



# CREOL, The College of Optics and Photonics

## Course Syllabus

### OSE-4470L Fiber Optic Communication Laboratory, 1 CREDIT HOUR

<b>Instructor:</b> Guifang Li	<b>Term:</b> Fall 2022
<b>Email:</b> li@ucf.edu	<b>Class Meeting Days:</b> Monday
<b>Phone:</b> (407) 823-6811	<b>Class Meeting Time:</b> 9:00am – 11:50am (I) 1:30pm – 4:20pm (II)
<b>TAs:</b> Dhruvkumar Desai dhruvjdesai@knights.ucf.edu	
<b>Office:</b> 53-A239	<b>Class Location:</b> CREOL: A210
<b>Office Hours:</b> Before/After class & Lab Off Weeks	<b>Website:</b> webcourses@ucf

**Additional Notes:** Simple questions can be quickly answered via email. For more elaborate discussions, join Zoom sessions, or by appointment.

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#### **Course Catalog Description:**

**Pre/Co-requisites:** OSE 4470 Fiber-Optic Communications

#### **Detailed Course Description and Learning Outcomes:**

##### **Detailed Description:**

This lab course is associated with the theory course on the same topic: OSE 4470 Fiber-Optic Communications.

1. This laboratory course will enable students to relate what they have learnt in classroom to experimental observations.
2. Take away the “fear factor” by providing experience of operating various equipment.
3. Establish good practices in experimentation including keeping records in a lab notebook, accurate data collection, critical thinking, analysis of data, and identifying sources of error.
4. Learn to write lab reports.

##### **Learning Outcomes and Measures:**

Upon completing this course, students will become familiar with various fiber optic components and systems and know how to:

- Couple light in and out of fibers
- Connect fibers
- Measure losses in fibers
- Measure the performance of analog and digital fiber links

##### **Topics: (See detailed schedule with dates at the end of this document)**

The experiments are set up to cover three main topics:

1. The optical fiber as a transmission channel.
2. Optoelectronic devices used in transmitters, receivers, and multiplexers.
3. Overall communication system performance.
  - Losses associated with coupling light into or between fibers are experimentally measured.

- Performance metrics for analog and digital communication will be introduced and quantified. A wavelength-division multiplexing (WDM) system will be built and qualitatively tested.

**Textbook:**

Laboratory notes and instructions, in conjunction with the required textbook for the lecture class (OSE 4470) will be sufficient for most students.

However, you may find the following reference textbooks useful:

- *Optical Fiber Communications*, 4th Edition G. Keiser, McGraw-Hill
- *Optical Fiber Communication Systems*, W. Jones, HRW.
- *Fundamentals of Photonics*, B. Saleh and M. Teich, Wiley.

**Relationship of Course to ABET Criteria**

ABET Criteria	Level of Emphasis During Course (Low, Medium, High)
(a) An ability to apply knowledge of mathematics, science, and engineering.	High
(b) An ability to design and conduct experiments, as well as to analyze and interpret data.	High
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	Low
(d) An ability to function on multidisciplinary teams.	Low
(e) An ability to identify, formulate, and solve engineering problems.	High
(f) An understanding of professional and ethical responsibility.	Low
(g) An ability to communicate effectively.	Medium
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	Low
(i) A recognition of the need for, and an ability to engage in life-long learning.	Medium
(j) A knowledge of contemporary issues.	Low
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	High

**Course Grading and Requirements for Success:**

- Attendance & Participation: 8%**
- Short Lab Reports: 42%** (6% for each lab)
- 1 Full Lab Report: 14%**
- 4 Quizzes: 24%** (6% each)
- Lab Notebook: 6%**
- Lab Skills Test: 6%**

**Make up class policy:** If an emergency arises and a student cannot 1) show up for class or 2) submit assigned work on time, the student **must** give notification to the instructor **no less than 24 hours before** the scheduled lab, or **no more than 48 hours after due date, respectively.**

Grading Scale (%)	Rubric Description
100 ≥ A > 90	Excellent, has a strong understanding of all concepts and is able to apply the concepts in all and novel situations. Has full mastery of the content of the course.
90 > B ≥ 80	Good, has a strong understanding of most or all of the concepts and is able to apply them to stated and defined situations.
80 > C ≥ 70	Average, has a basic understanding of the major concepts of the course and is able to apply to basic situations.
70 > D ≥ 60	Below average, has a basic understanding of only the simple concepts and is able to apply to only a limited number of the most basic situations.

**Grade Objections:**

All objections to grades should be made **in writing within one week** of the work in question. Objections made after this period will **not** be considered – NO EXCEPTIONS.

**Class Website:**

Materials used for classes will be available on UCF Webcourses for download before each class.

**Professionalism and Ethics:**

Per university policy and classroom etiquette, mobile phones, etc. must be silenced during all classroom lectures, unless you are specifically asked to make use of such devices for certain activities.

**Academic dishonesty in any form will not be tolerated.** If you are uncertain as to what constitutes academic dishonesty, please consult The Golden Rule in the UCF Student Handbook ([www.goldenrule.sdes.ucf.edu](http://www.goldenrule.sdes.ucf.edu)) for further details. As in all University courses, The Golden Rule Rules of Conduct will be applied. Violations of these rules will result in a record of the infraction being placed in your file and the student receiving a zero on the work in question AT A MINIMUM. At the instructor's discretion, you may also receive a failing grade for the course. Confirmation of such incidents can also result in expulsion from the University.

**Students with Special Testing/Learning Needs:**

Students with special needs and require special accommodations must be registered with UCF Student Disability Services prior to receiving those accommodations. Students must have documented disabilities requiring the special accommodations and must meet with the instructor to discuss the special needs as early as possible in the first week of classes. UCF Student Disability Services can be contacted at [www.sds.sdes.ucf.edu](http://www.sds.sdes.ucf.edu) or at (407)823-2371.

<b>OSE-4470 Fiber Optic Communication Laboratory: Tentative Weekly Schedule</b>			
Week	Date	Lab Topic	Note
1	Aug 22	Fiber Cleaving + Numerical Aperture of a Fiber-i	Lab
2	Aug 29	Numerical Aperture of a Fiber -ii	Report
3	Sep 12	Coupling into Fiber + Profile of Fundamental Mode - i	Lab
4	Sep 19	Profile of the Fundamental Mode - ii	Report
5	Sep 26	High-Order Modes in Fiber – One week only	Lab+Report
6	Oct 3	Coupling and Propagation Loss - i	Lab
7	Oct 10	Coupling and Propagation Loss - ii	Report
8	Oct 17	Analog Communication Link - i	Lab
9	Oct 24	Analog Communication Link – ii	Report
10	Oct 31	Digital Communication Link - i	Lab
11	Nov 7	Digital Communication Link - ii	Zoom Office Hour for Long Report
12	Nov 14	Wavelength Division Multiplexing - i	Lab Draft Long Report due
13	Nov 21	Wavelength Division Multiplexing - ii	Lab Skills Test
14	Week of Nov 28	Writing Long Lab Report	WDM Report Due
15	Week of Dec 5	FINAL EXAM Period, Long Lab Report Due	Long Report due 12/5