

Optics I

PHYS 4650

Credit: 3 credits

Room: SER122

Time of class: 1:30 pm – 2:45 pm, Tuesday and Thursday weekly basis

Instructor: Titus Yuan, Phone #: 797-2959, email: titus.yuan@usu.edu, Office: SER318D

Course description:

This class focuses on the basic principles of geometrical optics, including, thin lens, thick lens, optical systems and basic analytic ray-tracking. It will also introduce the E&M theory on light, and describe how the light propagates through the medium, reflection and refraction, etc.

Goal and expectation:

The expectation is that students would gain the knowledge of optical system (paraxial optics), including the optical technologies involved in the performance of some optical instruments, such as telescope and FPI. The students are also expected to understand the E&M theory on light propagation in the medium, including reflection and refraction etc.

Course schedule:

Below is the proposed schedule. Please be aware that this list intends to show the estimated schedule and materials. Since the course is going to cover a lot of ground within one semester, we may not be able to discuss every item in the list, and the schedule could be changed slightly.

8/28 – 9/1 Introduction and basic principles of Geometric Optics

9/4 – 9/8 Reflection and Refraction (Paraxial Optics)

9/11 – 9/15 Fiber Optics

9/18 – 9/22 Thin lens and lens combination (Paraxial Optics)

9/25 – 9/29 Thick lens and Matrix Optics

10/02 – 10/06 Aberrations

10/09 – 10/13 Basic principles of Optical instruments

10/16 – 10/20 Interference (one class)

Mid-term exam TBD

10/23 – 10/27 Interference (continue)
10/30 – 11/03 Interferometers
11/06 – 11/10 Electromagnetic theory
11/13 – 11/17 The propagation of light
11/20 – 11/22 (one class) Superposition of waves
11/27 – 12/01 Thin film theory
12/04 – 12/08 Laser
12/11 – 12/15 Final exams

Grade:

50% homework; 50% exams (one mid-term exam before fall break and final exam). Homework will be handed out on weekly basis.

Note:

For Graduate students, this is not a core class and must be put on your plan of study with approval from your committee in order for tuition waiving. Student should have taken Physics for Scientists and Engineers I & II, and E&M.