UNIVERSITY OF CENTRAL FLORIDA

OSE 4830 - IMAGING AND DISPLAY

Section: 0001

Optics and Photonics

Course Information

Term: Fall 2025
Class Meeting Days: MWF
Class Meeting Time: 07:30AM - 08:20AM
Class Meeting Location: ENG2 0205
Modality: P
Credit Hours: 3.00

Instructor Information

Name: Sean Pang
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Course Description

OSE 4830 OPTIC 3(3,0)Imaging and Display: PR: EEL 3123C, and C (2.0 GPA) or higher in??OSE 3052. Mathematical and physical models of two- and threedimensional imaging systems including gazing, scanning, interferometric, tomographic, and hyperspectral systems. Applications to remote sensing, biology, and medicine. Fall

This course introduces the basic principles of two- and three-dimensional imaging systems. It begins with the mathematical description of image formation as a linear system and draws on the student's knowledge of signals and systems to introduce the concepts of point spread function, transfer function (OTF and MTF), resolution, and restoration, for both coherent and incoherent illumination. Actual physical imaging systems (such as cameras, microscopes, telescopes, and copiers) operating in the gazing and scanning configurations are subsequently modeled and their resolution assessed. Interferometric imaging systems and their applications in metrology are described. Techniques for depth profiling are then introduced including point-by-point scanning (as in laser scanning fluorescence microscopy), echo ranging (as in radar and lidar imaging), and interferometry (as in optical coherence tomography). This is followed by an introduction to computational imaging, including the techniques of computed tomography (CT), range tomography, and magnetic resonance imaging (MRI). Spectral imaging systems using spectrophotometers in various configurations are then described including applications in detection (of tumors, for example) and classification (of different targets). Performance measures such as sensitivity and specificity are introduced. Applications for remote sensing, nondestructive testing, and biology and medicine are highlighted. The course ends with an introduction to lithography and display devices.

Student Learning Outcomes

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

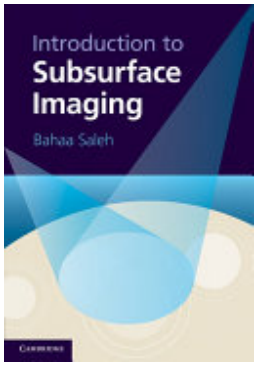
- Recognize the various configurations of imaging instruments, including gazing, scanning, interferometric, and tomographic systems.
- Select appropriate imaging modalities for various imaging applications.
- Model and simulate imaging system using linear systems principles.
- Write simple codes for tomographic and computational imaging
- Distinguish between structural and functional imaging.
- Recognize the fundamental analogies between electrical and optical systems (by virtue of the analogy between one-dimensional and two-dimensional concepts).
- Solve an unmixing problem and estimate concentrations or two materials using data produced by a spectrophotometer.

Required Course Materials and Resources

Lecture Notes

Optical Imaging System Modeling (MATLAB courseware)
Online Access: https://www.mathworks.com/matlabcentral/fileexchange/159396-optical-imaging-system-modeling

Recommended Course Materials



Title: Introduction to Subsurface Imaging
ISBN: 9781139495349
Authors: Bahaa Saleh
Publisher: Cambridge University Press
Publication Date: 2011-03-17

Course Assessment and Grading Procedure

Criteria	Grade Weighting
Homework & Quiz	20%
Term Paper	10%
Midterm Exam	30%
Final Exam	40%
Total	100%

Assignment Schedule

Due Date	Assignment Name	Assignment Type	Points

Due Date	Assignment Name	Assignment Type	Points
	Final Exam	Assignment	100
	Final Grade	Assignment	0
	Midterm 1	Assignment	100
8/22/25	Academic Activity Recording	Assignment	1
9/1/25	Homework 1	Assignment	10
9/5/25	Homework2	Assignment	10
9/12/25	Homework 3	Assignment	10
9/19/25	Homework4	Assignment	10
10/1/25	Homework 5	Assignment	20
10/15/25	Homework6	Assignment	15
10/17/25	term paper topic	Assignment	10
10/22/25	Homwork7	Assignment	9
11/1/25	Homework 8	Assignment	10
11/10/25	Homework 9	Assignment	10
11/15/25	Term Paper	Assignment	60
11/16/25	Term Paper Slides	Assignment	1
11/21/25	Homework 10	Assignment	10

Grading Scale

Grading Scale

Letter Grade	Percentage
A	90-100%

Letter Grade	Percentage
B	80-90%
C	70-80%
D	60-70%
F	0-60%

Policies for Course Grade

Missed/Late Assignments

The half-life time of the homework is 7 days, with 1-day grace period (i.e. if you are late within one day, you won't lose any point). Example: if you are 3 days late for your homework, and you get 80 points on 100 points scale. Your late homework will be graded as $80x(1/2)^{(3/7)}=59.4$.

Attendance

There will be occasional quiz during the lecture. We will record your attendance but it will not be used for grading purpose.

Artificial Intelligence (AI) Use Policy

You can use AI for learning the materials. However, AI will not be allowed for exams.

Disability Access & Accommodations

The University of Central Florida is committed to providing equal access to all students with disabilities (ADHD, learning disabilities, Autism, chronic medical conditions, physical disabilities, etc.). To receive consideration for reasonable disability-related course accommodations, disabled students must contact Student Accessibility Services (SAS) and complete the steps required for SAS to review accommodation requests. More information can be found on the UCF Student Accessibility Services website under the Start Here tab or by contacting SAS directly (Ferrell Commons 185; sas@ucf.edu; Phone - 407-823-2371).

Approved accommodations are shared with course instructors via the SAS Course Accessibility Letter. Implementing certain accommodations may require discussion about specific considerations of the course design, course learning objectives, and the individual academic and course challenges experienced by the student. While students with disabilities or chronic health needs are also encouraged to discuss any course concerns with professors in addition to contacting SAS, professors are not required to facilitate disability-related adjustments to the course unless the professor has received a Course Accessibility Letter from SAS that outlines approved accommodations.

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:

1. 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 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.
2. Any student who knowingly helps another violate academic behavior standards is also in violation of the standards.
3. 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 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.
4. 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.

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 access and community engagement, Title IX, accessibility, or UCF's complaint processes contact:

- Title IX – ONAC – Office of Nondiscrimination & Accommodations Compliance & 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.

Reporting an Incident or Issue

If you believe you have experienced discrimination by any faculty or staff member, contact the Office of Nondiscrimination & Accommodations Compliance via the ONAC website or at 407-823-1336. You can also choose to report using the UCF Integrity Line either anonymously or as yourself at 1-855-877-6049 or by using the online form. UCF cares about you and takes every report seriously. For more information see the Reporting an Incident or Issue Webpage.

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 arrangements.

Campus Safety

At UCF's 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 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.

Class Schedule

Course Schedule

Week	Topic
1	Introduction and overview A1 Image representation
2	A2 Image transform A3 Linear system
3	A4 Frequency analysis
4	A5 Frequency response of the filter
5	Midterm Review1, B1 Imaging system and physics of lens-based imaging
6	Midterm Exam1, B1 Imaging system and physics of lens-based imaging
7	B2 Lens physical model 1-2
8	B3 Optical Instruments, B4 Axial Imaging
9	B5 Interferometry, and OCT
10	B6 Computational Imaging, CT, Midterm Review 2
11	Midterm Exam 2 (Lens and Fourier Transform), D1 Color space
12	D1 Color Space and D2 Device
13	Term Paper Presentation
14	Term Paper Presentation and Thanksgiving
15	Final Review
16	