

OPTI 471B Syllabus (Spring 2012)

(Revised on 10/19/2012)

website: www.optics.arizona.edu/opti471b

Instructor Information

- Prof. Hong Hua, Rm 727 (west wing)
- Email: hua@optics.arizona.edu (Preferred method of contact)
- Phone: 520-626-8703

TA Information

- TBD
- TBD

Course Overview

OPTI471B. Advanced Optics Laboratory (2) II. Gaussian beam optics; Optical element testing; On-axis and Off-axis aberration testing; MTF measurement; Interferometry; Imaging system calibration; Human visual system.

Pre-requisites

- Opti 471A, OPTI 340

Course Objectives

- Be able to apply the optical principles discussed in the junior and senior level optics courses to experimental situations and observe laboratory phenomena;
- Develop skills in assembly and alignment of optical systems in the laboratory (students will assemble their labs themselves);
- Learn to clearly and accurately summarize and communicate experimental procedures and results;
- Learn to operate as a team.

Topics to Cover

- Gaussian beams:
 - Beam alignment
 - Propagation and profiling
 - Filtering, expanding, imaging, collimation and propagation
- Optical element testing:
 - Radius of curvature testing of optical elements with interferometers
 - Liquid crystal cells
- Aberrations and optical testing:

- Measurement of spherical aberration;
- Measurement of off-axis aberrations;
- Measurement of the Modulation Transfer Function
- Aberration testing with interferometers
- Imaging system calibration
 - Imaging system calibration
 - Image acquisition, analysis and processing
- Human visual system and perception

Class/Laboratory Schedule

- One 4-hour lab session per week, 15-week semester;
- One 50-minute recitation session per week.

Text & Readings

- No text required
- Selected readings will be assigned. They will be available for downloading through the course website.
- Instructor's lecture notes and lab instructions will be available for downloading through the course website.

Assignments and Grading Policy

The final grade will be based on attendance, pre-lab assignments, lab notebooks, video presentations, and quiz.

- Pre-lab assignments (30%)
- Post-lab assignments (10%)
- Team lab notebook (15%)
- Weekly video presentation (15%)
- Quiz (20%)
- Final Lab Report (5%)
- Mandatory attendance (Lecture and lab): 5%

Late submission policy

- No late submission is accepted for pre-lab assignments

Office Hours

- Instructor: Monday: 10:30AM~Noon or by appointment if other times are needed.
- TAs: Friday morning 8~9AM, West Wing 8th floor open area

Week-by-week lab schedules

Lab Schedule and Lecture Notes		
	Schedule	Lecture Notes
Introduction	Week 1	Course introduction
Lab1	Week 3	Kinematic Design and Gaussian Beam Alignment
Lab2	Week 4	Geometrical Approach to Gaussian Beam Profiling and Propagation
Lab3	Week 5	Gaussian Beam Imaging
Lab4	Week 6	Gaussian beam collimation and optical testing with shear plate interferometer Examples
Lab5	Week 7	Measurement of Spherical Aberration
Lab6	Week 8	Measurement of off-axis aberrations
Lab7	Week 9	Measurement of MTF Matlab program Matlab data example
Lab8	Week 11	Testing optics with shear plate interferometers Wyant's notes on interferogram analysis
Lab9	Week 12	Testing optics with Shack Cube interferometers
Lab10	Week 13	Imaging system calibration
Lab11	Week 14	Characterizing LCD polarization
Lab12	Week 15	Color, Vision & Perception
Make up	Week 16	Make up
		Quiz
	Week 17	Lab books and report due