

Optoelectronic Systems

Guía Docente

Adrián Hierro Cano



Departamento de
**Ingeniería
Electrónica**

Universidad Politécnica de Madrid

Máster Oficial en Ingeniería
de Sistemas Electrónicos

www.die.upm.es



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Optoelectronic Systems (OPTO 2)

Semester: 2

Number of credits: 4

Type: Optional

Objectives

The aim of the course is to develop the basic knowledge to understand the behavior of basic optoelectronic components that use semiconductors: light emitting diodes, laser diodes, photodetectors, and solar cell. To do this, it will start from the analysis of the origin of optical processes in semiconductors, its application in micro and nanostructures to come to understand the basic technology found in these devices and the description of these important figures. Finally, it will examine the application of these devices in present and social use applications such as environment sensors and bio-photonics, and their use in medical applications.

Program

TOPIC

1. Elemental and Compound Semiconductors
2. Electronic properties of semiconductors
3. Optical processes in semiconductors
4. Homo-unions and hetero-junctions
5. Light Emitting Diodes (LED)
6. Laser Diodes (LD)
7. Photodetectors

8. Optical Integrated Circuits
9. Surgical treatments with laser
10. Bio-photonics: Biosensors based on Optical Systems
11. Environment and Safety: Detection of contaminants, Combustion, etc...

Bibliography

Teaching material and Bibliography

The course will follow the book by Pallab Bhattacharya, and will have transparencies developed by teachers to be given to students at the beginning of each topic.

Textbook of the course:

- Pallab Bhattacharya, Semiconductor Optoelectronic Devices, 2nd Edition, Prentice Hall, 1997.

As additional supporting material is advised to use the following references:

-Robert F. Pierret, Semiconductor Fundamentals, Vol. I, Ed.2, 1989.

-Robert F. Pierret, Advanced Semiconductor Fundamentals, Vol. VI, Ed.1, 1987.

-Gerold W. Neudeck, The p-n junction diode (El diodo pn de union), Ed.2, 1989.

-S.M. Sze, Kwok K. Ng, Physics of Semiconductor Devices, Wiley-Interscience, Ed. 3, 2007.

Teachers

Coordinator: Adrián Hierro Cano

Teachers: Adrián Hierro Cano, Alvaro Guzmán, Miguel Angel Sánchez

Teaching Methodology

The course is conducted with lectures in which faculty present and discusses transparencies with course content. Additionally, students should solve such practical exercises outside of class hours that must deliver on specific dates. These problems will be solved and discussed in class between students and teacher. The student's contribution to the discussion of the agenda and the problems will therefore be essential and necessary.

Evaluation

Exercises to be handed in weekly by students (35% of the marks), and final exam (65% of the marks).

Contact

adrian.hierro@upm.es

Desk C-201

