MICRO-517 **Optical design with ZEMAX OpticStudio**

Pu Ye

Cursus	Sem.	Type
Microtechnics	MA1, MA3	Opt.
Photonics minor	H	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	During the semester
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	1 weekly
Exercises	1 weekly
TP	1 weekly
Number of positions	

Summary

Introduction to computer-aided design of optical systems using "ZEMAX OpticStudio" optical design software. Principles of optical systems design and performance analysis with geometrical optics and raytracing. Evaluation and minimization of optical aberrations in an optical design.

Content

- Introduction to optical design
- Geometrical optics and ray tracing
- Image formations and aberrations
- Operation of ZEMAX OpticStudio
- Design layout and performance assessment
- Performance optimization
- Non-imaging design
- Advanced design topics I
- Advanced design topics II
- Advanced design topics III
- Design project

Keywords

Computer-aided design, ZEMAX, OpticStudio, optical simulation, refraction, refractive index, dispersion, geometrical optics, ray tracing, lenses, objectives, aberrations, wave optics, Fourier optics, diffraction, wave aberrations, Zernike coefficients, telescope, microscope, optimization

Learning Prerequisites

Required courses

PHYS-201 General physics: electromagnetism
Micro 321 Ingénierie optique I
Micro 321 Ingénierie optique II

Recommended courses

MICRO-421 Imaging optics

Important concepts to start the course

Basics of optics, Refraction, Reflection, Diffraction, Dispersion, Polarization, Snell's law, Fourier transform, Basics of geometrical optics

Learning Outcomes

By the end of the course, the student must be able to:

- Carry out an optical design process efficiently and confidently
- Analyze an optical design problem and specify design targets and constraints
- Demonstrate an adequate proficiency in the operation of ZEMAX OpticStudio
- Construct an optical design in ZEMAX OpticStudio
- Assess / Evaluate the performance of a design by simulation
- Optimize a design with constraints to meet design specifications

Transversal skills

- Set objectives and design an action plan to reach those objectives.
- Manage priorities.
- Communicate effectively, being understood, including across different languages and cultures.
- Demonstrate the capacity for critical thinking
- Write a scientific or technical report.

Teaching methods

Lectures, exercises, and final projects

Expected student activities

A final project to practically design an optical system in ZEMAX OpticStudio with specified requirements and constraints.

Assessment methods

Exercises 50% + final project 50%

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Moodle Link

- https://go.epfl.ch/MICRO-517