

**OPTI 340, Optical Design
Spring 2022**

Lecture & Discussion Session:

MWF: 8:00 – 8:50 am

Tu: 8:00 – 8:50/9:15 am

Instructor:

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Course objectives:

This course will provide students with a fundamental understanding of 3rd 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 3rd 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 skill 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.
- 8.

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 password. Please email helpdesk@optics.arizona.edu for the password to the page:

Installation: Run the installer. At the "License installation Options" screen select Floating (network) license and use the following hostname: license.optics.arizona.edu

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

* CodeV runs on Windows. Mac users: see [How to install Windows 10 on Mac \(microsoft.com\)](#)

Wolfram Player

<https://www.wolfram.com/player/>

Recommended References:

- 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>
- Jenkins, Francis and White, Harvey (2001). *Fundamentals of Optics*. McGraw-Hill, ISBN-10: 0072561912
- James C. Wyant, Basic Wavefront Aberration Theory for Optical Metrology
- Code V Reference manuals, Test Drive and Introductory user's Guide (See handout for instructions on downloading).
- **CodeV Portal:** <https://opticsportal.synopsys.com/SitePages/Home.aspx>

D2L: Main Class Web

Grade posted on D2L is tentative. Students need to keep track his/her grading based on the Course Grading Policy.

Lectures:

A flexible and accelerated schedule will be followed to deliver the class lecture so that more time is available for the final design project. Lectures and Discussion Sessions are dynamically scheduled to accommodate students' needs. See separate lecture schedule.

Discussion Sessions:

Discussion Sessions are also dynamically scheduled (see schedule) to accommodate students' needs. Attendance is required. In the discussion session, students interact with Instructor(s) and Teaching Assistant to discuss and explore design projects. Also, the time slot will be used for demo experiments, lectures, and project meetings.

Attendance Policy: Students are expected to be regular and punctual in class attendance. There is a strong correlation between the attendance rate and final grade. Excused absences include: all holidays or special events observed by organized religions for those students who show affiliation with that particular religion and absences approved by the UA Dean of Students and notification of it to the instructor in advance.

Coursework Policies:

Homework, Design projects and Reports:

All problem sets and design projects are to be turned in to D2L during the class on the date due (by 17:00 pm). Late homework will be marked off by 50%. No late turn in is allowed after 1 week of the due date. All homework, exams, design projects, etc., must include your **name, and course number (OPTI 340) as header, and page number at bottom, deliverables without that information is -5pt deduction of grading.** Must be done on one side of an 8½ x 11 sheets of paper. Scan and uploaded in a single PDF format. Figures and answers, if handwritten, must be readable. Submission in a form of separate pictures, such as jpeg, bmp format will not be graded.

We consider late turn in of assignments to accommodate students' academic, family and health needs only if students obtained **a prior permission** from the instructor.

No re-grading after one week from the day the solution is posted (i.e., solution posted on Monday, students need to request for regrading by following Sunday).

Format for Design Projects:

All design projects should be completed and turned in on the date due (by 17:00 pm) as a formal written report formatted. Formatting, including class name, date, assignment title, page number, play an important part in your grade.

Format for Final Project:

Final Reports if assigned should be completed and turned in as a formal written report formatted based on SPIE template (<http://spie.org/x5258.xml?SSO=1>).

Course Grading:

Grading Policy: The grading for the class will be based upon homework, design projects, and exams. The distribution of points within each of assignments and exams are determined by the instructor.

Homework Problems	20%
Design Projects	20%
Midterms, (possibly with voluntary and no-penalty in class short quiz)	30%
Final Exam/Project Presentation & Report	30%

100%-90%: A | 75%-89%: B | 65%-74%: C | 55%-64%: D | 0%-54%: E

Face coverings are required in our classroom:

Per UArizona's Administrative Directive, face coverings that cover the nose, mouth, and chin are required to be worn in all learning spaces at the University of Arizona (e.g., in classrooms, laboratories and studios). Any student who violates this directive will be asked to immediately leave the learning space, and will be allowed to return only when they are wearing a face covering. Subsequent episodes of noncompliance will result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied. The student will not be able to return to the learning space until the matter is resolved.

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 academic 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.