Syllabus: Advanced Optics Laboratory I (Opti471A)

Professor: Mohamed ElKabbash, Wyant College of Optical Sciences

Fall Semester, 2025

1 Contact Information

- Room: GCRB 309
- Phone: 520-647-4492
- Email: melkabbash@arizone.edu

2 Class Schedule

- Lectures: Mondays, 11:00 – 11:50, in person, Rm 410
- Laboratory: Meinel 454. Labs start the week of August 28th.

3 Laboratory Sections

Section	Day	Time	TA
C (9)	T	8:00 – 11:50 am	Bryce Stickley
D (10)	W	1:30 – 5:20 pm	Bryce Stickley

4 Teaching Assistants

- Bryce Stickley: bstickley@arizona.edu

5 Textbook

No textbook. Handouts will be provided and background/reference readings are posted on the class D2L site.

6 Lab handouts

Each lab has a handout describing the laboratory procedures, prelab, and postlab questions. Lab instruction handouts may be revised during the term so check for current versions.

7 Lab notebooks

Students are highly recommended to keep detailed lab notebooks for recording procedures, data, and analysis. Lab notebooks will not be collected or graded.

8 Exams

There will be a midterm exam and a final exam. The exams emphasize conceptual understanding of fundamental material from lectures, and also cover some specific procedures / results from the labs.

9 Filmed Video Abstracts

For 5 of the 11 labs, each group should record a 4-minute video abstract. At the end of your lab session the TA can assist you in filming your group's lab summary. Within the four minutes everyone in the group must speak at least once. All filming must be done during the lab session, and the videos (or a link) uploaded to D2L within 24 hours of the end of lab. Each video summary should cover all of the following points:

1. Briefly explain the fundamentals behind the one or two key concepts that are being explored in the lab.

2. Why are these fundamental concepts worth learning about?

3. What were the one or two most significant results?

4. How do these results compare with your prior knowledge? (Prior knowledge can come from intuition, other classwork, theory, information from lecture, etc.)

5. Explain what you liked & did not like about the lab.

9.1 Grading

- Pre-lab and post-lab questions – 35%
- Video summaries – 20%
- Laboratory report (first draft) – 5%
- Laboratory report (final draft) – 20%
- Midterm exam – 10%
- Final exam – 10%

9.2 Prelab and Postlab Questions

- You must show work to get full credit.
- All material is to be turned in online using D2L $\rightarrow$ Assignments.

9.3 Written Lab Report

Each student will be required to select one lab during the semester on which to submit a polished lab report that includes descriptions of the procedures, data and analysis (including error analysis) as well as references to relevant literature. This report emphasizes quality of content and presentation over quantity of data. The format will be that of an Optics Letters journal paper, but limited to 3 pages. The first draft of the report is due Monday, November 20th. Feedback will be provided by Monday, November 27th. The final draft is due Thursday, December 7th.

10 Lab Makeup Policy

If you are sick, let your TA and the Professor know via email and do not come to lab. The geometric average of the labs with the least and most number of lost prelab & postlab points will be counted toward your final grade. Other missed labs will receive pre-lab, post-lab and video summary grades of zero. If you must miss more than one lab, you should contact the Dean of Students Office `DOS-deanofstudents@email.arizona.edu` to share documentation about the challenges you are facing.

11 Smartphones and Laptops

Smartphones must be put away during lectures. Laptops may be used for taking notes, but otherwise should be away as well. During laboratories, necessary phone conversations should take place in the hall outside the laboratory. Laptop use in the laboratories is encouraged to assist in the generation of data plots and analysis.

12 Course Objectives

1. Apply the optical principles discussed in the junior and senior level optics courses to experimental situations.
2. Clearly and accurately summarize and communicate experimental procedures and results.
3. Demonstrate knowledge and understanding of error analysis and curve fitting.
4. Learn common optical methods and procedures that are routinely used in the optics and photonics industry.
5. Understand safe and proper handling of common optical equipment.
6. Work in teams to solve problems.

13 Lab Setup and Topics

Eleven labs related to optical test and measurement are scheduled. Two labs are set up and available for two weeks at a time. Each section is divided into the A groups, which do one of the labs in the first week, while the B groups do the other lab. In the

following week, the two groups switch places to do the other lab that they didn't do during the first week. Please refer to the attached calendar for the schedule (which may be subject to change). The labs are:

1. Radiometry
2. Monochromators and Spectrometers
3. Faraday Rotation and Stress Optic Coefficient
4. Acousto-optic Modulators and Deflectors
5. The Sagnac Interferometer
6. Mueller Matrix Polarimetry
7. Luminescence
8. Fiber Optic Coupling, Fiber Splicing and Optical Circulators
9. Schlieren Imaging and Optical Element Testing
10. Metasurfaces

14 Academic Integrity

According to the Arizona Code of Academic Integrity, "Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own." Unless otherwise noted by the instructor, work for all assignments in this course must be conducted independently by each student. **CO-AUTHORED WORK OF ANY KIND IS UNACCEPTABLE**. Misappropriation of exams before or after they are given will be considered academics misconduct.

14.1 Misconduct Penalties

Misconduct of any kind will be prosecuted and may result in any or all of the following:

- Reduction of grade
- Failing grade

- Referral to the Dean of Students for consideration of additional penalty, i.e., notation on a student's transcript re. academic integrity violation, etc.

15 Students with a Learning Disability

If a student is registered with the Disability Resource Center, he/she must submit appropriate documentation to the instructor if he/she is requesting reasonable accommodations. More details can be found at DRC website.

16 Syllabus Changes

The information contained in this syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.