MICRO-625 **Optical Laboratories**

Scharf Toralf

Cursus	Sem.	Type
Photonics		Obl.

Language of teaching	English
Credits	3
Session	
Exam	Multiple
Workload	90h
Hours	**80**
Project	80
Number of positions	**10**

Frequency

Only this year

Remark

Last time 3-10.9.2018, not planed in the future

Summary

This laboratory work allows students to deepen their understanding of optical instruments, optoelectronic devices and diagnostic methods. Students will be introduced in state of the art optical instruments and measurement principles.

Content

4 experiments to be chosen from a range of subjects with your thesis director.
Available experiments:

1. Laser safety
2. Optical fibers - Light injection, multi and single mode fibers
3. Tunable diode laser – external cavity laser, MEMS grating
4. Fourier Optics
5. Solar cells characterization
6. Diode pumped Nd :YAG laser - frequency doubling
7. Birefringence and photoelasticity
8. Plasmonic particles and plasmonic nanostructures
9. Digital Holography
10. Fabry Perot interferometer
11. Microwave optics
12. Optical fiber amplifier
13. Optical fiber sensor
14. Optical tweezer
15. Spectroscopy - Grating and Fourier transform
16. Liquid crystal electro-optics

Keywords

optics, optical instrumentation, optoelectronic measurements, fiber, lasers, polarization optics

Learning Prerequisites

Recommended courses

MICRO-420: Advanced optics
MICRO-421: Imaging optics

MICRO-422: Lasers and optics of nanostructures
MICRO-522: Integrated optics
MICRO-523: Optical radiation detection methods
MICRO-321 Optical engineering I
MICRO-321 Optical engineering II

Learning Outcomes

By the end of the course, the student must be able to:

- Apply principles of laser security
- Perform data analysis using excel and Matlab
- Assess / Evaluate the reliability of a measurement
- Perform an optical measurement
- Explain measurement results
- Estimate measurement errors

Transversal skills

- Manage priorities.
- Communicate effectively with professionals from other disciplines.
- Use both general and domain specific IT resources and tools
- Continue to work through difficulties or initial failure to find optimal solutions.
- Demonstrate the capacity for critical thinking
- Take feedback (critique) and respond in an appropriate manner.

Teaching methods

- Practical laboratory work is given in groups of 2 persons
- 4 Experiments needed to be done.
- Each experiment is carried over two days.
- There wil be an entrance exam for each experiment
- A lab-notebook will be used to document your work during the laboratory.
- An examination will be organized at the end of the laboratory.

Expected student activities

Individual activity
- Participation at all experiments
- Execution of practical work
- Keep a Laboratory note book

Group activity
- Scientific/technical report writing per experiment

Assessment methods

Discussion of basic concepts during instruction (individual)
Evaluation of experimental work (groupl)
Evaluation of laboratory notebook (individual)
Final exam