

Academic Year: ( 2022 / 2023 )

Review date: 10/06/2021 18:29:51

Department assigned to the subject:

Coordinating teacher:

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 1

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

Electronics Engineering Fundamentals (2nd course, 2nd term)  
Analog Electronics I (3rd course, 1st term)  
Digital Electronics (3rd course, 1st term)  
Electronics Instrumentation I (3rd course, 2nd term)

## OBJECTIVES

By the end of this subject, students will have:

1. A coherent knowledge of their branch of engineering including some at the forefront of the branch of optoelectronics
2. The ability to apply their knowledge and understanding to identify, formulate and solve optoelectronic problems
3. The ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements
4. An understanding of design methodologies, and an ability to use them
5. The ability to design and conduct appropriate experiments, interpret the data and draw conclusions
6. Workshop and laboratory skills
7. The ability to select and use appropriate equipment, tools and methods
8. The ability to combine theory and practice to solve optoelectronic problems
9. An understanding of applicable techniques and methods in optoelectronics, and their limitations

## DESCRIPTION OF CONTENTS: PROGRAMME

- The light and its properties. Photometric and radiometric units
- Generation and detection of light. PN junction
- The LED
- Photodectors
- The semiconductor laser
- Optocouplers
- Propagation of light
- Case study 1: optical communications
- Case study 2: optoelectronic instrumentation
- Case study 3: Illumination systems

## LEARNING ACTIVITIES AND METHODOLOGY

- Magistral lectures and problem oriented lectures (3 ECTS credits)

The magistral lessons are aimed to provide the student with the key concepts and knowledge that will then be developed in the problem oriented lectures solving problems and real life examples of the implementation of this technology. Part of the group sessions will be devoted to "Projects Corner". In this sessions the students will have to resolve various case studies of real applications of Optoelectronics. This are problem bases learning sessions that will help strengthen the abilities they are developing during the present course.

- Practical sessions: laboratory sessions and project laboratory sessions (3 ECTS credits)
- The laboratory sessions will give the student the practical skills needed to work and characterize optoelectronic devices. In the project laboratory sessions the theoretical knowledge acquired to solve the design and implementation of a complete optoelectronic system.

#### ASSESSMENT SYSTEM

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

Continuous evaluation route (100%):

- Active participation in the lessons, resolution of the proposed work and laboratory sessions (20%)
- Project (40%): Both the actual system and the documentation will be evaluated. The assistance is compulsory.
- Midterm exam (40%)

#### BASIC BIBLIOGRAPHY

- B.E.A. Saleh , M.C. Teich Fundamentals of Photonics, Wiley - Interscience, 2007
- Endel Uiga Optoelectronics, Prentice Hall, 1995
- Eugene Hecht Optics, Addison Wesley, 2001