# Displays Technologies

**Academic Year: ( 2020 / 2021 )** **Review date: 14-03-2021**

**Department assigned to the subject: Electronic Technology Department**

**Coordinating teacher: TORRES ZAFRA, JUAN CARLOS**

**Type: Electives ECTS Credits : 3.0**

**Year : Semester :**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Components and Electronic Circuits

## OBJECTIVES

The goal of the course is to allow the student knowing the basic electro-optical parameters related to emissive and non-emissive displays and acquiring the ability to select the optimum display for each specific application in the scope of new industrial and multimedia systems.

To achieve this goal, the following competences related to the program outcomes will be acquired:
- A knowledge of how different display technologies work and their main applications (PO: a, b, k)
- A knowledge of electrical and optical modeling/characterization for each kind of technology (PO: a, b, k)
- An ability to select the best technology for specific applications (industrial systems, portable systems, among others)(PO a, b, i, k):.

## DESCRIPTION OF CONTENTS: PROGRAMME

- State-of-the-art and new trends in displays technologies
- Quality parameters of displays: brighness, contrast ratio, color gamut, response times, etc.
- Emissive displays (CRTs, LEDs, OLEDs, PDPs, ...): electrooptical characteristics and applications
- Non Emissive displays (LCDs, e-ink, ECs, SPDs, ...): electrooptical characteristics and applications
- 3D Technologies, HUD & e-books
- New high-end applications

## LEARNING ACTIVITIES AND METHODOLOGY

The training activities are organized as following:
- Lectures (1 ECTS) where the main concepts are presented on the basis of mathematical tools and basic optic's Laws/Theorems (PO a). The learning materials include the lecture notes, the classroom documentation, and the basic bibliography that is used as a reference for completing the themes and study them in depth.
- Practical classes (1 ECTS) that are focused on solving exercises and practical cases related different displays technologies. These classes are completed with the exercises and practical problems that are solved by the students at home. The methods of solving this cases are complemented with the use of computer simulation tools (PO e,k)
- Laboratory sessions (1 ECTS) where the students work in groups (couples). They set up practical optoelectronic circuits to characterize and and measure the main quality electrooptical parameters of different kind of displays (PO b, k).

## ASSESSMENT SYSTEM

The evaluation is based on the following criteria:
- 1 partial exam comprising a complete thematic block related to different displays technologies. (PO a, e)
- The mark of this thematic blocks is the 40% of the whole mark.
- Laboratory Sessions: The knowledge and abilities of each student are also evaluated though the practical implementation of some optoelectronic circuits that allow the electrooptical characterization of different displays. This activity will be carried out in groups. Each group will deliver a final report of each session that will include the measurements and an analysis of the results. (20% of the final grade) (PO b, k)
- Final Exam: The students knowledge of all contents of the course is evaluated as a whole in this activity. Additionally, practical problems that involves several practical cases will allow evaluating the

ability of the student to apply them to solve different enginering problems related to the use of different display technologies in real operation conditions (40%). (PO a, e)

Percentage of Final Exam (mandatory): 40
Percentage of Evaluation of Other Activities: 60

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

## BASIC BIBLIOGRAPHY

- E. Kaneko Liquid Crystal TV Displays: Principles and Applications of Liquid Crystal Displays, KTK Scientific Publishers, Tokio (1987)..
- J.A. Castellano Handbook of Display Technology, Academic Press, San Diego (1992)..
- M.A. Karim Ed Electro-optical Displays, Marcel Dekker Inc, New York (1992)..

## ADDITIONAL BIBLIOGRAPHY

- B. Bahadur Ed. Liquid Crystals: Applications and Uses Vol. I, II y III,, World Scientific, Singapore (1990, 1992 y 1993)..