

230093 - TD - Data Transmission

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
 Teaching unit: 744 - ENTEL - Department of Network Engineering
 Academic year: 2019
 Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
 ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Rico Novella, Francisco Jose
 Others: Forne Muñoz, Jorge
 Rojas Espinosa, Alfonso

Degree competences to which the subject contributes

Transversal:

07 AAT N2. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.

Teaching methodology

Lectures
 Individual work
 Mid-term and final exam

Learning objectives of the subject

The objective of this subject is to teach the fundamental mechanisms used by data transmission systems, including error control, data compression and cryptography.

Study load

Total learning time: 150h	Hours large group:	65h	43.33%
	Self study:	85h	56.67%

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Content

<p>1. Introduction. (6h)</p>	<p>Learning time: 13h 48m Theory classes: 6h Self study : 7h 48m</p>
<p>Description:</p> <ul style="list-style-type: none"> 1.1 General scheme 1.2 The concept of information 1.3 Source entropy 1.4 Channel capacity 	
<p>2. Source coding (6h)</p>	<p>Learning time: 13h 48m Theory classes: 6h Self study : 7h 48m</p>
<p>Description:</p> <ul style="list-style-type: none"> 2.1 Objectives and limits of lossless compression 2.2 Types of codes 2.3 Kraft's inequality 2.4 Source coding algorithms 	
<p>3. Channel coding (20h)</p>	<p>Learning time: 46h Theory classes: 20h Self study : 26h</p>
<p>Description:</p> <ul style="list-style-type: none"> 3.1 Introduction 3.2 Block codes 3.3 Convolutional codes 	

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4. Basic cryptography (23 h)	Learning time: 52h 54m Theory classes: 23h Self study : 29h 54m
Description: 4.1 Introduction 4.2 Security Services 4.3 Classical Cryptography 4.4 Modern Secret Key Cryptography 4.4.1 Stream ciphers 4.4.2 Block ciphers 4.5 Modern Public Key Cryptography 4.5.2 Diffie-Hellman 4.5.3 RSA 4.5.4 Digital Signature	
5. Dimensioning of transmission systems (10 h)	Learning time: 23h Theory classes: 10h Self study : 13h
Description: 5.1 Birth-Death Processes in Equilibrium 5.2 Little's Law 5.3 Delay Systems (Erlang-C) 5.4 Loss Systems (Erlang-B)	

Qualification system

The final grade will include continuous assessment (active participation in class and a mid-term exam) and the final exam, according to the following weight:

Final exam: 60%

Continuous assessment: 40%

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Bibliography

Basic:

Stallings, W. Network security essentials: applications and standards. 4th ed. Upper Saddle River, NJ: Pearson Education, 2011. ISBN 9780136108054.

Rifà i Coma, Josep; Huguet i Rotger, Llorenç. Comunicació digital: teoria matemàtica de la informació, codificació algebraica, criptologia. Barcelona: Masson, 1991. ISBN 8431105763.

Kleinrock, Leonard. Queueing systems. New York: John Wiley & Sons, cop. 1975-1976. ISBN 0471491101.

Complementary:

Menezes, A.J.; Van Oorschot, P.C.; Vanstone, S.A. Handbook of applied cryptography. Boca Ratón [etc.]: CRC Press, 1997. ISBN 0849385237.