

**COURSE DATA****DATA SUBJECT****Code:** 36436**Name:** Network and security**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2026-27**STUDY (S)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1406 - Degree in Data Science	Escola Tècnica Superior d'Enginyeria	2	Second quarter

**SUBJECT-MATTER**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1406 - Degree in Data Science	Computer Science	COMPULSORY

**COORDINATION**

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**SUMMARY**

Networks and Security are two fundamental requirements of computer systems, computing and data use.

Any task that requires the acquisition, use and processing of data must be based on the use of communication networks and take into account the security of information throughout the process (from acquisition to treatment and publication).

The security requirements and benefits of using networks change rapidly basically due to dependence on computer systems, the requirements of these systems, and the emergence of new technologies.

This course is designed to present an overview of the essential elements of networks and the security of



computer systems in order to teach students how to follow this process of continuous change, keep up to date, and use the most suitable techniques at all times.

Networks and Security is taught in the second semester of the second year as a component of Computing.

The theory classes will be taught in Spanish. The language for the practical and laboratory classes will be stated in the course guidelines available on the website for this degree.

## PREVIOUS KNOWLEDGE

### RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

### OTHER REQUIREMENTS

For a good progress in the subject, it is necessary to have successfully taken the Data Storage Infrastructure subject of the first semester of the second year of the Data Science Degree.

## COMPETENCES / LEARNING OUTCOMES

### 1406 - Degree in Data Science

(CB3) Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

(CE08) Ability to understand, select and use the infrastructure and the techniques used to handle mass data, according to criteria of efficiency, scalability, security, error tolerance and adaptation to the production environment.

(CE11) Ability to design and implement data acquisition, its integration, transformation, selection, verification of its quality and veracity from different sources, taking into account its character, heterogeneity and variability.

(CG01) Knowledge of basic subjects and technologies that enable students to learn new methods and technologies, and to provide them with versatility to adapt to new situations.

(CG04) Ability to work in a multidisciplinary group in a multilingual environment and to communicate, orally and in writing, knowledge, procedures, results and ideas related to data science.

(CT01) To be able to access (bibliographical) information tools and appropriately use them in the development of their daily tasks.



(CT02) To be able to complete technical, scientific, social and human training in general, and to organise self-learning with a high degree of autonomy.

(CT05) Ability to evaluate the advantages and disadvantages of different methodological and / or technological alternatives in different fields of application.

## DESCRIPTION OF CONTENTS

### 1. Computer networks. Layers structure. Physical layer and data link layer.

Layers structure  
Physical layer  
Data link layer  
- Medium Access Control sublayer  
Ethernet and Wifi  
Switches  
Spanning Tree  
VLANs

### 2. IP layer

Internet Protocol IP Layer  
ARP protocol  
IPv4 addressing  
IPv6 addressing  
Routers and routing protocols

### 3. Transport layer

Objectives of the transport layer  
TCP protocol  
UDP protocol  
Sockets and ports



## **4. Application layer**

Examples of the application layer using TCP and UDP

DNS. Name server

SMTP Email

HTTP. Web

Specific protocols for IoT: MQTT

Evolution of networks: NFV, SDN, IoT, Cloud

## **5. Computer security introduction**

The process of computer security

Risks, vulnerabilities, threats and impact

Regulations on data processing and security

## **6. Cryptography and applications**

Encryption with symmetric key

Public key cryptography

Hashes

Applications to storage and communication

Integrity and authentication. Chained integrity. Blockchain

Certificates and digital signatures

HTTPs and SSH protocols

## **7. Preventive measures. Hardening and Firewalls**

Preventive measures at the host level. Hardening. Malware

Preventive measures at the network level. Perimetral security. Firewalls, proxies and VPNs

## **8. Intrusion detection systems. Audit**

Intrusion detection systems



HIDS  
NIDS and NIPS  
Audit

## WORKLOAD

### PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
<b>Total hours</b>	<b>60,00</b>

### NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	2,00
Individual or group project	10,00
Independent study and work	30,00
Preparation of lessons	12,00
Preparation for assessment activities	30,00
Resolution of case studies	6,00
<b>Total hours</b>	<b>90,00</b>

## TEACHING METHODOLOGY

The teaching activities for this course are:

1. Theoretical activities. The topics taught in the theory classes will provide a global and integrating vision, analyze the key and most complex aspects in detail, and encourage student participation at all times (G-1, T-5, CE-8, CE-11).

2. Practical activities. These activities will complement the theoretical activities. The basic concepts will be applied and expanded with the knowledge and experience students will acquire by completing their assignments. These face-to-face activities include finding solutions to problems and questions discussed in the classroom, discussion sessions, problem solving and other exercises previously worked on by the students, laboratory practice, oral presentations, conferences and scheduled individual or group tutoring sessions (B -3, G-1, G-4, T-1, T-5)



3. Individual work. This includes completion (outside the classroom) of monographs, literature research, questions, problems, and studying for classes and exams. These activities are done individually and are intended to promote autonomous learning (T-1, T-2).

4. Small-group work. Group work completed outside the classroom in small groups of 2-4 students comprising assignments, questions and problems. This type of activity complements individual activities and fosters teamwork (G-4)

## EVALUATION

The subject can be evaluated in two different ways, one giving more weight to classroom activities dealing with continuous evaluation and laboratory, and another with greater weight for the final exam (SE1) (B-3, G-1, T-5, CE-8, CE-11). All students will have the final grade of the higher of the following two options.

Option with greater weight in continuous evaluation:  $0.2 * EC + 0.4 * Exam + 0.4 * Lab$

Where EC can include one or more of: classroom activities, controls, assistance, exercises, individual and group homework, presentations, etc. This note is not recoverable (SE2, SE3), (G-4, CE-8, CE-11).

Where Lab will be the assistance and work in 7 laboratory practices (SE2) (T-1, T-2, CE-8, CE-11).

To apply this option it will be necessary to have a minimum of 5 in the Lab part and 4.5 in the Exam part. If the minimum of the part of the exam is not reached, the final grade will be the minor of both Exam and Lab.

Option with greater weight for the final exam:  $0.1 * EC + 0.5 * Exam + 0.4 * Lab$

If a minimum of 4.5 is not reached in the exam part, the exam grade will be taken as the final grade.

In the second call the subject will be evaluated in the same way as in the first call, but only the option of greater weight for the final exam will be used as a note and in addition it will be possible to improve some laboratory note that can be done on a non-contact basis and this laboratory note can never be greater than



7 out of 10.

The exams of any call could be related to any activity in the subject: theory, problems and labs.

Advance call: To be able to request an advance notice, students must have previously studied the subject and have obtained the minimum grade required in the evaluation of practical laboratory activities (Lab).

Copying or plagiarism or any other fraudulent practice in any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA ([ACGUV 123/2020](#)).

In all cases the evaluation system will be governed by the University of Valencia's regulations on grading and assessment for bachelor's degrees and master's degrees, which is available at:

[http://www.uv.es/graus/normatives/2017\\_108\\_Reglament\\_avaluacio\\_qualificacio.pdf](http://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf)

## REFERENCES

- Redes de computadoras 5ED. Andrew S. Tanenbaum et alt. Ed.: Pearson. 2012. ISBN: 9786073208185
- Comunicaciones y redes de computadores. William Stallings. Ed.: Pearson. 2004. ISBN: 9788483227589
- Privacidad y anonimización de datos. Jordi Casas et altres. 2017. UOC. ISBN 978-84-9116-939-0