
6. Configure WLAN security on Cisco 1812W and Aironet AP devices.		
7. Site-to-site VPN configuration (pre-shared keys and digital certificates) using Cisco ISR family		
8. Configure VPN remote access - Easy VPN server component		
9. Configure VPN remote access - Easy VPN remote component		
10. Configure WebVPN and test facilities		
11. Configure DMVPN multipoint VPN.		
12. Configure WLAN options using Cisco AP equipment.		
13. Configure WDS using Cisco Bridge equipment.		
14. Use the Arduino platform for IoT deployment		
Bibliography <ol style="list-style-type: none"> 15. D. Zinca, Computer Networks (in Romanian). Editura Risoprint, Cluj-Napoca 2006 16. A.S. Tanenbaum, D.J. Wetherall, <i>Computer Networks. Sixth Edition</i>, Pearson 2021 17. Cisco Press – CCNA Security Official Exam Certification Guide, 2024 18. Cisco Press – CCNA Cyber Operations Official Exam Certification Guide, 2024 		
Online references <ol style="list-style-type: none"> 1. Cisco Networking Academy, 2024, https://www.netacad.com 		

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

The discipline content and the acquired skills are in agreement with the expectations of the professional Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	Written grid test (T) with multiple answers 18 questions x 0.5 points	80%
10.5 Seminar/ Laboratory	The level of acquired knowledge and abilities	Mini-project (P) defended in the laboratory (topics selected from a list)	20%

10.6 Minimum standard of performance

Qualitative point of view

Minimal theoretical and practical knowledge:

- ✓ Understanding of the main features of a security system in computer networks
- ✓ Understanding of the main security equipment in telecommunications networks and their facilities

Minimal acquired competences:

- ✓ Ability to list the main equipment used to ensure security in computer networks.
- ✓ Ability to specify the main advantages and disadvantages of security equipment.

Quantitative point of view

- ✓ $N=(T+P)/2$, $N \geq 5$, $T \geq 5$, $P \geq 5$

Date of filling in:	Responsible	Title First name SURNAME	Signature
20.06.2024	Course	Assoc. Professor Daniel ZINCA, Ph.D.	
	Applications	Assoc. Professor Daniel ZINCA, Ph.D.	

Date of approval in the Council of the Communications Department 10.07.2024	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of the Faculty of Electronics, Telecommunications and Information Technology 11.07.2024	Dean Prof. Ovidiu POP, Ph.D.

