



UNIVERSITY OF  
CENTRAL FLORIDA

# OSE 3043 - ANALYTICAL METHODS OF OPTICS

Section: 0001

*Optics and Photonics*

## Course Information

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**Term:** Fall 2024

**Class Meeting Days:** MW

**Class Meeting Time:** 15:00 - 16:15

**Class Meeting Location:** CROL 0266

**Modality:** P

**Credit Hours:** 3.00

## Instructor Information

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Armando Perez Leija

**Title:** Dr.

**Office Location:** 166

**Office Hours:**

Thursdays 4:00pm-5:00pm.

**Email:** aleija@creol.ucf.edu

## Course Description

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OSE 3043 OPTIC-OPTICS 3(3,0)Analytical Methods for Optics: PR: PR: MAC 2313.

Applications-oriented course on analytical concepts prevalent in optics and engineering integrating Matlab as a computational support tool. Fall

Analytical and Coding Methods of Optics will expose the students to common analytical concepts used extensively in optics, physics, and other engineering disciplines. With a focus on applications, this class is designed to teach the students these concepts through relevant optical and engineering examples. The homework will have a required Matlab component so the students, throughout the entirety of this course will gain an intuitive understanding for computer coding and Matlab specifically. This analytical methods class will extensively cover matrix and vector manipulations, solutions of linear systems, eigenvalues and eigenvectors, geometric transformations, and complex analysis.

#### Topics:

##### 1. Introduction to Matlab

- Variable definitions, building a vector, building a matrix
- Functions, operations, loops
- Plotting tools
- Animations

##### 2. Linear Systems

- Matrix Algebra
  - Matrix Manipulation
  - Systems of linear equations
  - Determinants
  - Diagonalization
- Eigenvalues and Eigenvectors

##### 3. Vector Analysis

- Dot, Cross, Triple Products, Differentiation of vectors
- Line integrals, Green theorem
- Solid angle calculation and integrating over a surface
- Divergence, Curl, Stokes' theorem

##### 4. Complex Analysis

##### 5. Transformation spaces

- Bessel
- Laplace
- Fourier

## Student Learning Outcomes

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At the end of this class the students will be able to tackle advanced concepts in matrix and vector problems that arise throughout the optics and engineering curriculum. They will be proficient users of Matlab and other similar computer coding techniques and be able to tackle advanced computation problems; they will have gained enough intuition with Matlab so that they will be able to apply techniques that are more advanced if and when needed. The students will be able to transform from one bases to another and more importantly why the transformations are important and when to use them and the right ones to use for a specific problem. This class will help with the reinforcement of Analytical concepts that any optical scientist or general engineer should know.

## Course Materials and Resources

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### Introduction to Computational Engineering with MATLAB®

**ISBN:** 978-1-003-27143-7 (ebk)

**Authors:** Timothy Bower

**Publisher:** CRC Press

**Publication Date:** 2023

**Edition:** First

## Course Assessment and Grading Procedure

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**The Basis for Final Grade:**

Criteria	Grade Weighting
Homework	60%
Participation	10%
Midterm Exam	15%
Final Exam	15%
Total	100%

## Grading Scale

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Letter Grade	Percentage
A	94-100%

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

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### **Makeup Work Policy**

### **Missed/Late Assignments**

### **Attendance**

## **Course Accessibility**

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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](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.

## **Academic Integrity**

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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**

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If you believe you have experienced abusive or discriminatory behavior by any faculty of 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**

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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](mailto:askanadvocate@ucf.edu)
- Disability Accommodation – Student Accessibility Services – [Student Accessibility Services](#) & [sas@ucf.edu](mailto: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](mailto:complianceandethics@ucf.edu)
- The [Ombuds Office](#) is a safe place to discuss concerns.

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

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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

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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

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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

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Week	Topic
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