Course: ECE 6397/5397
Instructor: Dr. Xiaonan Shan, Email: xshan@Central.UH.EDU
Office: W306 Engineering Bldg. 2 (D3); Phone: (713) 743-8593;
Office Hours: By appointment

Suggested Text
Any version of “Optics” by Eugene Hecht is suggested, but not required.

Required Reading
Course notes

Prerequisites
None

Learning Objectives
The goal of this class is to introduce basic concepts of various advanced imaging techniques in the biomedical and material research field. The brief principle of each technique will be explained, and the most important applications of these techniques will be introduced.

Course Topics

- Basic principle of optics
  - Electromagnetic waves, Maxwell’s equation, scattering, reflection, refraction, polarization, interference and diffraction.

- Optical microscope
  - Phase contrast, differential interference contrast (DIC) and confocal microscopy.
  - Super resolution fluorescent micro/nanoscopy.
  - Surface plasmon resonance imaging and near-field scanning optical microscope (NSOM).
  - Infrared spectroscopy and imaging, Raman spectroscopy, SERS and TERS.

- Electron microscopy.
  - Scanning electron microscope.
  - Tunneling electron microscope.
Other types of microscopy:

- Scanning tunneling microscopy (STM).
- Atomic force microscopy (AFM).
- Nuclear magnetic resonance (NMR).
- Ultrasound imaging.

**Expected Course Outcomes:**

Students who successfully complete this course are expected to meet the following course outcomes.

- Students will understand the fundamental of optics imaging.
- Students will understand the basic principle of different types of start-of-the-art optical imaging and sensing techniques.
- Students will learn principle of electron microscope and other advanced imaging techniques.
- Students should be able to relate their knowledge in this course with their own research and real world problems.

**Grading Policy**

Grades will be determined on the basis of final project, exam, homework grades, and attendance as follow:

- Homework (four times) 25%
- Midterm exam (exam at a certain time) 25%
- Final presentation (no written report required) 50%

**Grade Point Rule**

The following approximate grade point scale will be used in determining your grade. This scale may be modified somewhat, but is included here so that you will have a general idea of how well you are doing in the course. The final grade scale will be determined at the end of the semester.


**Academic Honesty Policy**

Students in this course are expected to follow the Academic Honesty Policy of the University of Houston. It is your responsibility to know and follow this policy. You must sign the Academic Honesty Statement on the last page of this handout, detach it, and submit it to your instructor by Wednesday, August 30, 2017. If you fail to do this, you may be dropped from the course. See the policy on the web at http://catalog.uh.edu/content.php?catoid=21&navoid=5723.

**Religious Holy Days**
Students whose religious beliefs prohibit class attendance on designated dates or attendance at scheduled exams may request an excused absence. To do this, you are strongly encouraged to request the excused absence, in writing, by Wednesday, August 30, 2017. Please submit this written request to your instructor to allow the instructor to make appropriate arrangements. For more information, see the catalog at [http://catalog.uh.edu/content.php?catoid=21&navoid=5543](http://catalog.uh.edu/content.php?catoid=21&navoid=5543).

**Students with Disabilities**
Students with recognized disabilities will be provided reasonable accommodations, appropriate to the course, upon documentation of the disability with a Student Accommodation Form from the Center for Students with Disabilities. To receive these accommodations, you must request the specific accommodations, by submitting them to the instructor in writing, by Wednesday, August 30, 2017. Students who fail to submit a written request will not be considered for accommodations. For more information, see the web at [http://www.uh.edu/csd/](http://www.uh.edu/csd/).

**Face Covering Policy** (required for courses with a face-to-face component)

To reduce the spread of COVID-19, the University requires face coverings on campus including classrooms for both faculty and students. Face coverings must cover your mouth and nose and be worn throughout the class session. A mask with a valve is not considered an adequate face covering and should not be used, as it can expel exhaled air, increasing the risk to others. Eating or drinking during class is discouraged and is not an excuse for removing the face covering for any extended length of time. For additional information on the use of face coverings, please see [Face Covering FAQs](http://www.uh.edu/csd/). Failure to comply with the requirement to wear a face covering in class will result in your being asked to leave the classroom immediately and a disciplinary referral through the Dean of Students Office. Requests for accommodations relating to the face covering policy may be directed to the [Center for Students with Disabilities (CSD)](http://www.uh.edu/csd/).

**Required Daily Health Self-Assessment** (required for courses with a face-to-face component)

Your presence in class each session means that you have completed a daily self-assessment of your health/exposure and you:

- Are NOT exhibiting any [Coronavirus Symptoms](http://www.uh.edu/csd/)
- Have NOT tested positive for COVID-19
- Have NOT knowingly been exposed to someone with COVID-19 or suspected/presumed COVID-19

If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see COVID-19 Diagnosis/Symptoms Protocols for what to do if you experience symptoms and [Potential Exposure to Coronavirus](http://www.uh.edu/csd/) for what to do if you have potentially been exposed to COVID-19. Consult the (select: [Undergraduate Excused Absence Policy](http://www.uh.edu/csd/) or [Graduate Excused Absence Policy](http://www.uh.edu/csd/)) for information regarding excused absences due to medical reasons.

**Excused Absence Policy** (required for all courses)
Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

**Interim Undergraduate Grading Policy** (required for undergraduate courses)

Due to the unique and unprecedented challenges associated with the COVID-19 pandemic, the University of Houston has implemented an Interim Undergraduate Grade Policy for undergraduate grades which applies to all undergraduate students in courses offered in all sessions during fall 2020. Under this policy, students have the option of converting final assigned letter grades to S (Satisfactory, applicable to any letter grade from A to D-) or NCR (No Credit Reported COVID-19, applicable to grades of F) on their transcripts. Please visit FAQs for additional information.

**Recording of Class** (required for all courses)

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Center for Students with DisABILITIES. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor’s recordings for their own studying and notetaking. Instructor’s recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

**Syllabus Changes** (required for all courses)

Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through (specify how students will be notified of changes).

**Resources for Online Learning**

The University of Houston is committed to student success, and provides information to optimize the online learning experience through our Power-On website. Please visit this website for a comprehensive set of resources, tools, and tips including: obtaining access to the internet, AccessUH, and Blackboard; requesting a laptop through the Laptop Loaner Program; using your smartphone as a webcam; and downloading Microsoft Office 365 at no cost. For questions or assistance contact UHOnline@uh.edu.
Email communications related to this course will be sent to your Exchange email account which each University of Houston student receives. The Exchange mail server can be accessed via Outlook, which provides a single location for organizing and managing day-to-day information, from email and calendars to contacts and task lists. Exchange email accounts can be accessed by logging into Office 365 with your Cougarnet credentials or through Access UH. They can also be configured on IOS and Android mobile devices. Additional assistance can be found at the Get Help page.

Webcams

Access to a webcam is required for students participating remotely in this course. Webcams must be turned on (state when webcams are required to be on and the academic basis for requiring them to be on). (Example: Webcams must be turned on during exams to ensure the academic integrity of exam administration.)

Honor Code Statement

Students may be asked to sign an honor code statement as part of their submission of any graded work including but not limited to projects, quizzes, and exams: “I understand and agree to abide by the provisions in the (select: University of Houston Undergraduate Academic Honesty Policy, University of Houston Graduate Academic Honesty Policy). I understand that academic honesty is taken very seriously and, in the cases of violations, penalties may include suspension or expulsion from the University of Houston.”

Course Delivery Formats and Final Exams

HyFlex Courses: This course is a HyFlex course. Some students may have a designated face-to-face spot reserved, but alternative ways to participate will also be provided. These alternatives may include (but are not limited to) attending class sessions through synchronous streaming, viewing recordings of class meetings asynchronously, participating in discussion boards, and/or completing self-directed activities. This course will have a final exam per the University schedule. As the University will be transitioning all classes and final exams given after the Thanksgiving Break to online delivery, the exam for this course will be delivered in the synchronous online format, and the specified date and time will be announced during the course. Prior to the exam, descriptive information, such as the number and types of exam questions, resources and collaborations that are allowed and disallowed in the process of completing the exam, and procedures to follow if connectivity or other resource obstacles are encountered during the exam period, may be provided.

Synchronous Online Courses: This course is being offered in the Synchronous Online format. Synchronous online class meetings will take place according to the class schedule. There is no face-to-face component to this course. In between synchronous class meetings, there may also be asynchronous activities to complete (e.g., discussion forums and assignments). This course will
have a final exam per the University schedule. The exam will be delivered in the synchronous online format, and the specified date and time will be announced during the course. Prior to the exam, descriptive information, such as the number and types of exam questions, resources and collaborations that are allowed and disallowed in the process of completing the exam, and procedures to follow if connectivity or other resource obstacles are encountered during the exam period, may be provided.

Asynchronous Online Courses (or asynchronous exam in another course format): This course is taught Asynchronously, which means there is no designated day or time assigned to the course (although optional synchronous sessions are possible, such as virtual office hours or discussion groups). Asynchronous instruction generally involves accessing content, such as recorded video lectures, readings, discussion prompts, assignments, and assessments during a flexible time frame, with due dates as specified. This course will have a final exam at the course conclusion. The exam will be asynchronous, and the date and time that it will be released and due will be announced during the course. Prior to the exam, descriptive information, such as the number and types of exam questions, resources and collaborations that are allowed and disallowed in the process of completing the exam, and procedures to follow if connectivity or other resource obstacles are encountered during the exam period, may be provided.

Alternative Assessment in Any Course Format: An alternative assessment will be used in the place of the traditional final exam at the course conclusion. Instructions will be provided, including the date and time that the assessment materials will be released to the class and will be due, resources and collaborations that are allowed and disallowed in the process of completing the assessment, procedures to follow if connectivity or other resource obstacles are encountered during the assessment period, acceptable submission formats, and submission location.

Helpful Information

COVID-19 Updates: https://uh.edu/covid-19/

Coogs Care: https://www.uh.edu/DSAES/coogscare/

Laptop Checkout Requests: https://www.uh.edu/infotech/about/planning/off-campus/index.php#do-you-need-a-laptop

Health FAQs: https://uh.edu/covid-19/faq/health-wellness-prevention-faqs/

Student Health Center: https://uh.edu/class/english/lcc/current-students/student-health-center/index.php

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The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.

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