



# UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

## OPTICAL COMMUNICATIONS

<b>Anno immatricolazione</b>	2021/2022
<b>Anno offerta</b>	2021/2022
<b>Normativa</b>	DM270
<b>SSD</b>	ING-INF/01 (ELETTRONICA)
<b>Dipartimento</b>	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
<b>Corso di studio</b>	ELECTRONIC ENGINEERING
<b>Curriculum</b>	Photonics
<b>Anno di corso</b>	1°
<b>Periodo didattico</b>	Secondo Semestre (07/03/2022 - 17/06/2022)
<b>Crediti</b>	9
<b>Ore</b>	77 ore di attività frontale
<b>Lingua insegnamento</b>	English
<b>Tipo esame</b>	SCRITTO
<b>Docente</b>	ANNOVAZZI LODI VALERIO (titolare) - 4 CFU GIULIANI GUIDO - 5 CFU
<b>Prerequisiti</b>	Basic knowledge of electromagnetic theory, optics and electronics from the courses of the First Level Degree in Electronics and Telecommunications; basic knowledge on lasers and photodetectors.
<b>Obiettivi formativi</b>	This course is a survey on optical communications, and provides information on the propagation medium (the fiber), lasers and detectors, passive components, optical amplification, and telecommunication systems.
<b>Programma e contenuti</b>	Optical Fiber, Emitters and Photodetectors, Passive components, Networks, Measurements  Optical Fibers Single-mode and multi-mode fibers, specialty fibers. Geometrical and

optical parameters. Modal theory of fibers. Attenuation. Dispersion.

#### Emitters and Photodetectors

Lasers and LEDs for optical communications. Laser/fiber coupling. Photodiodes for optical communications.

#### Passive components

Connectors and splices. Coupled-mode theory. Couplers; mirrors and resonators with couplers. Retarders and polarizer. Isolators and circulators. Modulators. Bragg gratings and filters. Arrayed waveguide devices.

#### Telecommunication systems

Point to point interconnections. Networks. Power budget. Electro-optic repeater. Optical amplifiers. Multi-wavelength transmission (WDM). Coherent detection.

#### Measurements?

Measurements on fibers and on devices for optical communications: power, attenuation, return loss, geometrical parameters, dispersion and frequency response. OTDR, BER tester.

#### Metodi didattici

The course includes frontal lessons, during which the course topics are carried out including several examples, using overhead projection of transparencies and Powepoint presentations. The course is completed by some laboratory activity, where optical devices and measurement instrumentation for optical networks are shown.

#### Testi di riferimento

Gerd Keiser. Optical fiber Communications. McGraw Hill. For reference only.

Dispense di Comunicazioni ottiche dalle lezioni dei prof. Silvano Donati, Valerio Annovazzi Lodi, Guido Giuliani. CUSL (in Italian).

Copies of transparencies (on the Kiro web site).

#### Modalità verifica apprendimento

A two-hour written exam, including both numerical exercises and theoretical questions, will test the candidate's knowledge on modern optical networks and their components and subsystems presented in the course, as well as its ability to perform simple numerical evaluations on optical signal transmission.

A calculator is recommended. Computers, books and notes are not allowed.

The final score is out of thirty.

#### Altre informazioni

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