

Academic Year: ( 2019 / 2020 )

Review date: 30-04-2020

Department assigned to the subject: Computer Science and Engineering Department, Electronic Technology Department

Coordinating teacher: VERGAZ BENITO, RICARDO

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 2

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

Subjects related to Mathematics, Physics and Electrical and Electronic Engineering Fundamentals

**OBJECTIVES**

The competences expected to be acquired by the student are the following:

- Be able to specify, design and evaluate electronic instrumentation systems and optoelectronic systems for Security applications.
- Ability to design, analyze, optimize, install and maintain different energy conversion systems.

This requires achieving learning outcomes are summarized below:

- Knowledge about the general concepts associated to the measurement of physical parameters and instrumentation
- Knowledge about the different kind of sensors and transducers and their applications.
- To know the main features and functionalities of video cameras and other kind of image acquisition devices (CCD, CMOS)
- To know IR image monitoring systems, as well as night vision devices

**DESCRIPTION OF CONTENTS: PROGRAMME**

Chapter 1: Introduction

- 1.1: Overall introduction to the course
- 1.2: Data acquisition needs in Security applications
- 1.3: Fundamentals on instrumentation and optics

Chapter 2: Static image acquisition

- 2.1: Block diagram
- 2.2: Capture parameters: Specifications and Limitations
- 2.3: Integration and communication interfaces
- 2.4: Data coding
- 2.5: Examples

Chapter 3: Dynamic image acquisition

- 3.1: Block diagram
- 3.2: Capture parameters: Specifications and Limitations
- 3.3: Integration and communication interfaces
- 3.4: Data coding
- 3.5: Examples

Chapter 4: Other image acquisition devices

- 4.1: NIR cameras
- 4.2: FIR, thermal cameras
- 4.3: X-Ray systems
- 4.4: Millimeter wave based acquisition of images
- 4.5: Medical image based systems and emerging technologies

Chapter 5. Security applications

- 5.1: Fire detection
- 5.2: People detection on open fields
- 5.3: Human recognition under cooperative environments
- 5.4: Human recognition under non-cooperative environments

## LEARNING ACTIVITIES AND METHODOLOGY

There are face-to-face activities as well as remote participation.

- Face-to-face ECTS: 1.2 credits, related to the classroom attendance as well as exercise resolution and in depth analysis with the help of the lecturer.
- Remote participation ECTS: 1.8 credits, related to a personal research work and the continuous study of the subject and exam preparation.

## ASSESSMENT SYSTEM

Assessment will consist on a 60% from a written exam at the end of the semester, and a 40% of the results of individual and/or group work assignments.

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

## BASIC BIBLIOGRAPHY

- Fredrik Nilsson and Communications Axis Intelligent Network Video: Understanding Modern Video Surveillance Systems, CRC Press.
- Julie K. Petersen Understanding Surveillance Technologies: Spy Devices, Privacy, History & Applications, Taylor & Francis Group, LLC.
- N. K. Ratha, Venu Govindaraju Advances in Biometrics: Sensors, Algorithms and Systems, Springer.
- Raúl Sánchez Reíllo Transparencias de la Asignatura, Universidad Carlos III de Madrid, 2018

## ADDITIONAL BIBLIOGRAPHY

- Omar Javed and Mubarak Shah Automated Multi-Camera Surveillance: Algorithms and Practice, Springer.

## BASIC ELECTRONIC RESOURCES

- Raúl Sánchez Reíllo . Material Docente de la Asignatura: <https://www.cugc.es/aulavirtual/>