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APPLIED OPTICS

PHYS 4452, SECTION 010
SPRING 2022

CLASS MEETINGS

TR 11:00AM–12:15PM

T 2:00PM–4:50PM

VIN 147



CONTACT INFORMATION

Dr. Michael C. Holcomb

Office: VIN 123 & Dr. Holcomb's Virtual Office

Phone: [325.486.6787](tel:325.486.6787)

Email: michael.holcomb@angelo.edu

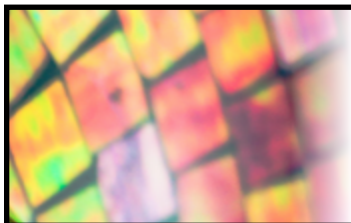
Webpage: www.mcholcomb.com/teaching

Office Hours

Monday, Wednesday, Friday 11:00am–12:15pm

Tuesday, Thursday 9:00am–10:45am

Also available by appointment or whenever my door is open!



REQUIRED MATERIALS

Introduction to Optics, 3rd Edition by Pedrotti, Pedrotti, and Pedrotti
(ISBN: 978-1-108-42826-2)

PHYS 4452

COURSE OVERVIEW

This course will cover the fundamental properties of light propagation and the interaction of light with matter under the approximation of geometrical optics and scalar wave optics. Time permitting, quantum optics may also be introduced.

This course is intended to reinforce existing knowledge of the scientific method and expand understanding of the laws of physics. To this end, the course will emphasize a mix of conceptual questions, problem-solving skills, and the application of theoretical principles in a hands-on setting. The lab will provide an opportunity to explore the correlation between theory and practice, demonstrating how scientists can develop theories from experimental approaches.

Expected Learning Outcomes

The expected learning outcomes for the course, listed below, will be assessed through performance on guided classroom discussions and embedded questions within the exams.

- ✦ Be able to apply scientific reasoning and critical thinking to the solution of problems.
- ✦ Gain an understanding of fundamental principles, generalizations, and theories of optics.
- ✦ Develop and demonstrate technical knowledge of major topics outlined in the course overview.

COURSE COMPONENTS

Class Meetings & Attendance

Attendance is mandatory, will be recorded daily, and will contribute directly to your participation grade in the course. A spirit of honesty will be maintained in the attendance policy. Note that you are responsible for everything that we do in class, so it is to your advantage to attend. The lecture and laboratory periods will not be treated as isolated components of the course. Lecture material may be introduced during the laboratory period and laboratory activities may be covered during the lecture periods.

Several times throughout the term you will be asked to complete in-class assignments that will directly contribute to your participation grade. These can be either individual or team-based exercises and may or may not be announced. You will be expected to scan all completed in-class assignments to PDF and submit them for grading via Gradescope. No makeup in-class assignments will be given.

Please read the section of this syllabus regarding classroom etiquette for further information on expectations for attendance.

Preparation for Class Meetings

You are expected to bring your assigned texts, paper for notes, and a suitable writing utensil (preferably a pencil with an eraser), a scientific calculator, and your ASU Student ID with you to every class meeting. You will likely find it helpful to read ahead in the textbook before each class.

Laboratory

You will receive one grade for lecture and laboratory combined. Laboratory is not a separate course and is not in any way optional. Throughout the term you will work in groups to complete experiments which you will document in a laboratory notebook as outlined in the guidelines below. Your laboratory notebook will be reviewed by the lecturer and will directly contribute to your overall grade in the course. Additionally, you will be asked to present at least two of your experiments as either a poster, oral presentation, or journal article style manuscript.

Laboratory Notebook Guidelines

In professional laboratories, laboratory notebooks are considered legal documents and as such are maintained to very high standards.

A laboratory notebook is a complete record of the actions you take, equipment you use, observations you make, and relevant thought processes that would enable another person to reproduce your results.

This means that items such as the following should be included:

- Bookkeeping
 - Date and list of group members.
 - Title of experiment.
 - A brief statement of purpose (2-3 sentences).
- Setup
 - A comprehensive list of equipment.
 - Neatly drawn schematics or diagrams of the apparatus.
 - A brief description of procedure; ordered lists are recommended.
- Observations
 - All that happens whether planned or unplanned.
 - All raw data, generally in the form of clearly labeled, orderly tables.

- Data Analysis
 - Sample calculations written out in detail using proper mathematical grammar.
 - Tables, graphs, or plots of results.
 - A brief discussion of your results.
- Future
 - Offer a brief summary of what, why, and how you would improve the experiment.

Each student in this class will maintain their own individual laboratory notebook. It is understood that data recorded during experiments, calculations with those data, and relevant data analyses will be similar between group members; however, it is expected that each individual group member will document these by hand in their own notebook. The only exceptions are computer generated data visualizations (i.e. graphs or plots) which may be printed and stapled into the laboratory notebook.



Below is a list of formatting guidelines that will be observed:

- ✦ All handwritten entries will be made in pen.
- ✦ Any errors will be denoted by a simple strikethrough (i.e. single horizontal line).
- ✦ Every page of the notebook will be numbered sequentially on the bottom outside corner.
- ✦ Every entry will begin with the date and list of those working with you.
- ✦ When you include datasheets, photographs, graphs, etc. use a staple to cleanly and permanently attach ONE edge.

Homework

Homework will be assigned by chapter. It is strongly recommended that you solve all assigned homework neatly on standard letter sized notebook, graph, or printer paper.

Homework will not directly count as a part of your final grade in the class; however, it is not optional. Completing all assigned homework is crucial for your understanding of the course material. You will likely find working through homework problems to be a productive way to prepare for exams.

Exams

Three (3) take home exams will be administered as scheduled. No makeup exams will be given, so please plan accordingly. All exams will be made available via Blackboard and you are expected to print a copy of the exam, scan your completed exam to PDF, and then submit for grading via Gradescope by 11:59pm on the due date.

Please see the course calendar on the last page of this syllabus for scheduled exam dates and anticipated content.

Exam Rules

Calculators, the assigned textbook, instructor-provided materials, and your own lecture notes are permitted. Cell phones and smart watches are not considered to be calculators regardless of what apps may have been installed. Any other reference materials (including sources found via the internet) are not permitted. If I believe that you have made use of restricted materials or devices during the exam, you will be issued a zero for the exam without exception and may be reported to the Office of Student Conduct.



STRATEGIES FOR SUCCESS

Be prepared! These tips will help you keep up, make for more productive classroom interaction, and help you be prepared for homework, labs, and exams that make up your semester grade.

- ✦ Read the material in the text before we cover it in class, and regularly study your notes from previous class meetings.
- ✦ Pay special attention to example problems and derivations introduced during class. Derivations provide examples of how equations can be manipulated and draw connections between seemingly unrelated phenomena. You will often find that many techniques used in derivations can also be applied when solving assigned problems.
- ✦ Begin all homework assignments as soon as possible. Don't get behind or wait until just before an exam to begin.
- ✦ If you are stuck, come by my office with questions during office hours or make an appointment to meet at another time.
- ✦ Once you can work through a problem with your notes, book, study group, etc., be sure you can rework it entirely on your own.
- ✦ Don't "blow off" any exam just because there is a dropped score. The purpose of the dropped score is in case of illness or other extenuating circumstances.
- ✦ Keep up with your laboratory notebook! Document while performing experiments rather than trying to write things down after the fact. Also, do your best to not put off any required data analysis. You will find it easier to work with the data when everything is fresh in your mind.

CLASSROOM ETIQUETTE

Attending lecture is mandatory. You are considered both advised and responsible for anything discussed during lecture. Leaving lecture early or arriving late is considered both rude and distracting. If you have an expected reason to depart early, please inform the lecturer at the beginning of class.

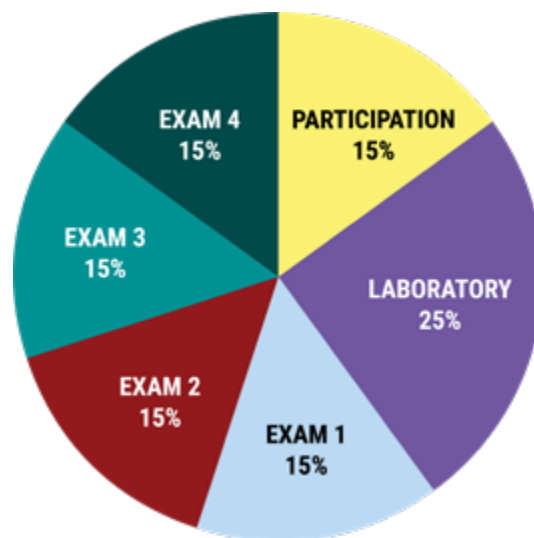
All students are expected to be respectful of their peers during lecture by not becoming a distraction. If you become a distraction to other students, then you will be dismissed from class for that day. Some actions, including but not limited to the following, will result in you being considered a distraction to your peers: repeatedly arriving late, reading unrelated material, using your cell phone in any way outside of approved exercises, visiting with your neighbor, sleeping, eating, "vaping," and the use of any and all tobacco products.

No laptops or any other electronic devices are allowed in class unless the need for such a device for reason of a disability is documented by Student Disability Services.



GRADING POLICIES

The following scores will be recorded during the course of the semester: Participation, Lab, Exam 1, Exam 2, Exam 3, Final Exam. The course grade will be the weighted average of Participation at 15%, Lab at 25%, and Exams at 15% each.



There are no makeup exams; however, the final exam score can replace the lowest midterm. In other words, the four highest scores from Exam 1, Exam 2, Exam 3, Final Exam, and Final Exam will be considered for the course grade.

Your letter grade will be determined on the following scale: F (≤ 49), D (50-59), C (60-74), B (75-89), A (90-100). The instructor reserves the right to lower the boundaries between letter grades at their discretion. The boundaries will never be raised above what is shown.

Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have a serious illness or personal misfortune that would keep you from completing course work.

Documentation may be required. [Please see ASU Operating Policy 10.11 Grading Procedures for more information.](#)

INCLUSIVE LEARNING ENVIRONMENT *(Adapted from Yale Center for Teaching and Learning)*

Civility and Respect

Our university supports and wants to foster a civil, respectful, and open-minded climate so that all of us can live and work in an environment free of harassment, bias-motivated behaviors, unfair treatment, and fear. The university expects all members of our community to refrain from actions or behaviors that intimidate, humiliate, or demean persons or groups or that undermine their security or self-esteem based on traits related to race, ethnicity, country of origin, religion, gender identity/expression, sexual orientation, age, or physical or mental ability, including learning and/or developmental disabilities and past/present history of mental disorder or other category protected by state or federal law.

Student Disability Services

Angelo State University is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ada@angelo.edu. For more information about the application process and requirements, visit the [Student Disability Services website](#).

The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas A. Swafford

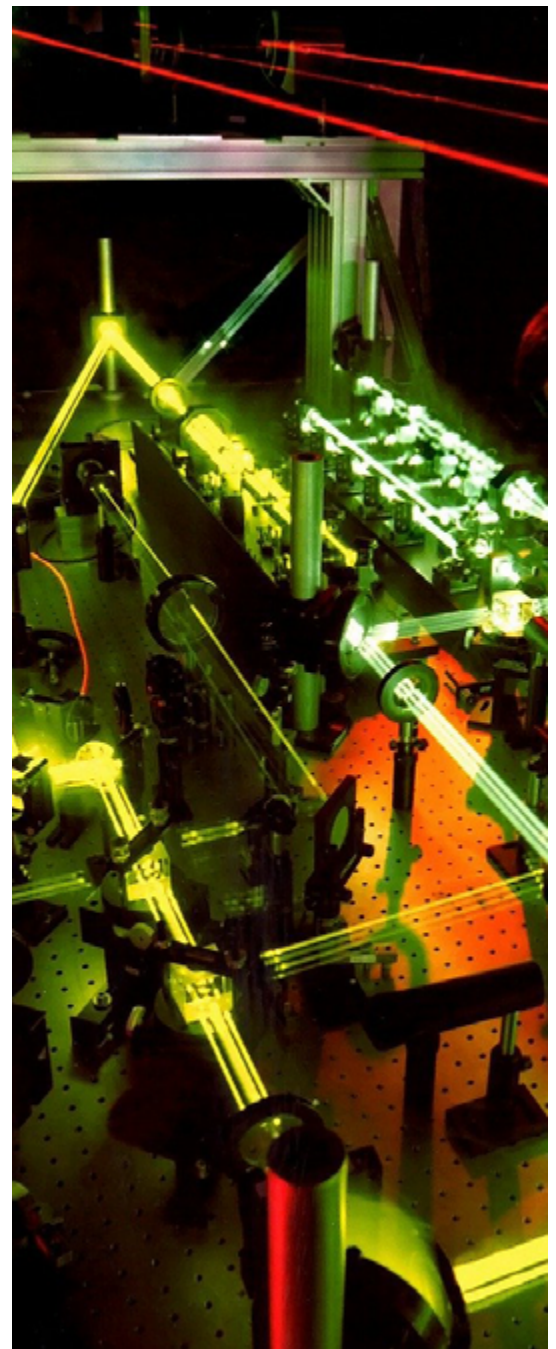
Director of Student Disability Services

Email: dallas.swafford@angelo.edu

Houston Harte University Center, Room 112

Office Email: ada@angelo.edu

Office Phone: [325.942.2047](tel:325.942.2047)



Title IX

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

Students are encouraged to report any incidents of sexual misconduct directly to ASU's Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.

Director of Title IX Compliance and Title IX Coordinator

Email: michelle.boone@angelo.edu

Mayer Administration Building, Room 210

Office Phone: [325.942.2022](tel:325.942.2022)

Report an incident: www.angelo.edu/incident-form

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit: www.angelo.edu/title-ix.

Note from Dr. Holcomb: As a faculty member at Angelo State, I am a mandatory reporter and am obligated to report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center ([325.942.2371](tel:325.942.2371)), the 24-Hour Crisis Helpline ([325.486.6345](tel:325.486.6345)), or the University Health Clinic ([325.942.2171](tel:325.942.2171)).



Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See [ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day](#) for more information.

ACADEMIC INTEGRITY

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the [Statement of Academic Integrity](#).

Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#) in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the [ASU Writing Center](#).

Copyright Policy

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

GENERAL POLICIES RELATED TO THIS COURSE

All students are required to follow the policies and procedures presented in these documents:

- ✦ [Angelo State University Student Handbook](#)
- ✦ [Angelo State University Catalog](#)

Modifications To The Syllabus

All components of this syllabus are subject to modification at the lecturer's discretion. In particular, the ongoing COVID-19 pandemic may require changes in course delivery, grade evaluation, schedule, and content on potentially short notice.



COURSE CALENDAR



Our tentative course calendar is below. I reserve the right to change this calendar as needed; however, I will inform you in class or via email in advance of any changes.

Remember to check our Blackboard class page regularly for class advisories and updates. Also remember to check your university email (RamMail) account regularly for other important university correspondence.

Week of	Events	Lecture Topic	Chapter
Jan. 17	Tuesday, Jan. 18: First class meeting Friday, Jan. 21: Last day to make schedule changes for this term	Mathematical Tools	
Jan. 24	Monday, Jan. 24: Laboratory - Experiments 1, 2, 3, 4 Available	Mathematical Tools	
Jan. 31	Thursday, Feb. 03: Drops and withdrawals are now recorded on transcripts Thursday, Feb. 03: Exam 1 Assigned (Math Tools)	Nature of Light	1
Feb. 07	Thursday, Feb. 10: Exam 1 DUE at 11:59pm via Gradescope	Geometric Optics	2
Feb. 14		Aberration	2, 3
Feb. 21	Friday, Feb. 25: Laboratory - Experiments 1, 2, 3, 4 Close	Aberration	20
Feb. 28	Laboratory: Experiment Write-Up Week	Optical Instrumentation	3, 19
Mar. 07	Tuesday, Mar. 08: Laboratory Presentations	Optical Instrumentation	3, 19
Mar. 14	<i>Spring Break – No class</i>		
Mar. 21	Monday, Mar. 21: Laboratory - Experiments 5, 6, 7, 8 Available Thursday, Mar. 24: Exam 2 Assigned (Ch. 1–3, 19, 20)	Wave Optics	4, 5
Mar. 28	Thursday, Mar. 31: Exam 2 DUE at 11:59pm via Gradescope	Wave Optics	4, 5
Apr. 04		Lasers	6, 26, 27
Apr. 11		Lasers	6, 26, 27
Apr. 18	Thursday, Apr 21: Exam 3 Assigned (Ch. 4–6, 26, 27) Friday, Apr. 22: Laboratory - Experiments 5, 6, 7, 8 Close	Optical Interferometry	7, 8
Apr. 25	Thursday, Apr 28: Last day to drop or withdraw for this term Thursday, Apr 28: Exam 3 DUE at 11:59pm via Gradescope Laboratory: Experiment Write-Up Week	Optical Interferometry	7, 8
May 02	Tuesday, May 03: Laboratory Presentations Thursday, May 05: Last class meeting	Fiber Optics	9, 10
May 09	Tuesday, May 10: Comprehensive Final Exam Assigned May 06 due May 13		