



# Photonics and Laser Sources

5 ECTS

**Lecturer:** R. Petkovšek, V. Agrež

Lectures: 30h | Tutorials: 10h | Labs: 20h | Project: 0h |

Lang.: 

## Objectives

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The objectives of this course are:

- Getting to know basic and advanced topics from the field of photonics and lasers
  - Use of acquired knowledge from the field of photonics to solve computational problems
  - Use of other sources (besides the prescribed literature) to solve problems / tasks.
  - Knowledge of experimental systems and methods in the field of photonics.
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## Programme

1. Light as Electromagnetic Radiation
2. Gaussian beams
3. Refraction, reflection, and optical imaging
4. Optical fibers
5. Optical modulators
6. Nonlinear optical phenomena
7. Light amplification
8. Introduction to lasers
9. Types of lasers
10. Fiber lasers
11. Short pulsed lasers
12. Ultrashort pulsed lasers
13. Ultrashort pulse interaction with matter
14. Advanced laser systems and applications

## Prerequisites

In order to attend this course, the students are expected to:

- Understand the basics of optics and the physics of light.

## Learning outcomes

After attending this course, the student will obtain the following knowledge/skills:

- Thorough theoretical, methodological and analytical knowledge with elements of a research work that form a basis for very demanding professional work in the field of photonics and laser sources.
- Mastering very demanding and complex work processes and methodological tools in specialised professional fields.
- Planning and managing of the working process on the basis of creative solving of problems that are linked to the teaching and training content.

## Assessment

25% theory, 25% theoretical calculus, 25% laboratory work, 25% laboratory work report

## Literature

1. V. Degiorgio, I. Christiani, "Photonics, A Short course", Springer, 2016
2. G. A. Reider, "Photonics: An Introduction", Springer, 2016
3. B. E. A. Saleh in M. C. Teich, "Fundamentals of photonics", John Wiley and sons, Inc., 2007
4. J. Landers, "Photonics: Concepts, Technology and Applications", Blackwell's, 2019
5. A. Sennaroglu, "Photonics and Laser Engineering: Principles, Devices, and Applications", McGraw-Hill Education, 2010