



FIO3656 Fiber-Optic Communication 9.0 credits

Fiberoptisk kommunikation

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FIO3656 valid from Autumn 2014

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

PhD student

It is anticipated that the students are acquainted with:

- Waveguides: Wave equation and the concept of modes.
- Solid-state electronics: p-n-junction
- Circuit theory: Impulse response, convolution, transfer function of linear systems.
- Signal theory: Auto correlation function, power spectral density

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Knowledge of fiber-optical components and systems with applications to communications. Parameters of devices that are relevant for the system performance are derived from physical descriptions, and form the input parameters for the design of fiber-optic links.

After a completed course, the participants should be able to:

- understand, describe, analyse, and compare the most important devices: optical transmitters, optical fibers, and optical detectors
- design digital fiber-optic links.
- simulate a multilevel coherent fiber-optic communication system using computer software

Course contents

Dielectric waveguides: Attenuation, wavelength dispersion, modes, fields.

Light sources and optical amplifiers: Semiconductor laser, light-emitting diode, rate equations, output power, modulation response, chirp, noise, optical amplifiers.

Detectors: PIN-diode, avalanche diode, responsivity, bandwidth, noise.

Transmission systems: Optical links, direct detection systems, soliton systems, coherent systems, multilevel signaling, dispersion limitations, attenuation limitations, additive noise, signal dependent noise, bit error rate, optical networks, simulation and design

Disposition

The course is given in a traditional way, i.e. with lectures (28h) followed by corresponding exercises (16h). There are also two laboratory works (2*4h) and one project assignment.

The course follows the undergraduate course IO2653 but includes also a project assignment where the student will design and simulate a fiber-optic system. The language is English.

Course literature

Fibre-Optic Communication Systems by Govind Agrawal, 4th edition, Wiley

Additional course material is possible to download from course webpage

Although 4th edition of the course book is recommended, also third edition of the book is possible to use

Equipment

Calculator and access to a computer for the project assignment

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The written examination is graded A-F. At least a grade C is necessary in this graduate course to get a passing grade on the exam. Calculator, mathematic handbook, the course book and the lecture notes (but NOT exercise notes) are allowed and recommended aids.

Other requirements for final grade

To pass the entire course, at least a C is needed on the examination and a passing grade on the laborations and the project assignment.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.