Advanced Physics and Applications of Optical Fibers

This course is a continuation of its prerequisites and aims to provide a deeper understanding of nonlinear phenomena in optical fibers.

The main part is a research project related to fiber lasers, supercontinuum generation or fiber sensors for which the **student returns a report and gives a presentation.**

The course includes support on scientific writing and is ideal for graduate and postgraduate students in photonics.
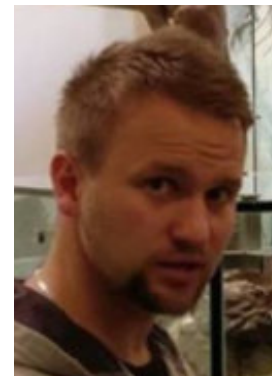
Prerequisites: ELEC-E3250 Optical fibers: Physics and Applications
PHYS-E0435 Optical Physics
Other photonics or basic optics course

Hanne Ludvigsen

Nicklas Anttu

Antti Matikainen

Micronova building/Rooms 4172, 4129, 4162

Learning Outcomes

Will give you the opportunity to study applications of fiber optics and laser technology

You will work in an optics lab as part of a project work

Learn experimental practices such as
- handling optical fibers
- coupling light into optical fibers
- high-power fiber lasers
- laser safety

You will learn how to analyze and interpret the data obtained in your experiments

You may choose to work with a modern simulation tool RP Fiber Power from RP Photonics to understand the operation of a high-power fiber amplifier or laser.

Course material

available as eBook
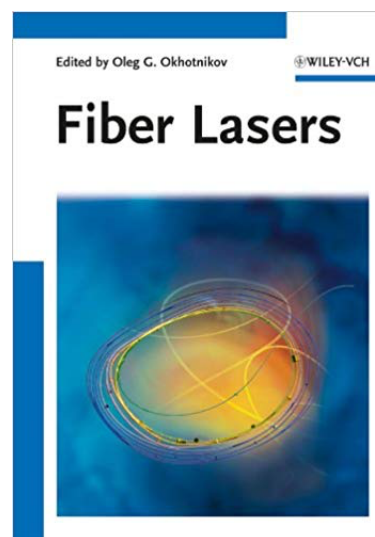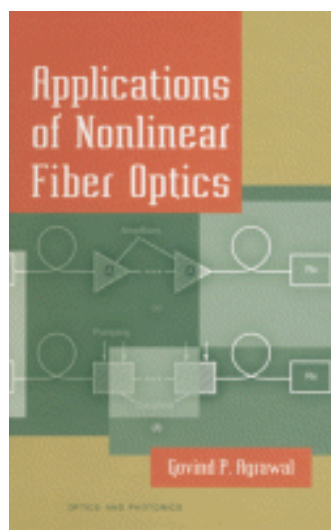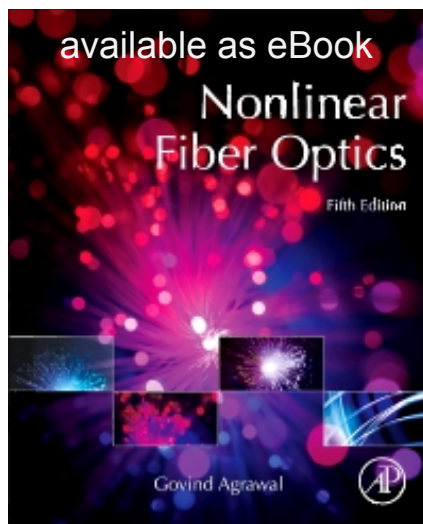
❑ Slides and other material distributed in MyCourses

❑ Reference material (books)

    o   G.P. Agrawal, *Nonlinear Fiber Optics*, 5th ed.
         (Academic Press, San Diego, California 2012)

    o   G.P. Agrawal, *Applications of Nonlinear Fiber Optics*,
         (Academic Press, 2001)

    o   Edited by O.G. Okhotnikov, *Fiber Lasers*,
         (Wiley-VCH, 2012)

    o   S.A. Maier*, Plasmonics: Fundamentals and Applications*
         (Springer, 2007)

Syllabus

Date	Topics
15.1	**Light propagation of optical pulses and nonlinear phenomena in optical fibers Supercontinuum generation (Hanne Ludvigsen)**
22.1	**Fiber lasers (Laser safety, coupling light, splicing) Simulation tool RP Fiber Power (Nicklas Anttu)**
29.1	**Plasmonic sensors (Antti Matikainen)**
5.2	**Choosing topic**
13.2	**Project work**
19.2	**Project work**
26.2	**Project work**
5.3	**Introduction to scientific writing**
12.3	**Project work**
19.3	**Project work**
26.3	**Follow-up on scientific writing**
2.4	**Project work**
9.4	**Presentations**