



ECE 8930: Advanced Fiber Optics
Spring 2021

MEETING TIME: Tuesday/Thursday: 3:30-4:45 PM

MEETING LOCATION: ONLINE SYNCHRONOUS

INSTRUCTOR(s): Prof. Liang Dong, 203 AMRL, dong4@clemson.edu, tel: 864 656 1160

OFFICE HOURS AND PROCEDURES: Arrange individual Zoom session via email. I will try to get back to you on the same day, unless I am out of town in which case, I will notify the class in advance.

COURSE MODALITY: ONLINE SYNCHRONOUS

COURSE DESCRIPTION: Optical fiber is the foundation of our modern high-speed telecommunication infrastructure. In the past decade, optical fiber lasers are also becoming a critical tool in manufacturing for material processing, machining, and welding. Today, optical fiber sensors are being deployed in a variety of environmental and structural monitoring capacities. The goal of this course is to provide advanced understanding of key concepts in optical fibers, including waveguide theories, optical fiber properties, passive/active optical fiber devices, and nonlinear properties of optical fibers.

COURSE PREREQUISITES: ECE380, ECE 381, ECE 427, ECE 430 or equivalent courses in EM theory and telecommunication theory.

Co-requisites: None

STUDENT LEARNING OUTCOMES: The goal of this course is to provide advanced understanding of key concepts in optical fiber communications, including waveguide theories, optical fiber properties, passive/active optical fiber devices, and nonlinear properties of optical fibers.

REQUIRED MATERIALS: Optical Fiber Communications Principles and Practice, 3rd edition, by John M. Senior, 2009, FT Prentice Hall, ISBN: 978-0-13-032681-2, optional.

The student is required to have a laptop computer, internet connectivity capable of transmitting and receiving video, a video camera, a microphone, and a cell phone.

CANVAS

Canvas (<http://www.clemson.edu/canvas/>) is an electronic course management system that will be used to post videos, class notes, assignments, homework clarifications and hints, supplemental readings, links to other resources, and grades. Canvas will also be used to collect homework assignments and take exams.

TOPICAL OUTLINE:

<u>Topics Covered</u>	<u>Classes</u>
1. Introduction	1
2. Exact waveguide Solutions	3
3. Weakly guiding Waveguides	2
4. Transmission characteristics of optical fibers	1
5. Advanced optical fibers	3
6. Coupled mode theory	2
7. Passive fiber devices	1
8. Erbium-doped fiber amplifiers	2

9. Nonlinear effects	3
10. Optical fiber lasers	3

Total Hours: 26.25

CLASS CANCELLATION POLICY: If the instructor does not arrive within 15 minutes of the start of class and no prior arrangements have been made, class will be canceled for that day.

GRADING POLICY:

Final grades will be assigned according to weighted overall performance where each student's work will be weighted according to the schedule:

1. Attendance: 10%
2. 4 assignments @15% each
3. 1 final exam @ 30%

Grade scale is 90-100 A, 80-89.9 B, 70-79.9 C, 60-69.9 D, 50-59.9 F.

ATTENDANCE POLICY:

1. Students are required to be present online during class hours (Zoom meeting details are already emailed to you and posted on Canvas). This is without exception unless prior arrangements are made. Attendance is recorded and accounts for 10% of final grade.
2. Lecture notes will be posted on Canvas. Some lectures may cover material not found in the textbook.
3. It is the responsibility of each student to make up any deficiencies that result from a missed class.
4. In the event of a class cancellation on a test day, the test will be re-scheduled.
5. Student can use the Notification of Absence module in Canvas or email to inform the instructor of student absences. It is the student's responsibility to secure documentation of emergencies.

ASSIGNMENTS:

1. Assignment will be collected via Canvas for credit. Deadline is 11:59pm on the day which it is due. Submit files under the assignment on the due date.
2. You should solve assignment problem on your own. All submitted work must be completed by you individually. In case of copying other's work, all involved will be given zero grade for the problem.
3. Write up your derivation and process as detailed as possible. Derivation and process will be graded, and grade will be deducted if no derivation and process is given.
4. To submit, scan the entire assignment into a SINGLE PDF file. Upload the pdf file with other required files to the submission location on Canvas under Assignments.
5. Late assignment penalty: 25% of total available points next day, 10% each day thereafter.

FINAL EXAM:

1. If the university is closed due to unforeseen circumstances (e.g. inclement weather, power outage) during a scheduled exam time, then the exam will be rescheduled.
2. All materials including the use of computers are allowed during the final exam.
3. A missed & unexcused exam will be given a grade of zero.
5. Exam problems are provided on Canvas at the beginning of the exam and pdf, MS Word or photos showing clear answers are submitted via Canvas before the end of the exam. Later submission is not accepted. It is your responsibility to ensure your submission is accepted. A live video showing the student on Zoom is required during the entire exam.

ACCESSIBILITY STATEMENT: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to a class should let the instructor know and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848 or by emailing studentaccess@lists.clemson.edu. Students who receive Academic Access Letters are strongly encouraged to request, obtain, and present these to their instructors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

TITLE IX STATEMENT: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. The University is committed to combatting sexual harassment and sexual violence. As a result, you should know that University faculty and staff members who work directly with students are required to report any instances of sexual harassment and sexual violence, to the University's Title IX Coordinator. What this means is that as your professor, I am required to report any incidents of sexual harassment, sexual violence or misconduct, stalking, domestic and/or relationship violence that are directly reported to me, or of which I am somehow made aware. There are two important exceptions to this requirement about which you should be aware:

Confidential Resources and facilitators of sexual awareness programs such as "Take Back the Night and Aspire to be Well" when acting in those capacities, are not required to report incidents of sexual discrimination.

Another important exception to the reporting requirement exists for academic work. Disclosures about sexual harassment, sexual violence, stalking, domestic and/or relationship violence that are shared as part of an academic project, a research project, classroom discussion, or course assignment, are not required to be disclosed to the University's Title IX Coordinator.

This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Ms. Alesia Smith is the Executive Director for Equity Compliance and the Title IX Coordinator. Her office is located at 223 Holtzendorff Hall, phone number is 864.656.3181, and email address is alesias@clemson.edu

SAFE CAMPUS: Clemson University is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

- a. Ensure you are signed up for emergency alerts (<https://www.getrave.com/login/clemson>)
- b. Download the Rave Guardian app to your phone (<https://www.clemson.edu/cusafety/cupd/rave-guardian/>)
- c. Learn what you can do to prepare yourself in the event of an active threat (<http://www.clemson.edu/cusafety/EmergencyManagement/>)

ACADEMIC INTEGRITY: As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a

Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity. Further information on Academic Integrity can be found in the [Undergraduate Announcements](#) and in the [Graduate School Policy Handbook](#).

COPYRIGHT STATEMENT: Materials in this course are copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students should be reminded to refer to the Use of Copyrighted Materials and “Fair Use Guidelines” policy in on the Clemson University website for additional information: <https://clemsun.libguides.com/copyright>.

MODIFICATION STATEMENT: The instructor reserves the right to modify any aspect of the syllabus at any time during the semester for reasons including but not limited to COVID-related situations. This syllabus is revised on January 5, 2021.