

DEA-TEL-522 Optical Communications

SEMESTER: Spring

CREDITS: 6 ECTS (4 hrs. per week: 3 Theory + 1 Lab, on average)

LANGUAGE: English

DEGREES: MIT

Course overview

The objective of this course is to provide the student with the techniques needed to transmit information using the light spectrum. This knowledge is focused on the analysis derivation of the processes that allows the modulation and demodulation of signals using light. During the course, the main elements in optical communication systems will be overviewed.

Prerequisites

Knowledge of complex variable and differential calculus. Basic knowledge of communication systems and physics.

Course contents

Theory:

1. Introduction to Optical Communications
2. Propagation in Fiber Optics
3. Optical Sources: LED and LD
4. Optical Detectors
5. Passive Optical Components
6. Optical Amplifiers
7. Integrated Components and Device
8. Optical Communication Systems
9. Introduction to Optical Networks

Laboratory:

There will be six 2-hour sessions throughout the course.

- P1. Measuring reflections, refractions and numeric aperture.
- P2. Static characterization of light sources and photodiodes.
- P3. Dynamic characterization of light sources and photodiodes.
- P4. Optical Time-Domain Reflectometer (OTDR)

P5. Characterization of passive devices.

Textbook

- Capmany, J., & Francoy, J. C. (2003). Problemas de comunicaciones Ópticas. Editorial de la UPV.
- Capmany, J., Peláez, F. J. F., & Martí, J. (1999). Dispositivos de comunicaciones ópticas. Síntesis.
- Capmany, J. (1998). Fundamentos de comunicaciones ópticas. Síntesis.
- Agrawal, G. P. (2010). Fiber-optic communication systems (4th ed.). Wiley.
- Coldren, L. A., Corzine, S. W., & Mashanovitch, M. L. (2012). Diode Lasers and Photonic Integrated Circuits. Wiley.
- Saleh, B. E. A., & Teich, M. C. (2007). Fundamentals of Photonics. Wiley.
- Concepts in Systems and Signals, J. D. Sherrick. Prentice-Hall 2001.

Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.

The overall grade is obtained as follows:

- Final exam 65%.
- Other exams 10%. Typically there is 1 mid-term exam (2-hour long), although, depending on the schedule, other might be programmed. Students will be told at least a week in advance.
- Lab reports 25%.