

MSE-643

Optical Materials: Fundamental concepts and recent developments

Sorin Fabien

| Cursus | Sem. | Type |
|-----------------------------------|------|------|
| Materials Science and Engineering | | Opt. |

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| Language of teaching | English |
| Credits | 1 |
| Session | |
| Exam | Oral |
| Workload | 30h |
| Hours | 15 |
| Lecture | 11 |
| Exercises | 4 |
| Number of positions | |

Frequency

Every year

Remark

Next time: Spring 2024

Summary

In this class we will review the fundamental origin of the optical properties exhibited by different classes of materials. We will then give examples of the most up-to-date research on optical materials in a few growing scientific and technological fields.

Content

The exploitation of the optical properties of materials is becoming a key aspect in a growing variety of fields beyond telecommunication, such as energy harvesting and saving, health care and life sciences, and sensing and monitoring. Scientists and engineers in these fields of application are very likely to face challenges associated with the understanding of light interaction with different types of materials and configurations. In this course we will present the fundamental concepts behind light propagation in materials and light-matter interaction. The optical properties of different classes of materials will be introduced and explained. This will give us the basis to discuss up-to-date research activities in the field of optical materials for light transport and transmission (optical fibres, waveguides and transparent conducting materials), light absorption and emission (photodetectors and photovoltaic devices, LEDs) and light management solutions (photonic crystals, plasmonics, metamaterials).

Keywords

optical properties of materials

Learning Prerequisites**Recommended courses**

Basic knowledge in waves physics, Optics and solid state physics.

Assessment methods

Oral exam