OPTI 340, Optical Design
Spring 2025-2026

Lecture& Discussion Session:
MWF: 9:00 – 9:50 am
Tu: 9:00 (8:00) – 10:15 am

Instructor:
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Course objectives:
This course will provide students with a fundamental understanding of third order aberrations as applied to lens design. Emphasis will be on practical understanding of the optical design procedure and the use of an optical design program (CodeV, Synopsys) to correct for the third order aberrations.

The primary objective of this course is to enable an optical engineering student to:

1. Understand nature of optical design: art and science.
2. Develop skills to efficiently use ray trace code.
3. Design optical systems for a particular application based on specifications.
4. Understand classical lens designs, characteristics/limitations.
5. Develop insight to determine the necessary image quality for an application as well as the limitations of designs.
6. Develop the knowledge to evaluate lens designs via various figures of merit, i.e., ray aberrations, spot diagrams, modulation transfer functions, Strehl ratio.

7. Understand importance of Tolerancing in optical design.

D2L: Main Class Web:

Required Text and Materials:

CodeV

https://wp.optics.arizona.edu/helpdesk/osc-site-licensed-software/

Code V software is required for this course. Enrolled students may obtain an electronic key for one license by asking for a password, OSCstudent

* Remember you must be connected to the **UofA VPN to use this software offsite**.

* CodeV runs **only on Windows**. Mac users: see How to install Windows 10 on Mac (microsoft.com) for Intel Mac, or use virtual machine environment for newer mac with ARM (M1-3) CPU. Technical help is available from the help desk of the college: helpdesk@optics.arizona.edu.

In case you encountered "License Server Error": please directory email to helpdesk (**helpdesk@optics.arizona.edu), cced** to Instructor/TA, by explaining the nature of the error. Instructor/TA has no access to license server to fix the problem.

Recommended References:

- Jenkins, Francis and White, Harvey (2001). *Fundamentals of Optics.* McGraw-Hill, ISBN-10: 0072561912
- Kidger, Michael. J (2001). Fundamental Optical Design. SPIE monograph. ISBN-10: 0819439150
  - **https://ebookcentral.proquest.com/lib/UAZ/detail.action?docID=728562**
- Smith, Warren (2007). *Modern Optical Engineering* (4th ed.). McGraw-Hill. ISBN-10: 0071476873
  - **https://ebookcentral.proquest.com/lib/uaz/detail.action?docID=4656882**
- James C. Wyant, Basic Wavefront Aberration Theory for Optical Metrology
- Code V Reference manuals, Test Drive, and Introductory user's Guide

Attendance Policy:

- Students are expected to be regular and punctual in physical class attendance.
- When class recording is available, access to the recording is granted for review purposes to the student who attended the class. Please email the instructor to get access code for the recording.
- When class is broadcasted, live view and recording is available for all students.

Class Recording

Students should be mindful that instructor course content is subject to intellectual property protections, and that fellow students have privacy rights and expectations as part of class activities. Some students may have an approved accommodation from the Disability Resource Center, which automatically notifies instructors through the DRC Instructor portal. Students who do not have a DRC accommodation must notify the instructor if they wish to record (audio and/or video) or photograph any class activity. When course activities are recorded, they should be used for a student's own personal educational use only.

https://catalog.arizona.edu/resources/catalog-resources/syllabus-policies

Discussion Sessions:

Discussion Sessions are also dynamically scheduled. Attendance is suggested when it is held.

Coursework Policies:

Homework:

All problem sets are to be turned in to D2L on the date due (by 23:59 pm). Late submissions will be marked off by 50%. Later submissions will not be graded after 1 week of the due date or after the solutions are posted, whichever fast.

All homework, exams, etc., must include your:

Name
Course number (OPTI 340)
Page number at the bottom.

Submission without that information is 5pt deduction of grading. Submission must be made on one side of an 8½ x 11 sheets of paper. Scan and uploaded it **in a single PDF format. Files submitted in the file type/format other than the specified one, will not earn grade.** Submission in the form of separated pictures will not be graded. The policy is strict and not negotiable. Figures and answers, if handwritten, must be readable.

We consider late turn in assignments for the two cases:

1) students are away from campus to attend academic conference for a substantial period, and
2) physical health needs,

only if students obtained prior ***permission and updated due date*** from the instructor. Please do not email TA to ask for extension, since TA can't decide if it is granted or not.

No same day request for an extension is granted unless the situation is serious and critical. The instructor reserves the right to decide on whether late turn in is granted or not.

Midterm and Final Exams:

- Midterms are in class ***or*** in discussion sessions, ***starting at 8am***.
  - Midterm #1: Week of Feb. 16, starting at 8am
  - Midterm #2: Apr.
- Final exam
  - May 14, 10:30am-12:30, no early/late test day scheduled.

Course Grading:

The grading for the class will be based upon homework including design work, and exams.

Homework problems including CodeV design works	50%
Midterms #1 and #2 (in Feb., and April, starting at 8am)	25%
Final exam (May 14, 10:30-12:30, no early/late test day scheduled)	25%

100%-89%: A | 80%-88%: B | 70%-79%: C | 55%-69%: D | 0%-54%: E

Optional Final Project: students who participated in design project and successfully submitted a 10 page report to optical design competition receive an additional credit to the final exam.

The distribution of points within and over each assignment and exams are determined by the instructor and subject to change. Instructure reserves the right to adjust the grading scale.
Final exam date and time are specified by university, not negotiable.

Academic Integrity

According to the Arizona Code of Academic Integrity "Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own." Unless otherwise noted by the instructor, work for all assignments in this course must be conducted independently by each student. Co-authored work of any kind is unacceptable. Misappropriation of exams before or after they are given will be considered academics misconduct. Misconduct of any kind will be prosecuted and may result in any or all the following:

- Reduction of grade
- Failing grade
- Referral to the Dean of Students for consideration of additional penalty, i.e., notation on a student's transcript re: academic integrity violation, etc.

Students with Disabilities

Accessibility and Accommodations: *At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268,* ***https://drc.arizona.edu****) to establish reasonable accommodations.*

The information contained in this syllabus may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

The instructor reserves the right to modify the contents in the syllabus. It is the students' responsibility to keep up with the latest policy by regularly attending class and frequently checking the announcements on D2L**.**