SYLLABUS

ECE / OPTI 201R (3 units)
Fall 2022
Geometrical and Instrumental Optics I

Tuesdays and Thursdays 8:00 am – 9:15 am
Meinel 410

Description of Course

This course will introduce students to the fundamentals of Geometrical Optics. All of the equations that relate to paraxial (first-order) optics will be derived, explained, and used to solve a wide variety of problems in paraxial optics.

Course Prerequisites or Co-requisites

Grades of C or higher in MATH 124 or 125, MATH 129, PHYS 141, and MSE 100

Instructor and Contact Information

Instructor

Prof. Michael Nofziger ("Dr. Mike")
Office: Meinel 412A
520-626-8363
nofziger@optics.arizona.edu
Office Hours: Thur. 1:00–3:00 pm, or by appointment (email me!)

Teaching Assistant

Matt Nero nero@email.arizona.edu
Office Hours: (TBD…)

Course Content/Website

(all course materials are on our D2L class site for OPTI 201R)

Course Format and Teaching Methods

The course will meet in-person. NOTE: ***Class format may change depending on current U of A Guidelines in regards to COVID-19.***

The course is curriculum-centered with traditional-style lectures and exams.

Course Objectives

This course provides the fundamental background in geometrical optics for students to be successful in many of their other, upcoming OPTI courses, most notably OPTI 202R and OPTI 340. Material covered and homework assigned will provide students with a working knowledge of geometrical optics, allowing them to understand and solve a wide variety of problems in optics and optical engineering. This includes the first-order design of optical instruments (OPTI 202R), and the higher-order design of optical systems to control aberrations, using industry-standard software (OPTI 340).

Expected Learning Outcomes: [Relationship to ABET Student Outcomes (1-7)]

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

- explain the fundamental principles of paraxial optics. (3)
- apply these principles and equations to the first-order design of a wide variety of optical instruments. (1,2)
- calculate the location of the cardinal points of any optical system. (1)
- Gaussian-reduce a complex optical system to its paraxial equivalent. (1)
- perform a paraxial raytrace of an optical system. (1)
- make calculations to determine the properties of the image formed by an optical system (image magnification, location, and orientation). (1)

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences

Participating in the course, and attending lectures are vital to the learning process and critical to being successful in this course. Our class notes provide a thorough, but highly distilled, introduction to all of the topics we will discuss, but they are not a textbook! It is critical that you attend each class to be able to ask questions about the material being presented.

To summarize: attendance is expected at all lectures (but not required). Absences will likely affect your learning of the material, and therefore your final course grade. If you are unable to participate in class activities for whatever reason, please contact me (Dr. Mike) as soon as possible. Do ***not*** wait until the end of the semester to talk with me!

If you are experiencing unexpected barriers to your success in your courses, please talk with your Undergraduate Academic Advisor, Amber Soergel (asoergel@optics.arizona.edu).
Do ***not*** wait until the end of the semester to reach out for help!

COVID-19: University of Arizona's latest COVID-19 Guidelines are at: www.covid19.arizona.edu
► ***As of 8/15/22, UA policy states: "…masks are recommended, but not required, in most indoor spaces including classrooms."***

Required Texts or Readings

- All required class notes will be made available through our class D2L webpage.

Required or Special Materials

None required but the following books will be useful (especially the Field Guide):

- John E. Greivenkamp, *Field Guide to Geometrical Optics* (SPIE Press)
  http://ezproxy.library.arizona.edu/login?url=http://dx.doi.org/10.1117/3.547461
- Warren J. Smith, *Modern Optical Engineering* (SPIE Press)
  https://ebookcentral.proquest.com/lib/uaz/detail.action?docID=4656882
- Eugene Hecht, *Optics* (Addison-Wesley Publishing Company)

Assignments and Examinations: Schedule/Due Dates

Homework:

- Homework assignments and their DUE dates will be posted on-line at our D2L site.
- Turn in your homework in class, on paper. Homework scores will be posted on D2L.
- You will have (a minimum of) one week to do each homework set. Expect 7-10 problems assigned per homework set, and about 8 homework sets for the semester.
- ***Homework will not be accepted after the due date and time*** (see "Late Policy" for details).
- You may work with other classmates on the homework sets. In fact, this is encouraged. ***However***, be sure that you really understand and actually learn the material—all exams must be your own work!
- Corrections to errors in grading will only be considered within one week following the return of the homework assignment or exam.

LATE POLICY:

All work is due by the date and time posted for that assignment, as shown on our D2L class site.

Late material will only be accepted because of medical reasons or a family emergency. Contact your instructor (Dr.Mike) to work out a new due date.

Quizzes:

- We will have one quiz per week. The quizzes will be administered and graded through our D2L class site. No paper quizzes.

- Each weekly quiz will be available on D2L from 5:00 pm Friday until 11:59 pm Sunday. Expect to spend 15-20 minutes on each quiz.
  (NOTE: some of the quizzes may have a time limit, others not.)

- The purpose of the quizzes is to help you "monitor" your basic understanding of the material presented in class, as well as to encourage you to "keep up" with your learning of new material—all on a weekly basis.

- You may use your notes, textbook, etc. to do the quizzes.
- Quizzes will be graded only for 'completion' and not graded for "right or wrong" answers.

- ***Missed quizzes cannot be made up.***

Exams:

- 2 Midterm Exams (Oct. 11 and Nov. 17, 2022)
- 1 Final Exam (Dec. 15, 2022 8:00 – 10:00 am)

- *The only electronic device allowed during the exams will be a calculator*. Any student who uses any other electronic device (laptop, cell phone, cell phone camera, etc.) will receive a zero (0%) for that exam.

Grading:

- Quizzes = 10%
- 2 Midterm Exams: 20% each = 40%
- Problem Sets (Homework): 30%
- Final Exam: 20%
- **Final grading will be done on a curve.**
- Corrections to errors in grading will only be considered within one week following the return of the homework assignment or exam.

Incomplete (I) or Withdrawl (W)

"**Requests for incomplete (I) or withdrawal (W)** must be made in accordance with University policies, which are available at http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading-s"ystem#Withdrawal respectively."

(30 October) LAST DAY TO WITHDRAW FROM A CLASS ONLINE THROUGH UACCESS

Classroom Behavior Policy

"To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.)."

Please refrain from disruptive conversations with people sitting around you during our class (which includes whispering with your neighbor). Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave the classroom. However, I strongly encourage questions during class!

Threatening Behavior Policy

"The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students."

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."

Please be aware that the accessible table and chairs in our classroom (room 410) should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity

"Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The University Libraries have some excellent tips for avoiding plagiarism, available at http://new.library.arizona.edu/research/citing/plagiarism.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement."

UA Nondiscrimination and Anti-harassment Policy

"The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others."

Additional Resources for Students

UA Academic policies and procedures are available at http://catalog.arizona.edu/policies

Student Assistance and Advocacy information is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

Confidentiality of Student Records

http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Scheduled Topics/Activities (subject to change..!!)
(for Homework assignments and due dates, see D2L)

Week 1:	**Tue.**	**Aug. 23**	Syllabus review; Sec. 1 (pgs. 1-19)
	Thur.	**Aug. 25**	Sec. 1 (pgs. 20-30)
Week 2:	**Tue.**	**Aug. 30**	Sec. 1 (pgs. 31-38)
	Thur.	**Sept. 1**	Sec. 2 (pgs. 1-15)
Week 3:	**Tue.**	**Sept. 6**	Sec. 2 (pgs. 16-26)
	Thur.	**Sept. 8**	Sec. 2 (pgs. 27-35)
Week 4:	**Tue.**	**Sept. 13**	Sec. 3 (pgs. 1-19)
	Thur.	**Sept. 15**	Sec. 3 (pgs. 20-36)
Week 5:	**Tue.**	**Sept. 20**	Sec. 3 (pgs. 37-50)
	Thur.	**Sept. 22**	Sec. 4 (pgs. 1-14)
Week 6:	**Tue.**	**Sept. 27**	Sec. 4 (pgs. 15-26)
	Thur.	**Sept. 29**	Sec. 4 (pgs. 27-37)
Week 7:	**Tue.**	**Oct. 4**	Sec. 5 (pgs. 1-13)
	Thur.	**Oct. 6**	Sec. 5 (pgs. 14-24)
Week 8:	**Tue.**	**Oct. 11**	**Midterm Exam I (covers Sections 1-4)**
	Thur.	**Oct. 13**	Sec. 5 (pgs. 25-43)
Week 9:	**Tue.**	**Oct. 18**	Sec. 7 (pgs. 1-13)
	Thur.	**Oct. 20**	Sec. 7 (pgs. 14-22)
Week 10:	**Tue.**	**Oct. 25**	Sec. 7 (pgs. 23-42)
	Thur.	**Oct. 27**	Sec. 7 (pgs. 43-47)
Week 11:	**Tue.**	**Nov. 1**	Sec. 9 (pgs. 1-11)
	Thur.	**Nov. 3**	Sec. 9 (pgs. 12-22)
Week 12:	**Tue.**	**Nov. 8**	Sec. 9 (pgs. 23-29)
	Thur.	**Nov. 10**	Sec. 9 (pgs. ???)
Week 13:	**Tue.**	**Nov. 15**	Sec. 9 (Power Point example of YNU raytraces)
	Thur.	**Nov. 17**	**Midterm Exam II (covers Sections 5, 7, and 9)**

Week 14: **Tue. Nov. 22** Sec. 9 (pgs. 30-39)

Thur. Nov. 24 – NO CLASS (Thanksgiving)

Week 15: **Tue. Nov. 29** Sec. 10 (pgs. 1-12)

Thur. Dec. 1 Sec. 10 (pgs. 13-25)

Week 16: **Tue. Dec. 6** Sec. 10 (pgs. 26-33)

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Thur. Dec. 15 – Final Exam (8:00 am – 10:00 am)

Important Dates:

Date	Event	Comments
8/22/2022	Classes Begin	
10/11/2022	**Midterm I**	**Covers Sections 1-4**
11/17/2022	**Midterm II**	**Covers Sections 5, 7, and 9**
11/24,25/2022	Thanksgiving	No Class on 11/24
12/15/2022	**Final Exam**	**8:00 – 10:00 am**