Course guide
230605 - DTP - Data Transmission Protocols

Last modified: 11/04/2025

Unit in charge:	Barcelona School of Telecommunications Engineering
Teaching unit:	744 - ENTEL - Department of Network Engineering.

Degree:	MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).
	MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

Academic year: 2025   **ECTS Credits:** 5.0   **Languages:** English

LECTURER

Coordinating lecturer:	MIGUEL SORIANO IBAÑEZ
Others:	Primer quadrimestre:
	JORGE FORNE MUÑOZ - 10
	MIGUEL SORIANO IBAÑEZ - 10

PRIOR SKILLS

Probability and stochastic processes.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Ability to apply information theory methods, adaptive modulation and channel coding, as well as advanced techniques of digital signal processing to communication and audiovisual systems.
2. Ability to plan networks and decision-making about services and applications taking into account: quality of service, operational and direct costs, implementation plan, supervision, security processes, scalability and maintenance. Ability to manage and assure the quality during the development process
3. Ability to understand and to know how to apply the functioning and organization of the Internet, new generation Internet technologies and protocols, component models, middleware and services

Transversal:
4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

TEACHING METHODOLOGY

- Lectures
- Application classes
- Exercises
- Extended answer test (Final Exam)

LEARNING OBJECTIVES OF THE SUBJECT

Learning objectives of the subject:

The aim of this course is to give students a clear overview of the problems and issues that must be dealt with on designing protocols, including formal description, syntax, semantics and synchronization of communication. Moreover, other aspects that are addressed for many network protocols are included: error detection and correction, compression to reduce the size of data transmitted and security.

Learning results of the subject:

- Understand the design issues related to network protocols, taking into account all the elements included in its specification.
- Ability to analyse, model and implement new network protocols
- Ability to analyse and apply advanced security techniques, including cryptographic protocols, firewalls, and collection mechanisms, authentication and content protection.
- Ability to evaluate the performance of different error detection and correction mechanisms
- Ability to apply source coding mechanisms in communication protocols, evaluating the achieved compression rate.

STUDY LOAD

Type	Hours	Percentage
Self study	86,0	68.80
Hours large group	39,0	31.20

Total learning time: 125 h

CONTENTS

2. Network Security

Description:
- Introduction
- Security services
- Security mechanisms
- Examples of security protocols

Full-or-part-time: 35h
Theory classes: 10h 30m
Self study : 24h 30m

3. Source coding

Description:
- Introduction to lossless compression
- Introduction to entropy
- Lossless compression methods
- Compression protocols

Full-or-part-time: 31h
Theory classes: 9h
Self study : 22h

4. Channel coding

Description:
- Introduction to error correction and detection
- Linear Block codes.
- The standard array and syndrome table decoding
- Perfect codes. Hamming codes
- Weight distributions and performance of linear codes

Full-or-part-time: 35h
Theory classes: 10h 30m
Self study : 24h 30m

ACTIVITIES

EXERCISES

Description:
Exercises to strengthen the theoretical knowledge.

SHORT ANSWER TEST (CONTROL)

Description:
Mid-term control.

EXTENDED ANSWER TEST (FINAL EXAMINATION)

Description:
Final examination.

GRADING SYSTEM

Final examination: 35%
Partial examinations and controls: 65%

BIBLIOGRAPHY

Complementary:
- Bossert, M. Channel coding for telecommunications. Chichester: John Wiley & Sons, 1999. ISBN 0471982776.
- Stallings, W. Cryptography and network security: principles and practice. 8th ed. Boston: Pearson Education Limited, 2023. ISBN 9781292437484.
- Salomon, D. Data compression: the complete reference [on line]. 4th ed. London: Springer-Verlag, 2007 [Consultation: 11/05/2020]. Available on: https://link.springer.com/book/10.1007/b97635. ISBN 9781846286025.