

Academic Year: ( 2023 / 2024 )

Review date: 28-01-2024

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: SANCHEZ REILLO, RAUL

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester :

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

Subjects related to baseline Mathematics

## OBJECTIVES

- 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.
- 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

- 1: Introduction
- 2: Optics and Sensors
  - 2.1 - Optic Group
  - 2.2 - Sensors
- 3: Information Coding
  - 3.1 - Image Files
  - 3.2 - Video Files
- 4: Storage
  - 4.1 - Magnetic
  - 4.2 - Optic
  - 4.3 - Semiconductor
- 5: Communication Interfaces
  - 5.1 - Synchronous Serial Communication (I2C and SPI)
  - 5.2 - USB
  - 5.3 - Firewire
  - 5.4 - Ethernet
  - 5.5 - Bluetooth
  - 5.6 - WiFi
- 6: Screens
  - 6.1 - Types and Parameters
  - 6.2 - Interfaces
- 7: Other Technologies
  - 7.1 - NIR
  - 7.2 - FIR
  - 7.3 - X-Rays
  - 7.4 - Computerized Axial Tomography (CAT)
  - 7.5 - Ultrasounds
  - 7.6 - Magnetic Resonance
  - 7.7 - Millimetric Waves and THz

## 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 tests and/or assessments either individual or in groups, to be developed during the course.

<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/>