

## SUBJECT TEACHING GUIDE

G1471 - Video Compression

Degree in Telecommunication Technologies Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering			Type and Year	Optional. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Optional Subjects				
Course unit title and code	G1471 - Video Compression				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web	<a href="http://moodle.unican.es">http://moodle.unican.es</a>				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA				
Name of lecturer	GUSTAVO A. RUIZ ROBREDO				
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Office	Facultad de Ciencias. Planta: + 2. DESPACHO PROFESORES (2050)				
Other lecturers					

3.1 LEARNING OUTCOMES
- Ability to process digital images and digital video streams with Matlab.
- Ability to use basic techniques of image and video compression with Matlab.
- Knowledge and ability to use standard JPEG image compression.
- Knowledge and ability to use video compression standard H.264 / MPEG-4 Part 10.
- Ability to handle specialized software tools for analysis of H.264 encoded videos.

#### 4. OBJECTIVES

The main objective of the course is to provide students with the fundamental knowledge to enable them to understand the structure of standards latest image compression and video electronic equipment used in recording and reproduction of images and video for home and professional use : photo and video cameras, recorders and video players and televisions.

Specific objectives:

- Study the structure and formats of digital imaging and digital video sequences.
- Learning to process digital images and digital video streams with Matlab.
- Study the basic techniques of image and video compression.
- Apply the basic techniques of image compression and video with Matlab.
- Analyze and use the standard JPEG image compression.
- Analyze and use the video compression standard H.264 / MPEG-4 Part 10.
- Using specialized software tools for analysis of videos encoded in H.264.
- Introduction to the H.265/HEVC.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	THEMATIC BLOCK 1. Digital imaging: color spaces. Digital video formats, compression and quality. Image and video processing using Matlab specific functions. Basic techniques of image and video compression: Practical analysis with Matlab. JPEG image compression: Practical analysis with Matlab. Practical exercises in JPEG image compression with Matlab: Comparative analysis of quality.
2	THEMATIC BLOCK 2. H.264 video compression. Hierarchical structure. Motion estimation and compensation in H.264. Interpredicción and intra prediction modes. Transform and quantization. Practical exercises of H.264 video compression using different profiles: Comparative analysis of quality. Analysis of videos encoded in H.264 using specialized software tools. Introduction to H.265 o HEVC. FFmpeg free software.

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Evaluation of the practical exercises of the Block 1.	Activity evaluation with Virtual Media	No	No	15,00
Practical exam of Block 1.	Activity evaluation with Virtual Media	No	Yes	30,00
Evaluation of the practical exercises of the Block 2.	Activity evaluation with Virtual Media	No	No	15,00
Practical exam of Block 2.	Activity evaluation with Virtual Media	No	Yes	40,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
Exams and exercises are carried out through the Moodle platform.				
The final grade is obtained according to the following equation: $\text{Final Grade} = (\text{Practical exercise Block 1}) \cdot 0.15 + (\text{Practical exam Block 1}) \cdot 0.30 + (\text{Practical exercise Block 2}) \cdot 0.15 + (\text{Practical exam Block 3}) \cdot 0.40$				
This subject is passed if the Final Grade is greater than or equal to 5.0. However, Practical exam Block 1 and Practical exam Block 2 should both be greater than or equal to 4.0.				
Resit exams are in February and September.				
Notice: According to the University policy, cheating is penalised with 0.				
<b>Observations for part-time students</b>				
Grades of part-time students follows the same criteria as the rest of the students.				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
K. S. Thyagarajan, "Still Image and Video Compression with MATLAB", Wiley-IEEE Press, 2010.
Oge Marques, "Practical Image and Video Processing Using MATLAB", Wiley-IEEE Press, 2011.
M. Wien, "High Efficiency Video Coding: Coding Tools and Specification", Springer, 2015.
Iain E. Richardson, "The H.264 Advanced Video Compression Standard", Wiley, 2010, 2nd Edition.
F. Korble, "Fmpeg Basics: Multimedia and Handling with a Fast Audio and Video Encoder", 2012.