

Regardless of course type; e.g., traditional, media-enhanced, or Web, syllabi at UCF are required to include:

- Course title and number
- Credit hours
- Name(s) of instructor(s)
- Office location
- Office or Web hours
- Course goals
- Course description
- Course requirements
- Methods of evaluation; grading system, including plus and minus grade policy, how grades will be posted
- Makeup exam policy
- Required and optional texts
- Final exam date and time
- Financial Aid Statement
- Other required course material

**PRIOR TO PRINTING, DELETE THIS LINE AND ABOVE
ALTER THE SYLLABUS BELOW TO YOUR LIKING**



Course Syllabus

OSE3043 Analytical Methods in Optics, 3 credits

Instructor: S. Sean Pang	Term: 2021 Fall
Email: pang@creol.ucf.edu	Class Meeting Days: MoWe
Phone: 4078236869	Class Meeting Time: 4:30 pm - 5:45 pm
Office: CROL A237	Class Location: CROL 102
Office Hours: Zoom	Website:

Additional Notes: I am happy to discuss the material with you anytime. Make sure you send an e-mail to schedule a zoom meeting in advance.

Course Catalog Description:

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

Prerequisites: This class will require the students to have completed Calculus I, II, and III (MAC 2311C, MAC 2312, and MAC 2313) and Differential Equations (MAP 2302).

Detailed Course Description and Learning Outcomes:

Detailed Description:

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.

Learning Outcomes:

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.

Topics:

- Introduction to Matlab
- Linear Systems
 - Matrix Algebra
 - Matrix Manipulation
 - Systems of linear equations
 - Determinants
 - Diagonalization
 - Eigenvalues and Eigenvectors
 - Introduction to Linear Optimization
- Fourier Series and Fourier Transform
 - Transform spaces
 - Fourier Series
 - Fourier Transform
- Vector Calculus
 - Dot, Cross, Triple Products, Differentiation of vectors
 - Line integrals, Green Theorem
 - Solid angle calculation and integrating over a surface
 - Divergence, Curl, Stokes' theorem
- Ordinary and Partial Differential Equations
- Special functions

Textbook:

Dianat, Saber, Advanced Linear Algebra for Engineers with Matlab, CRC Press.

Course Notes

Recommended Reference:

Hansen, Nagy, O'Leary, *Deblurring Images, Matrices, Sectra, and Filtering*, SIAM

Other Reference Books:

Gbur, *Mathematical Methods for Optical Physics and Engineering*, Cambridge
 Golub, Van Loan, *Matrix Computations*, Johns Hopkins.

Course Grading and Requirements for Success:**Final Exam:**

Make up Exam Policy: If an emergency arises and a student cannot submit assigned work on or before the scheduled due date or cannot take an exam on the scheduled date, the student **must** give notification to the instructor **no less than 24 hours before** the scheduled date and **no more than 48 hours after** the scheduled

Criteria	Grade Weighting
Homework & Quiz	20%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	40%
Total	100%

Final Exam: Dec. 2021

Financial Aid and Attendance: As of Fall 2021, all faculty members are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the following academic activity by the end of the first week of classes. Failure to do so will result in a delay in the disbursement of your financial aid.

Grading Scale (%)	Rubric Description
100 ≥ A > 85	Excellent, has a strong understanding of all concepts and is able to apply the concepts in all and novel situations. Has full mastery of the content of the course.
85 > B ≥ 75	Good, has a strong understanding of most or all of the concepts and is able to apply them to stated and defined situations.
75 > C ≥ 65	Average, has a basic understanding of the major concepts of the course and is able to apply to basic situations.
65 > D ≥ 60	Below average, has a basic understanding of only the simple concepts and is able to apply to only a limited number of the most basic situations.
60 > F ≥ 0	Demonstrates no understanding of the course content.

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.

Class Website:

Materials used for classes will be available on UCF Webcourses for download before each class.

Professionalism and Ethics:

Per university policy and plain classroom etiquette, mobile phones, etc. must be silenced during all classroom lectures, unless you are specifically asked to make use of such devices for certain activities. Academic dishonesty in any form will not be tolerated! If you are uncertain as to what constitutes academic dishonesty, please consult The Golden Rule in the UCF Student Handbook (www.goldenrule.sdes.ucf.edu) for further details. As in all University courses, The Golden Rule Rules of Conduct will be applied. Violations of these

rules will result in a record of the infraction being placed in your file and the student receiving a zero on the work in question AT A MINIMUM. At the instructor's discretion, you may also receive a failing grade for the course. Confirmation of such incidents can also result in expulsion from the University.

Students with Special Testing/Learning Needs:

Students with special needs and require special accommodations must be registered with UCF Student Disability Services prior to receiving those accommodations. Students must have documented disabilities requiring the special accommodations and must meet with the instructor to discuss the special needs as early as possible in the first week of classes. UCF Student Disability Services can be contacted at www.sds.sdes.ucf.edu or at (407)823-2371.

Dates:

First Day of Class	Aug. 23, 2021
Last Day to Add/Drop Classes:	Aug. 27, 2021
Last Day of Classes:	Dec. 1, 2021
Final Exam:	Dec. 6-11, 2020