

OPT 300 Course Syllabus

Course title:

Introduction to Optics

Instructor:

Dr. Anders M. Jorgensen
Workman 245
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Class hours:

Tuesday 9:30-11:45

Classroom location:

Workman 117

Office hours:

Tuesday 12-16

Textbooks:

1. Warren J. Smith: Modern Optical Engineering. The Design of Optical Systems, 3rd edition, McGraw-Hill. (You can order this book from www.amazon.com for \$70.36).
2. Handouts

Learning objectives:

1. Understand the fundamental principles of optical systems.
2. Understand how optical systems are designed, characterized, and analyzed.
3. Gain an understanding of some of the specific trade-offs that must be made in commercial and scientific optical systems.
4. Survey modern optical systems.

Prerequisites:

PHYS 122 or 132, MATH 231

Topics covered:

1. The electromagnetic spectrum, light wave propagation
2. Snell's law of refraction.
3. Image formation, perfect/Gaussian optics.

4. Aberrations.
5. Prisms and Mirrors.
6. The eye.
7. Aperture stops and their effects.
8. Depth of focus, resolution.
9. Optical materials, coatings.
10. Radiometry and photometry.
11. Basic optical systems, including telescopes, field lenses, microscopes, rangefinders, and zoom systems.
12. Image evaluation, aberrations, point spread functions.
13. Design of optical systems.
14. Examples of optical system designs.

Course work:

1. Course readings and discussion problems. You are expected to come to class prepared to discuss the assigned readings and problems.
2. Homework. Written homework will be assigned at the conclusion of every chapter.
3. Laboratory exercises. Approximately three computational labs will be assigned during the semester. You will also be required to demonstrate practical skills during separate exercises. A formal report is required for each laboratory.
4. Final exam. There will be a take-home final exam.

Grading policy:

1. Homework 30%
2. Active participation in class 10%
3. Computational Laboratory exercises 30%
4. Practical Laboratory exercises 10%
5. final exam 20%

Schedule: (tentative)

Date	Topic	Preparation	Hand in
Jan 16	Course Overview		
Jan 23	Chapter 1	Ch 1	
Jan 30	Chapter 2	Ch 2	Ch 1: 1-6
Feb 6	Chapter 3	Ch 3	Ch 2: 1-11
Feb 13	Optical Design Software	Study Oslo EDU	Ch 3: 1-4
Feb 20	Chapter 4	Ch 4	
Feb 27	Chapter 5	Ch 5	
Mar 6	Chapter 6	Ch 6	Ch 5: 1-6
Mar 13	Spring break		
Mar 20	Chapter 6	Ch 6	
Mar 27	Chapter 7	Ch 7	Ch 6: 1-14
Apr 3	Chapter 9	Ch 9	Ch 7: 1-5
Apr 10	Chapter 11	Ch 11	Ch 9: 1-9
Apr 17	Chapters 12, 13, 14	Chs 12, 13, 14	Ch 11: 1-3
Apr 24	Review		
May 1	Final Exam		

Computational Laboratory:

There will be three computational labs which will be assigned at regular intervals during the semester.

Physical Laboratory:

You will be required to demonstrate practical skills in one or more laboratory exercise to be scheduled by arrangement during the semester.