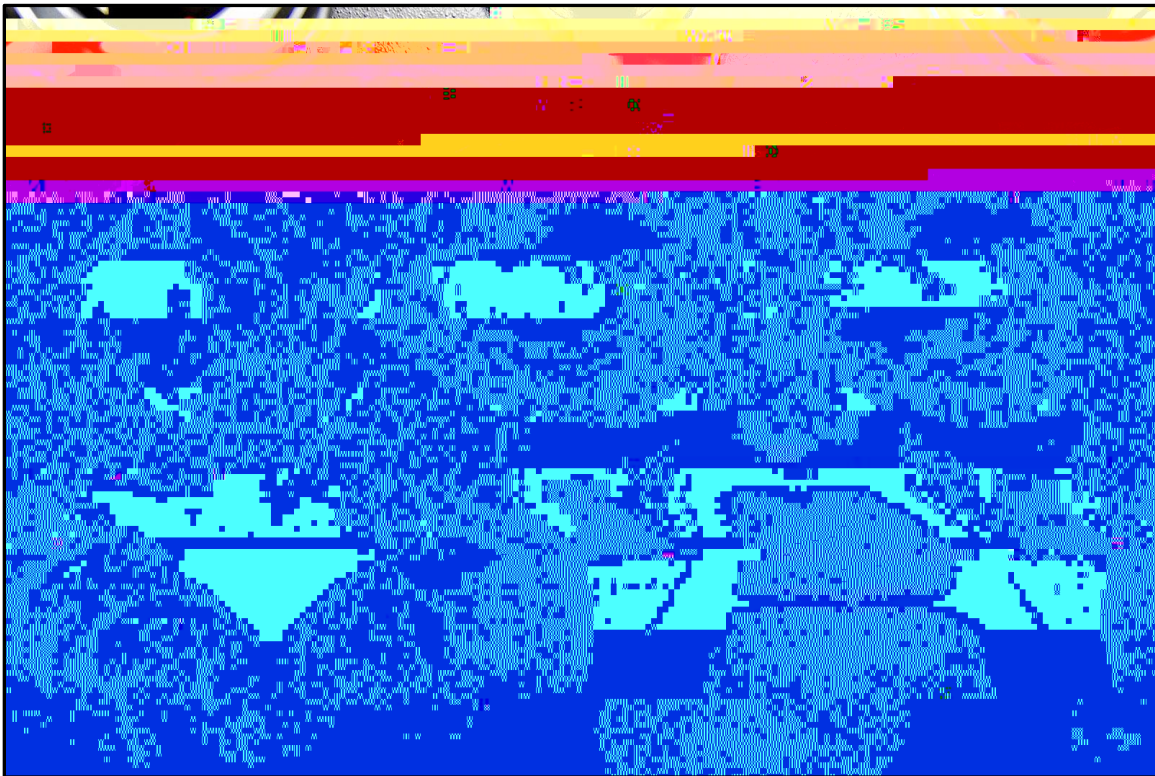# Physics 462

Geometrical and Physical Optics – 4 Credits

Instructor   Dr. Mark Conde

https://visionsource-mcphersonoptometry.com/wp-content/uploads/2018/03/eye-exam-machine.jpg

Overview

Description

This class will cover a broad range of topics in optics, including the nature and propagation of light; geometrical optics with mirrors, prisms, and lenses; polarization; superposition and interference; diffraction theory; nonlinear optics; Fourier optics; and coherent wave theory. These concepts will be covered in three one-hour lectures per week plus one three-hour laboratory session.

The course will follow the assigned textbook (Hecht) very closely. The emphasis in class will be on key concepts, rather than on complex mathematical derivations or proofs. Nevertheless, students will be expected to demonstrate mastery of the underlying mathematics in homework and exams.

Some topics will likely receive additional emphasis relative to that given by the textbook. These include compound thick lens systems, basic optical design, aberrations, and familiarity with common optical instruments. PHYS462 is not a General Education (GER) course.

Course goals and student learning outcomes

<u>Approximate</u> schedule

Week	Dates	Class Topics	Lab Sessions
1	Jan 11 - Jan 15	Class introduction; Hecht. chapter 2	
2	Jan 18 - Jan 22	Hecht chapters 3,4	Lab 1
3	Jan 25 - Jan 29	Hecht chapter 4	Lab 2
4	Feb 01 - Feb 05	Hecht chapter 5	Lab 3
5	Feb 08 - Feb 12	Hecht chapter 5	Review for exam
6	Feb 15 - Feb 19	Exam 1 (Wed). Hecht chapter 6	Lab 4
7	Feb 22 - Feb 26	Hecht chapter 6	Lab 5
8	Mar 01 - Mar 05	Hecht chapter 8	Lab 6
9	Mar 08 - Mar 12	Spring Break	
10	Mar 15 - Mar 19	Hecht chapter 8,7	Lab 7
11	Mar 22 - Mar 26	Hecht chapter 9	Review for exam
12	Mar 29 - Apr 02	Exam 2 (Wed). Hecht Chapter 9	Lab 8
13	Apr 05 - Apr 09	Hecht chapter 10	Lab 9
14	Apr 12 - Apr 16	Hecht chapter 10	Lab 10
15	Apr 19 - Apr 23	Hecht chapter 11,12	Lab 11
16	Apr 26 - Apr 30	Finals week	
17	May 03 - May 07	Grades posted	

Course components and instructional methods

Course materials

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whole prefers otherwise. I understand this is not ideal, but with existing covid-19 restrictions it is the best and safest lab experience that I can offer.

There will be no lab session during the first week of class, or during the weeks immediately prior the midterm and final exams. These sessions will be available for study and review with the instructor.

There will be eleven lab experiments. You must submit a written report for at least 10 labs. A passing grade in the labs is necessary to pass the course.

Note that I will be experimenting with the required format for Lab reports. I will not be requiring complete, traditionally formatted reports for every Lab. I will distribute a
for each lab that specifies how it is to be written up. In some cases, I will ask for relatively traditional long-form lab reports, whereas in others I will just be looking for a simple summary of your findings. This is an attempt to reduce the time burden that Lab reports have created for students in previous years.

Reports or worksheets from a given lab will be due at the start of the lab session in the following week. Please understand that in grading the reports, I am not looking to see if you
the measurements; that aspect of my grading carries negligible weight. The aspects of your lab work that I will be assessing are:

Have you demonstrated that you understand the technique?
Have you described the experiments clearly and completely enough that someone else could repeat the measurements and your subsequent analysis of results?
Have you included sufficient error analysis to allow you to state with confidence the uncertainties associated with all your numerical results?
Do you understand the results? Are they plausible? If not, have you identified possible reasons for this?
Is the report clear, complete, and well presented?

A well-written lab report should be concise
Your report must be complete, and must include sufficient detail to allow others to repeat

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given, at the discretion of the instructor. An unexcused absence for an exam will lead to 0 points earned on that exam.

Problem sets will generally not be accepted after the due date, without documented evidence of illness or genuine emergency. Students having documented clashes with other UAF commitments may pre-arrange alternate homework submission deadlines with me. All decisions regarding late homework or alternate deadlines will be at the discretion of the instructor.

Student conduct and academic honesty

It is the responsibility for each student to be informed about the policies for student conduct and safety at the University of Alaska. You are encouraged to read these policies at https://www.uaf.edu/student-affairs/student-resources/conduct.php#condu. It should go without saying that students are expected to do their own original work for all assignments. Any deviation from this may be considered academic misconduct and may result in a failing grade and referral to university authorities for possible disciplinary action.

In general, it is better to work with algebraic variables whenever possible; numerical values should not be substituted in until absolutely necessary.

Other issues

Complaints and concerns

You are always welcome to discuss your concerns with me. However, if you have a concern