

OSE 6455 Photonics Laboratory

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Time: Fridays 1:00pm - 5:00pm

TA: Ning Wang and Huiyuan Liu

Office Hours: Tuesday 9:00-12:00 CREOL 278 or by
appointment (no appointments on Friday)

Goals:

1. Relate what you have learnt in classroom to what you can see in the lab of a variety topics related to photonics.
2. Take away the “fear factor” by providing experience of operating various equipment.
3. Establish good practices in experimentation including keeping a lab notebook and keeping the experiment station clean.
4. Learn to write lab reports of journal-manuscript quality/style.

Preliminary Schedule

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|-------|---|
| 8/26 | Introduction, Show & Tell Q&A on Beam Propagation, Waveguides and AO Notes |
| 9/2 | LabView, Beam Propagation, Waveguides, AO |
| 9/9 | LabView, Beam Propagation, Waveguides, AO |
| 9/16 | LabView, Beam Propagation, Waveguides, AO |
| 9/23 | LabView, Beam Propagation, Waveguides, AO |
| 9/30 | Q&A on Fiber, E-O, LCD and LD Notes (Make up) (Travel Day for me) |
| 10/7 | E-O, LCD, Fiber sensor, LD |
| 10/14 | E-O, LCD, Fiber sensor, LD |
| 10/21 | E-O, LCD, Fiber sensor, LD |
| 10/28 | E-O, LCD, Fiber sensor, LD |
| 11/4 | Q&A on Fiber-Optic Communications/WDM Notes (Make up) |
| 11/11 | Fiber-Optic Link, WDM, VPI-Simulation of Systems |
| 11/18 | Fiber-Optic Link, WDM, VPI-Simulation of Systems (Travel Day for me) |
| 11/25 | Thanksgiving |
| 12/2 | Fiber-Optic Link, WDM, VPI-Simulation of Systems |

Instructional Materials

- **Lecture Notes**
- **Lab Procedure**

References

- *Fundamentals of Photonics* by **B. E. A. Saleh and M. C. Teich**, Wiley.
- *Optical Electronics in Modern Communications* by **A. Yariv**, Oxford.

Laboratory Notebook

- **Goal is to be able to**
 - **Reproduce the experimental setup (hardware)**
 - **Repeat the experiment by recording the details of the laboratory settings**
- **Notebook Organizations**
 - **Date, Partner(s)**
 - **Equipment List include model #**
 - **Schematic Drawing and Raw Data for each lab procedure**

Lab Reports

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|--|--|
| LabView: | Short Lab Report |
| Beam Propagation: | Short Lab Report |
| Waveguides: | Short Lab Report |
| Acousto-Optics: | <u>Full Lab Report (Practice)</u> |
| Electro-Optics: | <u>Full Lab Report</u> |
| Liquid Crystal Display: | Short Lab Report |
| Fiber Sensor: | <u>Full Lab Report</u> |
| Laser Diode: | Short Lab Report |
| Fiber-Optic Link: | <u>Full Lab Report</u> |
| Wavelength-Division Multiplexing: | Short Lab Report |
| Simulation of Photonic Systems: | Short Lab Report |

Lab reports are due Thursday night.

Short Lab Reports

OSE 6455L – Photonics Laboratory – Fall 2009

Lab 2 Report: Propagation of Gaussian Laser Beams vs. Fiber Guided Beams

Assignment 1:

Plot of measured power vs. razor position for the Gaussian beam

How to obtain beam intensity profile? Describe procedures used to go from plot above to plot below.

Plot of the intensity profile for the beam and a Gaussian fit for the profile.

Assignment 2:

a. Plot of $W(z)$ vs. z

Far Field Divergence Angle=?

b. Calculation of W_0 from the average Far Field Divergence Angle, with $\lambda = 632.8\text{nm}$

c. Computed parameters of the Gaussian beam inside the laser cavity. Is the waist inside the cavity?

Full Lab Reports

- Write the Lab report as if you have just discovered the phenomenon/experimental method for the first time.
- Style and Quality Consistent with Journal Manuscripts (see Optics Express for examples)
- The focus on the lab report is the science behind the experiments, not the Experiments/Procedures themselves.
- Lab Report Organization
 - Title & Abstract
 - Introduction
 - Theoretical Background:
 - present all formula used for interpretation of data in a coherent and concise way by independent literature search.
 - Use your own language to complete this section
 - Experimental Results: As many sections as necessary for each phenomenon you observed/investigated in the lab.
 - Conclusions
- Lab Report should answer all the questions raised in the Lab Procedures; they can be anywhere in the lab report where they fit.
- Lab Reports for team members should be substantially dissimilar to show independent work.
- Short Reports Due 1 week from date of lab. Full reports due 2 weeks from date of lab. No late reports.

Full Lab Report Recommendations

- **Use third person**
- **Number sections/subsections**
- **Focus on science, results, rather than the lab itself. Lab procedures should be discussed, if necessary, as part of the whole coherent scientific story.**
- **Theory cannot be too much alike the lecture notes**
- **Pay attention to Typo, grammar, equation editors**
- **Read a few journal papers that have both theory and experiments**

Grading Policy

- **On-Time Attendance/Active Involvement:** 7%
- **Pre-Lab:** 9%
- **Lab Notebook:** 7%
- **3 Full Lab Reports:** 42%
- **1 Full Lab Report (Practice):** 7%
- **7 Short Lab Reports:** 28%

Will have +/- grades

A: >95; A-:90-94; B+:85-89; B:80-84

Enjoy the Lab!