

FFFN25/FYST50 Optoelectronics and Optical Communication, Spring 2019

<http://www.ftf.lth.se/courses/FFFN25>

Credits: 7.5 hp

Aim: The course will provide a platform both for the selection of suitable devices for various optoelectronic applications and for the development of next generation devices. In order to achieve this, the course will emphasize the underlying physics as well as how performance is affected by device design and materials properties.

Course coordinators: Dan Hessman, room B109, Dan.Hessman@ftf.lth.se
Cord Arnold, room A218, Cord.Arnold@fysik.lth.se

Literature: Fundamentals of Photonics B. E. A. Saleh and M. C. Teich, Wiley Series in Pure and Applied Optics, John Wiley & Sons, together with lecture notes and handout material.

Assessment: Written examination (22 March, room: MA9, 8.00-13.00) and completed laboratory exercises.

Lectures: 28 hours. Mondays 13-15 and Thursdays 8-10. The lectures will be in K404 with the exception for some Mondays: 21 Jan and 25 Feb in Rydberg and 28 Jan in MA1.

Calculus: 14 hours. Fridays 13-15 room: H221 except Friday 1 Mar when it is at 15-17

Each calculus class will be focused on the exercises related to the material discussed in the lectures that week and can be found on the course homepage before the class.

Laboratory exercises:

<u>Lab</u>	<u>Duration</u>	<u>Room</u>	<u>Supervisor</u>
Diode Laser	4h	Q131	Enrique.Barrigon[at]ftf.lth.se Sara.Mikaelsson[at]fysik.lth.se
Fiber Optics	4h	H443	Hafsa.Syed [at]fysik.lth.se Reza.Jafari_Jam [at]ftf.lth.se
Noise in Cameras and Photodiodes	4h	H442	Ivan.Unksov[at]ftf.lth.se Antti.Ranni[at]ftf.lth.se

- All laboratory exercises are mandatory.
- Written reports of the laboratory exercises should be sent by email (as a pdf) to the instructor.
- Deadline for the report is one week after the experiments were carried out, if the instructor gives no other information.
- An email will be sent out with links for signing up to the laboratory exercises.
- In case of illness contact Dan Hessman or Cord Arnold

Outline lectures:

Week

1. Optical Processes & Semiconductor Optics Ch. 16 [DH]
2. Semiconductor Photon Sources Ch. 17.1-17.4 [DH]
Lasers Ch. 15.1-15.2
3. Waveguide and fiber optics Chs. 8, 9 [CA]
4. Semiconductor Photon Detectors Ch. 18.1-18.4 [DH]
Photon streams Ch. 12.2 pp 458-465 (excluding signal-to-noise ratio and forward)
5. Fiber communication Ch. 9 + parts of Ch. 23 & 24 [CA]
6. Optoelectronic devices
Mon: Cameras (hand-out material) [DH]

Thu: Photovoltaics (hand-out material) [Enrique Barrigon]
7. Optoelectronic devices and repetition
Mon: Coherent communication (hand-out material) [CA]

Thu: Repetition [DH, CA]

