



# CREOL, The College of Optics and Photonics

**OSE 6313 Materials for Optical Systems**  
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**Credit Hours: 3**  
**Term: Spring 2024**

## Syllabus

<b>Time:</b>	T/Th 9 – 10:15am, 9 January – 25 April 2024
<b>Location:</b>	CREOL A214
<b>Prerequisites:</b>	Graduate Standing or Consent of Instructor
<b>Course Description:</b>	This course will review key attributes of optical materials that allow them to be used in a range of applications. Physical properties and their structural origin will be used to predict performance and limitations of these materials as used in devices and components in optical systems.
<b>Instructor:</b>	Prof. Kathleen Richardson
<b>Email/Contact Info:</b>	<a href="mailto:kcr@creol.ucf.edu">kcr@creol.ucf.edu</a>
<b>Office Hours and Location:</b>	After class by appointment, CREOL A110
<b>Course Modality:</b>	P, V
<b>Class Website/ Webcourse</b>	OSE 6313, <a href="mailto:webcourses@UCF">webcourses@UCF</a>

### COURSE MATERIALS:

Understanding materials is integral to the design of modern optical systems. This course introduces students to the properties of engineered optical materials such as glasses, single-crystals, transparent ceramics and polymers. The course is taught from an 'engineering perspective' with specific discussion of applications (often, with industry-specific topic areas as examples) followed by the connection to the underlying science and engineering fundamentals required to critically evaluate the materials challenge involved. The relationship between material processing (melting, growth or deposition), manufacturing (optical fabrication) and resulting optical properties is reviewed. We will analyze the impact of these variables, and the role defects, impurities or tolerancing errors can make upon the optimal material selection choice for a target application. The role of processing method and thermal history, electronic and crystallographic-specific properties on the candidate material is discussed and examined as a potential detriment to the generation and propagation of light. Issues related to in-service performance are highlighted providing real world understanding of multi-material limitations within optical systems.

The use of peer-reviewed literature will be exploited to highlight state of the art examples of key optical materials and their use. Guest lecturers from industry and national laboratories will participate in providing real world examples of key concepts.

Recommended textbooks for this class are shown. Additional reading materials will include peer-reviewed journal articles from UCF's library. Most of these books can be accessed through the UCF library, e-book portal (see below):

**Transparent Ceramics: Materials, Engineering, and Applications**, Adrian Goldstein, Andreas Krell, Zeev Burshtein (2020), e-book available UCF library:

**Handbook of Glass** (2019) e-book available, UCF library:

**Materials for Infrared Windows and Domes: Properties and Performance**, Daniel C. Harris, SPIE Press (1999) e-book available, UCF library:

Other useful references (optional):

- M. Fox, *Optical Properties of Solids*, Oxford Master Series in Condensed Matter Science, Oxford University Press (2010)
- J. Simmons, K.S. Potter, *Optical Materials*, Academic Press (1999)
- Key optical material literature – peer reviewed journal articles, AS ASSIGNED

To check on whether they are available on e-books, check here <https://library.ucf.edu/textbook-affordability/etextbooks/>. You will be asked to log on with your NID, then search by course number or instructor name.

**COURSE GRADING, RUBRICS and ASSESSMENT FOR SUCCESS:**

Homework assignments (6-8) – 200 pts	20 %
Quizzes (~ 10) – 100 pts	10%
Midterm Exam – 200 pts	20 %
FINAL Project and participation – 200 pts	20 %
Final Exam – 300 pts	30 %

Your grade will be based on your point total\*\*:

900-1000	=	A
800- 899	=	B
700-799	=	C
600-699	=	D
below 600	=	F

*\*\*borderline point totals will qualify for a + or - grade*

**HOMEWORK and GROUP PROJECT:** Homework assignments will be a combination of reading assignments, problems from select textbooks, and the FINAL PROJECT (live/virtual and social distance-permitting) will involve critical thinking related to an actual industry-relevant materials problem. Whether the final project is an individual or group project will depend on the number of students enrolled in the class.

**EXAMS:** The announced MIDTERM exam is worth 20% of your grade (200 pts) and the FINAL is 30% (300pts). It will be determined in advance (and you'll be notified) whether they are open book, closed book or a combination of **both**, and whether they will be completed during class time, or as **take home exams**. Most questions (in a written exam) will be multiple choice, short answer, or short essay, based on classroom lectures and reading assignments.

**For in-class section students, you MUST be present to take/submit your exams.** Take home exams will be uploaded to WebCourses. In emergency situations – if you are sick, or have to be away for urgent reasons – you must notify me before the class and have documentation related to your absence. I will confirm receipt of this notification. **No make-up exams will be offered.**

#### **HONOR CODE**

All assignments and exams must be done on your own. All students at UCF are governed by the provisions of the Golden Rule Handbook. We take the honor code VERY SERIOUSLY and any violations will be reported and may result in dismissal from the class and/or other penalties.

#### **SYLLABUS, ASSIGNMENT SUBMISSION VIA WEBCOURSES and ADDITIONAL INFO**

Modifications to the syllabus and course schedule may occur during the semester. Any change will be announced in class and posted online. Please check [webcourses@ucf](mailto:webcourses@ucf) regularly where copies of all course notes/reading assignments will be posted. Assignments (and exams if appropriate) are expected to be submitted electronically to the instructor by 5pm on the due date (start of class) unless another submission time is stated. **No late submissions are allowed.** Double-sessions (or extra classes) may be scheduled if needed.

#### **GRADE OBJECTIONS:**

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

#### **DEADLINES, HOLIDAYS AND SIGNIFICANT SEMESTER DATES:**

First Day of Class:	Tuesday 9 January 2024
Last Day to Drop or Add Classes:	Friday 12 January 2024
Spring Break – no class:	T/Th 22 and 24 March 2024
Withdrawal deadline:	Friday 29 March 2024
Last Day of Class	Thursday 22 April 2024
Final Exam:	Thursday 25 April 2024

## GRADE DISSEMINATION

To comply with the Family Educational Rights and Privacy Act (FERPA), grades will not be released to third parties, which includes posting grades by name, SSN, or UCFID. This section can indicate how you will return graded assignments to the individual student. To ensure students have prompt feedback, and knowledge of their progress, all grades will be recorded and posted in **Webcourses@UCF** and follow student data classification and security standards.

## Policy Statements

### Academic Integrity

In addition to notes above re: the HONOR CODE, students should familiarize themselves with UCF's Rules of Conduct at <<https://scai.sdes.ucf.edu/student-rules-of-conduct/>>. According to Section 1, "Academic Misconduct," students are prohibited from engaging in

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violate academic behavior standards.
8. Soliciting assistance with academic coursework and/or degree requirements.

### Responses to Academic Dishonesty, Plagiarism, or Cheating

Students should familiarize themselves with the procedures for academic misconduct in UCF's student handbook, *The Golden Rule* <<https://goldenrule.sdes.ucf.edu/>>. 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, 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.

### **Unauthorized Use of Websites and Internet Resources**

There are many websites claiming to offer study aids to students, but in using such websites, students could find themselves in violation of academic conduct guidelines. These websites include (but are not limited to) Quizlet, Course Hero, Chegg Study, and Clutch Prep. UCF does not endorse the use of these products in an unethical manner, which could lead to a violation of our University’s Rules of Conduct.

They encourage students to upload course materials, such as test questions, individual assignments, and examples of graded material. Such materials are the intellectual property of instructors, the university, or publishers and may not be distributed without prior authorization. Students who engage in such activity could be found in violation of academic conduct standards and could face course and/or University penalties. Please let me know if you are uncertain about the use of a website so I can determine its legitimacy.

### **Unauthorized Distribution of Class Notes**

Third parties may attempt to connect with you to sell your notes and other course information from this class. Distributing course materials to a third party without the my authorization is a violation of our University’s Rules of Conduct. Please be aware that such class materials that may have already been given to such third parties may contain errors, which could affect your performance or grade.

Recommendations for success in this course include coming to class on a routine basis, visiting me during my office hours, connecting with the Teaching Assistant (TA), and making use of the Student Academic Resource Center (SARC), the University Writing Center (UWC), the Math Lab, etc. If a third party should contact you regarding such an offer, I would appreciate your bringing this to my attention. We all play a part in creating a course climate of integrity.

### **In-Class Recording**

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach enrolled students about a particular subject.

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, private conversations between students in the class or between a student and the faculty member, and invited guest speakers is prohibited.

Recordings may not be used as a substitute for class participation and class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct as described in the Golden Rule.

### **Course Accessibility Statement**

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) <http://sas.sdes.ucf.edu/> (Ferrell Commons 185, [sas@ucf.edu](mailto: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.

### **Deployed Active Duty Military Students**

If you are a deployed active duty military student and feel that you may need a special accommodation due to that unique status, please contact your instructor to discuss your circumstances.

### **Campus Safety Statement**

Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts.

- In case of an emergency, dial 911 for assistance.
- Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Students should make a note of the guide's physical location and review the online version at <https://centralflorida-prod.modolabs.net/student/safety/index>.
- Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.
- If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see <https://ehs.ucf.edu/automated-external-defibrillator-aed-locations>.
- To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to <https://my.ucf.edu> and logging in. Click on "Student Self Service" located on the left side of the screen in the toolbar, scroll down to the blue "Personal

Information” heading on the Student Center screen, click on “UCF Alert”, fill out the information, including e-mail address, cell phone number, and cell phone provider, click “Apply” to save the changes, and then click “OK.”

- Students with special needs related to emergency situations should speak with their instructors outside of class.
- To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video <https://youtu.be/NIKYajEx4pk>.

#### **Detailed Course Outline**

- Course outline/weekly schedule will be made available on WEBCOURSES – and will be updated as needed