# uc3m | Universidad Carlos III de Madrid

## Secure computer network systems

**Academic Year:** ( 2023 / 2024 )                    **Review date:** 28/04/2023 11:19:49

**Department assigned to the subject:** Computer Science and Engineering Department, Telematic Engineering Department

**Coordinating teacher:** VIDAL FERNANDEZ, IVAN

**Type:** Compulsory  **ECTS Credits :** 3.0

**Year :** 1 **Semester :** 1

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

This course has no specific previous requirements.

## OBJECTIVES

The general objectives of the course are:

- Understand the fundamental concepts and principles of communication networks, including key aspects such as topology, connectivity, data transmission, quality of service, and network management.
- Understand and analyze the functionality of the different communication protocols of the TCP/IP architecture.
- Understand the fundamental concepts and principles of computer security, including classical cryptography, symmetric key cryptography, and public key cryptography.
- Identify and evaluate vulnerabilities and security risks in communication networks.
- Design and implement security solutions for communication networks, including selecting and configuring appropriate security protocols and mechanisms for a given application or environment.
- Demonstrate skills in deploying and configuring a computer network system, considering security and data protection.

Learning outcomes that will be acquired by the student:

- Ability to determine the limitations of traditional computer network systems and its future evolution lines.
- Ability to setup and deploy traditional cybersecure solutions, their limitations and evolution lines.

## DESCRIPTION OF CONTENTS: PROGRAMME

The programme of the Secure Computer Network Systems course consists of different topics that cover both the architecture and protocols of computer networks and the Internet, and the risks and solutions related to network security.

The contents specific to the course are:

- Systems and protocols of computer network systems.
- Deployment and setup of computer network systems.
- Security risks in computer network systems.
- Deployment of cybersecure solutions.
- Cybersecurity in computer network systems.

## LEARNING ACTIVITIES AND METHODOLOGY

Learning activities include:

- Theoretical class.
- Practical classes.
- Laboratory exercises.

- Work in groups.
- Individual student work.
- Partial and final exams.

Regarding the methodology to be used, the following is considered:

- Presentations by the teacher with the support of computer and audiovisual media, in which the main concepts of the subject are developed and bibliography is provided to complement the learning process.
- Critical reading of texts recommended by the teacher: articles, reports, manuals, and/or academic papers, either for later discussion in the classroom, or to expand and consolidate knowledge on the subject.
- Resolution of practical cases, problems, etc. posed by the teacher individually or in groups.
- Presentation and discussion in the classroom, moderated by the teacher of topics related to the content of the subject, as well as of practical cases.
- Development of work and reports, either individually or in groups.

## ASSESSMENT SYSTEM

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|---|---|
| **% end-of-term-examination/test:** | 60 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 40 |

- Individual or group work done during the course: 40% of the grade.
- Final exam: 60% of the grade.

## BASIC BIBLIOGRAPHY

 - James Kurose, Keith Ross. Computer networking: a top-down approach, Pearson, Seventh, global edition (2017)


 - William Stallings Cryptography and network security: principles and practice, Pearson, Seventh, global edition (2017)


## BASIC ELECTRONIC RESOURCES

 - James Kurose, Keith Ross. . Computer networking: a top-down approach (available online from the University): https://bibliotecas.uc3m.es/permalink/f/1qk6at5/34UC3M_ALMA51315102860004213

 - William Stallings . Cryptography and network security: principles and practice: https://bibliotecas.uc3m.es/permalink/f/1qk6at5/34UC3M_ALMA51315103190004213