Digital Television

Academic Year: (2020 / 2021) **Review date: 09-07-2020**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: DIAZ DE MARIA, FERNANDO

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Video System Engineering

OBJECTIVES

General competences:
Knowledge and management of the basic concepts and techniques in digital television, emphasizing those employed in modern video coding and broadcasting systems.

Specific competences:
- Knowledge of mathematics and physics related to digital television systems. (PO a)
- Knowledge of the fundamentals and standards in video coding. (PO a, c, k)
- Knowledge of the MPEG standards at system level as well as their development and evolution. (PO c, i, j)
- Knowledge of the essential subsystems in TV distribution and broadcasting. (PO k, j)
- Ability of effective communication of information, in speech and in writing. (PO g)

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Fundamental equipment for TV production
2.- Auxiliary equipment for TV production
3.- Design of control rooms of TV studies
4.- MPEG compression
5.- Compressed-signal Frame format for emission
6.- TV encoding headers
7.- DVB Emission (satellite and terrestrial)
8.- Standard Definition TV evolution: HD and Ultra HD (4k)

Lab Exercises

1.- TV Studio
- Video Mixer
- Professional camcorder and ENG
2.- MPEG compression
3.- TDT frame analysis

LEARNING ACTIVITIES AND METHODOLOGY

Three teaching activities are proposed: theoretical classes and examples, class exercises, and lab exercises.

THEORETICAL CLASS AND EXAMPLES
The theoretical class will be given in the blackboard, with slides or by any other means to illustrate the concepts of the lectures. In these classes the explanation will be completed with examples.
In these sessions the student will acquire the basic concepts of the course. It is important to highlight that these classes require the initiative and the personal and group involvement of the students (there will be concepts that the students themselves should develop).

CLASS EXERCISES
Before the exercise class, the students will have available the exercise formulation. The students should solve the exercises proposed in order to assimilate the concepts of the lectures in a more complex environment and to self-assess their knowledge. Eventually, the students will make a speech based on

secondary subjects derived from the main points in the program.

LABORATORY EXERCISES
Some basic and selected concepts learnt during the course are applied in the lab. The students should participate actively in the exercise implementation and deal with the results from a critical point of view.

ASSESSMENT SYSTEM

The final grade will be a weighted sum of partial grades coming from: class exercises and partial exams (PO a, c), lab exercises (PO c, g, k), and a final written exam (PO a, c, g).

The continuous assessment grade consists of three mid-term exams that weigh 20% each in the final grade (i.e. 60%). The final exam will weigh the remaining 40%.

% end-of-term-examination:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

BASIC BIBLIOGRAPHY

- Charles Poynton Digital Video and HDTV: Algorithms and Interfaces, Morgan Kaufmann, 2012
- Herve Benoit Digital Television: Satellite, Cable, Terrestrial, IPTV, Mobile TV in the DVB Framework, Focal Press, 2008
- Iain E. G. Richardson H.264 and MPEG-4 Video Compression, Wiley 2003.
- M. Robin, M. Poullin Digital Television Fundamentals, McGraw Hill.
- Marcus Weise How Video Works: From Analog to High Definition, Morgan Kaufmann, 2007
- Robert L. Hartwig Basic TV Technology: Digital and Analog, Focal Press , 2005
- Walter Fischer Digital Television: A Practical Guide for Engineers, Springer , 2004

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ADDITIONAL BIBLIOGRAPHY

- Arch Luther, Andrew Inglis Video Engineering, McGraw-Hill, 1999
- Gerald W. Collins Fundamentals of Digital Television Transmission, Wiley-IEEE Press, 2000

- Gerald W. Collins Fundamentals of Digital Television Transmission, Wiley-IEEE Press, 2000

- Herve Benoit Digital Television: MPEG-1, MPEG-2 and Principles of the DVB System, Focal Press, 2002
- John Watkinson El Arte del Video Digital, Instituto Oficial de RTVE / Focal Press, 1992
- Keith Jack Video Demystified: A Handbook for the Digital Engineer, Newnes, 2007
- Michael Robin, Michel Poulin Digital Television Fundamentals: Design and installation of video and audio systems, McGraw-Hill Professional , 2000
- Ulrich Reimers DVB: The Family of International Standards for Digital Video Broadcasting (Signals and Communication Technology), Springer, 2004