UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Communication Networks

Academic Year 2025/2026

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Communication Networks (L9015)

5. Scientific Area

6. Curricular Year

2nd

7. Type of Curricular Unit / Semester

1st Semester

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8. Class type and workload (work time)

Theoretical classes:	
Practical classes:	
Theoretical-Practical Classes	30,00
Tutorial Guidance:	20,00

9. ECTS Credits

6,00

10. Scientific Area Coordinator

11. Regent

Prof. Doutor PEDRO RAMOS DOS SANTOS BRANDÃO

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

O1 - Know the fundamental concepts of Cybersecurity;
O2 - Understand what system vulnerabilities are;
O3 - Understand how security attacks can be perpetrated;
O4 - Understand how attack systems can be defended;
O5 - Know methods to mitigate and recover from an attack.

15. Specific Objectives

O1 - Understand the fundamentals of security in computer networks;
O2 - Understand the basic principles of the main threats and security vulnerabilities in computer networks;
O3 - Understand the basic principles of the main security measures to be adopted to minimize the probability of success of the main threats to security in computer networks;
O4 - Understand the basic principles of the main security protocols and VPN service to support secure communication in networks

16. Skills to be acquired

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Know how to detect security anomalies.
Know how to implement a security plan.
Know how to mitigate a cyberattack.
Knowing how to identify dubious behavior in a network.
Know how to encrypt a file.
Knowing how to work in the field of Ethical Hacking.

17. Teaching Methodology

Practical theoretical classes.
The development will be through exposure, exercises, discussion and student participation.
The formative assessment methodologies, translated into the analysis of questions and the resolution of practical exercises, guarantee that the defined objectives, in terms of theoretical understanding and practical abilities, will be achieved by the students who participate in these activities.

18. Course Unit Program

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1. Introduction and basic security concepts
1.1 Objectives of Computer Security
1.2 Overview of Security Measures
1.3 Overview of Security Threats

2. Threats and vulnerabilities
2.1 Types of malware
2.2.1 Worms
2.2.2 Viruses
2.2.3 Rootkits
2.2.4 Trojans
2.2.5 Ransomware
2.2.6 Spyware
2.2.7 APTs (Advanced Persistent Threats)
2.2.8 Malware Analysis Tools
2.2 Common vulnerabilities in software
2.2.1 Segmentation faults
2.2.2 Race conditions
2.2.3 Validation of inputs
2.3 Common vulnerabilities in communication networks
2.3.1 Password sniffing
2.3.2 Session hijacking
2.3.3 ARP Spoofing
2.3.4 Denial of Service (DoS)
2.4 Common vulnerabilities on the web
2.4.1 Cross site scripting
2.4.2 SQL injection
2.4.3 Involuntary disclosure of data
2.4.4 Adware
2.5 Network attack methodologies
2.5.1 IP Spoofing
2.5.2 DDoS (Distributed DoS) attacks
2.5.3 DNS Attacks
2.5.4 Phishing emails
2.5.5 Discovery of weak passwords
2.5.6 Theft of private data
2.5.7 Removal of evidence of attack
2.5.8 Cyberattack Maps

3. Computer security measures
3.1 Security Policies in Organizations
3.1.1 Specification
3.1.2 Implementation

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3.2 Firewalls
3.2.1 Introduction to Firewalls
3.2.2 Firewall Components
3.2.3 Topologies of Firewalls with DMZ
3.2.4 DMZ (demilitarized zone)
3.2.5 Functionalities of Firewalls
3.2.5.1 Packet filters (packet filter)
3.2.5.2 Application filters (application gateway)
3.2.5.3 Next Generation Firewalls (NGFW)
3.2.5.4 Network Address Translation (NAT)

4. Practical cases: cybersecurity laboratories.

19. Assessment Methods

Tests
practical works

20. Didactic Resources

Powerpoints,
Computers,
Virtual Machines,
Whiteboard,
Multimedia projection,
Spreadsheets,
Virtualization platforms,
Specific software: Windows Pro 11, Windows Server 2011, Ubuntu.
Moodle.

21. Sustainability Objectives

SDG 4 Quality Education: Develops advanced technical skills in computer networks and security, essential for quality training in engineering and information technology. SDG 9 Industry, Innovation, and Infrastructure: Enables students to implement reliable and innovative technology solutions in the field of communications infrastructure. SDG 16 Peace, Justice, and Strong Institutions: Contributes to the promotion of a culture of digital security and incident prevention.

22. Keywords

cybersecurity
IT Security
Network Security

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23. Main Bibliography

Author(s):	Willian Stallings		
Title:	Computer Security		
Edition:	Global Edition	Year:	2018
Local:	New York		
Publisher:	Pearson		

Author(s):	William Stallings		
Title:	Effective Cybersecurity		
Edition:	1	Year:	2019
Local:	New York		
Publisher:	Pearson		

Author(s):	Wenliang Du		
Title:	Computer and Internet Security		
Edition:	Second	Year:	2017
Local:	Syracuse		
Publisher:	Independently Published		

24. Complementary Bibliography

Author(s):	Pascal Ackerman		
Title:	Modern Cybersecurity Practices		
Edition:	First	Year:	2020
Local:	Mumbai		
Publisher:	BPM Publications		

Author(s):	Vijay Kumar Velu		
Title:	Mastering Kali Linux for Advanced Penetration Testing		
Edition:	Second	Year:	2017
Local:	Birmingham		
Publisher:	Packt		

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Autor / Author	Prof. Doutor PEDRO RAMOS DOS SANTOS BRANDÃO
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