UAB
Universitat Autònoma de Barcelona

Data Transmission and Criptography

2026/2027

Code: 44734
Credits: 6

Degree programme	Type	Course
Research and Innovation in Computer based Science and Engineering	OP	1

Contact lecturer

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Teaching staff

Sergi Sánchez Aragón

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Group languages

You can consult this information at the end of the document.

Prerequisites

There are no formal prerequisites. Graduate-level knowledge on topics related to data transmission is assumed.

In addition, basic knowledge of linear algebra and combinatorics is recommended for the coding theory part of the subject.

Objectives

The objective of this course is to study and delve into different data transmission search topics. To do this, the course focuses on providing an introduction to research in three main blocks:

- coding theory,
- computer networks,
- security.

Students will learn advanced concepts of these topics and will be introduced to current research.

Learning outcomes

- CA12 (The graduate will be able to design reliable, efficient and secure data transmission and storage systems, using error-correcting codes, compression and security techniques.) The graduate will be able to design reliable, efficient and secure data transmission and storage systems, using error-correcting

codes, compression and security techniques.
- CA13 (The graduate will be able to plan and develop research projects with content within the area of information processing.) The graduate will be able to plan and develop research projects with content within the area of information processing.
- KA16 (Graduates will be able to describe different error correction systems applied to post-quantum cryptography and based on LDPC codes.) Graduates will be able to describe different error correction systems applied to post-quantum cryptography and based on LDPC codes.
- KA17 (Graduates will be able to describe different compression methods used for IoT, social networking, telepresence, point cloud and medical imaging data.) Graduates will be able to describe different compression methods used for IoT, social networking, telepresence, point cloud and medical imaging data.
- KA18 (Graduates will be able to describe different cryptographic methods based on elliptic curves and used in blockchain technology, as well as methods that guarantee data privacy.) Graduates will be able to describe different cryptographic methods based on elliptic curves and used in blockchain technology, as well as methods that guarantee data privacy.
- SA21 (Apply different encryption methods for error correction in the field of post-quantum cryptography and Big Data transmissions.) Apply different encryption methods for error correction in the field of post-quantum cryptography and Big Data transmissions.
- SA22 (Apply different compression algorithms to different types of data.) Apply different compression algorithms to different types of data.
- SA23 (Apply different cryptographic mechanisms, based on elliptic curves and blockchain technology, as well as data privacy.) Apply different cryptographic mechanisms, based on elliptic curves and blockchain technology, as well as data privacy.

Contents

The main contents of the course are divided into the three main blocks of the subject:

- Coding theory: Error correction codes applied to steganography and post-quantum cryptography and LDPC codes used, e.g. on digital television.
- Computer Networks: Advanced concepts of computer networking, including opportunistic routing and delay-tolerant networks.
- Security: Basic aspects of security applied to computer networks.

Depending on the background and interests of the students, they will have the opportunity to delve more or less into certain topics.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
In-class activites	15	0.6	SA21, SA22, SA23
Preparation of written assignments	25	1	CA12, CA13, SA22, SA23
Homework and class preparation	35	1.4	KA16, KA17, KA18, SA21
Study for tests and presentations	15	0.6	KA16, KA17, KA18
Teacher directed sessions	45	1.8	KA16, KA17, KA18, SA21, SA22
Preparation of synthesis tests	15	0.6	CA12, CA13, SA21, SA22, SA23

The methodology of this course is designed to expose students to some of the relevant research topics in the areas of coding theory, computer networks and security. It will be based on the concept of \"learning by doing\", and will be adapted to the number of students who enroll in the course. There will generally be a combination of theoretical and practical sessions, including lectures, student assignments, presentations, challenge solving, and collaborative work.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Synthesis tests	30%, the minimum mark required for this part is 4 out of 10	0	0	KA16, KA17, KA18, SA21, SA22, SA23
Assignments	70%	0	0	CA12, CA13, SA22, SA23

We want to adopt an assessment methodology that is flexible enough to adapt to the specific work done in class, which means that it can vary slightly from one course to another. The evaluation will be based on 2 different types of activities:

- Assignments: different assignments will be proposed to students during the course. These may include individual and group work and may have a theoretical or practical orientation. Examples can be: exercises, study and presentation of a topic related to the subject, challenge based learning activities, practices, ...
- Tests: Summative tests will be used as an individual assessment activity. These tests can be replaced by other assessment activities if, for example, the number of students is low. The minimum mark required for this part is 4 out of 10.

The assessment activities will be explained in detail at the beginning of the course.

The minimum mark required to pass the course is 5 out of 10 points. "Honours Distinction" (Matrícula d'Honor) will be awarded taking into account the results achieved on synthesis tests, as well as active participation throughout the course and the quality of the assignments.

Only students who have not participated in any assessment activity will receive the grade Not Assessed.

Use of Generative AI Tools

This course acknowledges the growing use of generative artificial intelligence as a support tool and therefore allows its use in a limited manner. In general, these tools may only be used to improve formal aspects of the work, such as writing, style, clarity of exposition, linguistic correctness, or translation, as well as for occasional assistance with technical aspects.

It is not acceptable to use generative artificial intelligence tools to generate content that is subject to assessment, such as methodological approaches, designs, experiment execution, analysis or interpretation of results, idea development, or conclusion formulation. These tasks must be carried out entirely by the student,

as they represent the core intellectual and creative work required to pass the course. Given the wide variety of assignments, please consult your tutor if in doubt.

In any case, students must explicitly state, in each report or deliverable, whether generative AI tools have been used, specifying which tools were employed, for what purpose, and to what extent. Irresponsible, excessive, or unnecessary use of these tools may negatively affect the final grade of the bachelor's thesis. Undeclared or improper use of such tools may result in failing the course.

Bibliography

Will be provided at the beginning of the course. Given the dynamic nature of the topics to be presented, the specific bibliography will change each course to adapt it to the current state-of-the-art research in this area. It will usually include relevant papers.

Software

Will be provided at the beginning of the course.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TEm) Theory (master)	1	English	second semester	afternoon
(PLABm) Practical laboratories (master)	1	English	second semester	afternoon