



UNIVERSITY OF
CENTRAL FLORIDA

OSE 4470 - FIBER-OPTIC COMMUNICATIONS

Section: 0001

Optics and Photonics

Course Information

Term: Fall 2024

Class Meeting Days: MW

Class Meeting Time: 10:30 - 11:45

Class Meeting Location: VAB 0111

Modality: P

Credit Hours: 3.00

Instructor Information

Darren Hudson

Title: Associate Professor

Office Location: 212

Office Hours:

Monday and Wednesday, 3 pm to 4 pm

Email: darren.hudson@ucf.edu

Teaching Assistants

Ameer Batarseh

Course Description

OSE 4470 OPTIC 3(3,0)Fiber-Optic Communications: PR: EEL 3552C and C (2.0 GPA) or higher in OSE 3052 Introduction to the principles and design of fiber-optic communication systems including the integrated-optic and optoelectronic devices used in transmitters and receivers. Fall

This course is an introduction to the principles of optical fiber communication systems. The course covers three topics: 1) The optical fiber as a transmission channel. 2) Optoelectronic devices used in transmitters, receivers, and multiplexers. 3) Design of the overall communication system and assessment of its performance. In part 1, step-index and graded-index multimode and single-mode optical fibers are described and their attenuation and dispersion characteristics are determined. The transfer function of the fiber system is determined. Part 2 introduces the basic principles of interaction of light with semiconductor materials, including absorption and electroluminescence. Light emitting diodes, laser diodes, and photodiodes are introduced as the basic components of optical transmitters and receivers. Semiconductor and fiber optical amplifiers are also introduced. Part 3 deals with the design of the digital fiber communication system, including derivation of the bit error rates for attenuation- and dispersion-limited systems and determination of the maximum data rates possible for a given length. Introductions to wavelength-division multiplexing(WDM) and optical fiber networks are also provided.

Student Learning Outcomes

After successful completion of this course, students will be able to:

- Understand how optical fibers guide light, including the concepts of guided modes and group velocity.
- Know how to compute the attenuation and pulse broadening encountered when optical pulses at a given wavelength travel in long fibers.
- Know the operational principles of light emitting diodes and laser diodes and their distinction.
- Know the operational principles and the limitations of photodiodes and avalanche photodiodes.
- Understand the basics of optical modulation and multiplexing.

- Be able to design a fiber link of given length operating at a given wavelength, and at a prescribed bit error rate by use of optical repeaters.
- Acquire an integrated view of engineering by seeing the fundamental analogies between electrical and optical communication systems.

Course Materials and Resources



Fiber Optic Communications

ISBN: 9789813346659

Authors: Gerd Keiser

Publisher: Springer Nature

Publication Date: 2021-03-01

Recommended Course Materials

*image
not
available*

Title: Introduction to Optical Fiber Communication Systems

ISBN: 9780030228377

Authors: William B. Jones

Publisher: Henry Holt

Publication Date: 1988-01-01

Title: Fundamentals of Photonics

ISBN: 9781119702115

Authors: Bahaa E. A. Saleh, Malvin Carl Teich

Publisher: John Wiley & Sons

Publication Date: 2020-03-04

FUNDAMENTALS OF PHOTONICS

ISBN 978-0-471-31073-4
Printed in the United States of America
© 2002 by John Wiley & Sons, Inc.
All rights reserved.
WILEY

WILEY

*image
not
available*

Title: Fiber-optic Communication Systems

ISBN: 9789814126601

Authors: Govind P. Agrawal

Publication Date: 2002-01-01

Course Assessment and Grading Procedure

Course Item

Percent of Final Grade

Homework	20%
Quizzes	10%
Two Mid-Term Exams	40% (20% each)
Comprehensive Final Exam	30%

Grading Scale

Letter Grade	Percentage
A	94-100%
A-	90-93%
B+	87-89%
B	84-86%

Letter Grade	Percentage
B-	80-83%
C+	77-79%
C	74-76%
C-	70-73%
D+	67-69%
D	64-66%
D-	61-63%
F	0-60%

Policies for Course Grade

Missed/Late Assignments

- Late assignments are generally not allowed. In the event of extenuating circumstances, late assignments will be considered on a case-by-case basis.

Attendance

- Regular class attendance is mandatory
- Please be on time to class
- Come to class prepared

Course Accessibility

The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need access to course content due to course design limitations should contact the professor as soon as possible. Students should also connect with [Student Accessibility Services \(SAS\)](#) (Ferrell Commons 185, sas@ucf.edu, phone 407-823-2371). For students connected with SAS, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential course access and accommodations that might be necessary and reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course

barriers experienced by the student. Further conversation with SAS, faculty and the student may be warranted to ensure an accessible course experience.

Academic Integrity

Students should familiarize themselves with UCF's Code of Conduct at [Student Conduct and Integrity Office](#). According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

- a. Academic misconduct is defined as any submitted work or behavior that obstructs the instructor of record's ability to accurately assess the student's understanding or completion of the course materials or degree requirements (e.g., assignment, quiz, and/or exam). Examples of academic misconduct include but are not limited to: plagiarism, unauthorized assistance to complete an academic exercise; unauthorized communication with others during an examination, course assignment, or project; falsifying or misrepresenting academic work; providing misleading information to create a personal advantage to complete course/degree requirements; or multiple submission(s) of academic work without permission of the instructor of record.
- b. Any student who knowingly helps another violate academic behavior standards is also in violation of the standards.
- c. Commercial Use of Academic Material. Selling of course material to another person and/or uploading course material to a third-party vendor without authorization or without the express written permission of the University and the instructor of record. Course materials include but are not limited to class notes, the instructor of record's slide deck, tests, quizzes, labs, instruction sheets, homework, study guides, and handouts.
- d. Soliciting assistance with academic coursework and/or degree requirements. The solicitation of assistance with an assignment, lab, quiz, test, paper, etc., without authorization of the instructor of record or designee is prohibited. This includes but is not limited to asking for answers to a quiz, trading answers, or offering to pay another to complete an assignment. It is considered Academic Misconduct to solicit assistance with academic coursework and/or degree requirements, even if the solicitation did not yield actual assistance (for example, if there was no response to the solicitation).

Responses to Academic Dishonesty, Plagiarism, or Cheating

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, [The Golden Rule](#). UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office of Student Conduct and Academic Integrity, which could lead to disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a "Z" designation on one's transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, the recipient of scholarships, participation in University activities such as study abroad, internships, etc.

Let's avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

Reporting an Incident or Issue

If you believe you have experienced abusive or discriminatory behavior by any faculty or staff member, contact the Office of Institutional Equity [online](#) or at 407-823-1336. You can also choose to report using the UCF Integrity Line and can report anonymously or as yourself at 1-855-877-6049 or using the [online form](#). UCF cares about you and takes every report seriously. For more information see the [Reporting an Incident or Issue Webpage](#).

Title IX

Title IX prohibits sex discrimination, including sexual misconduct, sexual violence, sexual harassment, and retaliation. If you or someone you know has been harassed or assaulted, you can find resources available to support the victim, including confidential

resources and information concerning reporting options at [Let's Be Clear](#) and [UCF Cares](#).

For more information on diversity and inclusion, Title IX, accessibility, or UCF's complaint processes contact:

- Title IX – OIE – [Office of Institutional Equity](#) & askanadvocate@ucf.edu
- Disability Accommodation – Student Accessibility Services – [Student Accessibility Services](#) & sas@ucf.edu
- [Access and Community Engagement](#) (including the Ginsberg Center for Inclusion and Community Engagement, Military and Veteran Student Success, and HSI Initiatives)
- UCF Compliance and Ethics Office – [Compliance, Ethics, and Risk Office](#) & complianceandethics@ucf.edu
- The [Ombuds Office](#) is a safe place to discuss concerns.

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Deployed Active-Duty Military Students

Students who are deployed active duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make related arrangements.

Campus Safety

At UCF Public Safety and Police, safety is the top priority. Emergencies on campus are rare, but if one should arise, it's important to be familiar with some basic safety and security concepts.

- In an emergency, always dial 911.
- Every UCF classroom has an **Emergency Procedure Guide** posted on a wall near the door, which will show you how to respond to a variety of situations. This guide can also be found online [here](#).
- In the event of an active threat, remember **AVOID, DENY, DEFEND**. Choose the best course of action and act immediately. Watch the video [here](#) to learn more.
 - **AVOID**. Pay attention to your surroundings and have an exit plan. Get as much distance and as many barriers between you and the threat as quickly as possible.
 - **DENY**. When avoiding is difficult or impossible, deny the threat access to you and your space. Lockdown by creating barriers, turning the lights off and remaining quiet and out of sight. Make sure your cell phone is silenced, but do not turn it off.
 - **DEFEND**. When you are unable to put distance between yourself and the threat, be prepared to protect yourself. Commit to your actions, be aggressive and do not fight fairly. Do whatever it takes to survive.
- For emergencies on campus, UCF will utilize the [UCF Alert](#) system. All UCF students, faculty and staff are automatically enrolled to receive these email and text alerts, however, it's a good idea to frequently ensure your [contact information is up to date](#).

Financial Aid Accountability

All instructors/faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete this activity by the end of the first week of classes or as soon as possible after adding the course. Failure to do so may result in a delay in the disbursement of your financial aid.