

Academic Year: (2021 / 2022)

Review date: 10-06-2021

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

Coordinating teacher: SANCHEZ REILLO, RAUL

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

- 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 a group work assignment on research technologies.

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