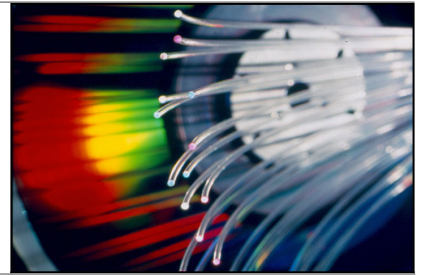


SC5 | Optical fibers and applications



Nouveau Programme

NIVEAU : BASIC

Publics : Technicians and engineers wishing to acquire basic knowledge and know-how in optical fibers

Prérequis : Basic knowledge in optics

Responsable(s) pédagogique(s) : Nicolas Dubreuil - Enseignant-chercheur à l'Institut d'Optique

Langue de la formation : French

Capacité maximum : 12

Prix : 2150€ HT - **Durée :** 5 days - 35 h

Objectifs

- ▶ Understanding the characteristics and the operation of both singlemode and multimode optical fibers
- ▶ Learn about the optical fiber based technologies and applications
- ▶ Implement an optical fiber based system

Thèmes abordés

Basic notions in guided optics

- ▶ Total internal reflection, guided modes

Singlemode and multimode fibers and related technologies

- ▶ Operation principles and characterizations

Applications of optical fibers

- ▶ Erbium doped fiber amplifier and laser, Raman fiber amplifier and laser
- ▶ Optical fiber communication systems
- ▶ Optical fiber sensors

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Le programme

Reminders in Optics

- ▶ Light: photon and wave optics
- ▶ Basics in guided optics
- ▶ Measurement instrumentations

Optical fibers

- ▶ Structures and characteristics
- ▶ Step-index and graded index singlemode and multimode fibers. Cutoff wavelength. Optical attenuation and chromatic dispersion.
- ▶ Dispersion shifted and compensated dispersion fibers. Polarization maintaining fibers. Photonic crystal fibers.
- ▶ Nonlinear fiber optics: optical Kerr effect, four-wave mixing, Raman and Brillouin scattering effects.

Optical fibers applications

- ▶ Laser beam transport. Pigtailed laser diodes
- ▶ Numerical optical transmission: noise detection, transmission performances, WDM systems and associated components
- ▶ Erbium doped fiber amplifiers: architectures and characteristics, broad-band source
- ▶ Nonlinear optical fiber. Raman fiber amplifier. Wide broad-band source.
- ▶ Optical fiber sensors: Constraints, temperature, pressure, acceleration measurements. Interferometric measurements.

Optical labworks

- ▶ Erbium doped fiber amplifier and laser. Optical reflectometry. Chromatic dispersion measurement in a single mode fiber
- ▶ Raman scattering effect in a silica based fiber. Brillouin scattering effect in a silica based fiber: amplification, slow light effect. Optical fiber gyroscope: measurement of the Earth speed rotation
- ▶ Set-up and characterization of a numerical transmission on a singlemode fiber: quality factor, bite error rates

Méthodologie et évaluation

Lectures and exercises

Interactive experimental demonstrations

Labworks and practise with instruments