Summary
This course explores different facets of modern optics and photonics.

Content
• Summary of fundamental optics (ray optics, Maxwell's equations, wave optics and polarization optics)
• Material properties and optical constants
• Light scattering
• Optics of metals and plasmonics
• Gratings, stratified media and photonic crystals
• Acousto-optics
• Electro-optics
• Metamaterials.

Keywords
Maxwell's equations, optics, photonics, polarization, material constant, dispersion, light scattering, Mie scattering, plasmonics, gratings, photonic crystals, acousto-optics, electro-optics, metamaterials, nonlinear optics

Learning Prerequisites
Recommended courses
General knowledge of fundamental optics, e.g. courses Ingénierie Optique I & II

Learning Outcomes
By the end of the course, the student must be able to:
• Analyze an optics problem
• Develop a model for this problem
• Synthesize the properties of different fundamental optical phenomena
• Elaborate a deep understanding of the underlying phenomena
• Model an optics problem using Matlab
• Explore an optical parameter range using Matlab

Transversal skills
• Assess one's own level of skill acquisition, and plan their on-going learning goals.
• Set objectives and design an action plan to reach those objectives.
• Use both general and domain specific IT resources and tools

Teaching methods
Ex-cathedra and exercises on Matlab.

Expected student activities
Read the course material beforehand, participate actively during the lecture and during the exercises with Matlab. Go through the solution of the exercises and seek feedback when necessary.

Assessment methods
Oral exam.

Resources
Ressources en bibliothèque
• Wave optics : basic concepts and contemporary trends / Gupta

Notes/Handbook
Provided on Moodle and during the lecture.