Video Engineering

Academic Year: (2024 / 2025) **Review date: 24-04-2024**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: GONZALEZ DIAZ, IVAN

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Physics, Linear Systems, Digital Information Processing

OBJECTIVES

General competences:

Knowledge and management of the concepts, equipments and processing techniques in video system engineering.

Specific competences:
- Knowledge of mathematics and physics related to video systems.
- Knowledge of light nature, color and its representation, and human visual system.
- Knowledge of the essential video subsystems and ability to design simple systems.
- Notions of video production.
- Knowledge of the essential video processing algorithms.

- Knowledge of video processing techniques.
- Ability of effective communication of information, in speech and in writing.

DESCRIPTION OF CONTENTS: PROGRAMME

Block I: Audiovisual Systems
1.- Light, color and Human Visual System
2.- Introduction to Audiovisual Systems
3.- Generation of TV images
4.- Baseband Video Stream
5.- Sampling in Video and SDI interface
6.- Ultra HD & UHD interfaces
7.- Digital Video Measures
8.- Synchronization and Time Codes
9.- Processing in professional TV cameras
10.- Storage Systems (Magnetic Disks)
11.- Storage Systems (Hard Drives)

Block II: Video Processing Techniques
12.- Motion Estimation
13.- Temporal Transitions in video editing and indexing
14.- Stereo Vision and Video 3D
15.- Video Format Conversion

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.

LABORATORY EXERCISES

Some basic and selected concepts learnt during the course are applied in the lab. Two types of lab sessions are envisaged in which the student will work with:
a) Hardware devices used in Audiovisual Systems.
b) Information search, device selection and audiovisual system design
c) Simulation Tools of video processing techniques.

ASSESSMENT SYSTEM

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

The final grade is computed considering:

1) Continuous Assessment Grades: 5 points
- Partial exames: 2.5 pts
- Laboratory practices: 6 practices evaluated following distinct modalities: test resolution, software notebooks, reports, etc.

2) End-of-term Exam: 5 points
There is a minimum grade of 3.5/10 in the end-of-term exam to pass the course,

BASIC BIBLIOGRAPHY

- A. Murat Tekalp Digital Video Processing, Prentice Hall, 2015

- Arch Luther and Andrew Inglis Video Engineering (Third Edition), Mc-Graw Hill, 1999

- Forsyth, Ponce Computer Vision: A Modern Approach, Pearson, 2012

- Moeslund, Thomas B. Introduction to Video and Image Processing: Building Real Systems and Applications, Springer, 2012

ADDITIONAL BIBLIOGRAPHY

- Charles Poynton Digital Video and HDTV: Algorithms and Interfaces, Morgan Kaufmann Publishers, 2003.

- Keith Jack Video Demystified: A Handbook for the Digital Engineer (5th Edition), Newnes, 2007.