

# Syllabus: Advanced Optics Laboratory I. Opti471A

## Syllabus Advanced Optics Laboratory (Senior Lab) Optical Sciences: OPTI 471A Fall Semester, 2018

### Professor:

Professor Euan McLeod, College of Optical Sciences, Room 623  
520-626-7212; [ewanmc@optics.arizona.edu](mailto:ewanmc@optics.arizona.edu)

**Lectures:** Mondays, 10:00 - 10:50 in Meinel 422

**Laboratory:** Meinel 454

### Laboratory Sections

Section	Day	Time	TA
A	M	2:00 – 5:50 pm	Jilian Nguyen
C	T	8:00 – 11:50 am	Matthew Noyes
D	W	2:00 – 5:50 pm	Jilian Nguyen
F	R	8:00 – 11:50 am	Matthew Noyes

**Class Web Site:** D2L

### Prof. McLeod's Office Hours:

Mondays, immediately after class (Meinel 422)  
Tuesdays 10am-11am in Meinel 623

### Teaching Assistants:

Jilian Nguyen: [jiliannguyen@email.arizona.edu](mailto:jiliannguyen@email.arizona.edu)  
Matthew Noyes: [mrmoyes@email.arizona.edu](mailto:mrmoyes@email.arizona.edu)

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

**Lab handouts:** Each lab has a handout describing the laboratory procedures. The prelab questions are to be completed and handed in at the beginning of your laboratory session in 454. (**Exception:** if you are in the Monday lab section and the material for your lab that week was just covered in the lecture earlier that day, then you may turn in your prelab before 5pm on Tuesday.) The postlab questions are due in class at the lecture following the lab. Lab instruction handouts may be revised during the term so check for current versions.

**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 but can be used during tests. Lecture notes and copies of relevant information from handouts can also be put into the lab notebook.

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**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.

### Filmed video abstracts

Every week each group will record a 4-minute video abstract. At the end of your lab session the TA will 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 sent to [uanmc@optics.arizona.edu](mailto:uanmc@optics.arizona.edu) 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
6. (when applicable) Some labs may also include specific questions to be answered in the video.

**Lab makeup policy:** One lab can be missed and made up during the semester. Other missed labs will receive pre-lab, post-lab and video summary grades of zero.

### 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 last day to hand in this report is December 4th.

### Grading:

- Pre-lab and post-lab questions - 35%
- Video summaries - 10%
- Mid-term exam - 20%
- Laboratory report - 10%
- Final exam - 25%

### Prelab and postlab questions

- You must show work to get full credit.
- Prelab questions are to be handed in at lab (room 454) before you start that week's lab (Exception: if you are in a Monday lab section and the material for your lab that week was just covered in the lecture earlier that day, then you may turn in your prelab before 5pm on Tuesday.)
- Post lab questions are due at the lecture after the lab.

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- Questions are graded on a scale of 0-10 points. Three points per problem will be deducted for late homework. The labs have different numbers of questions so some labs may contribute more significantly than others to your final grade.
- Homework solutions will be available in lecture upon request but will not be posted to D2L.

### 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.

### 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.

### Lab Setup and Topics

Eleven labs related to optical test and measurement are scheduled. Two labs are available for setup 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 Spectrophotometers
3. Acousto-optic Modulators and Deflectors
4. Mueller Matrix Polarimetry
5. Luminescence
6. Faraday Rotation and Stress Optic Coefficient
7. The Sagnac Interferometer
8. Fiber Optic Coupling, Fiber Splicing and Optical Circulators
9. Microscopy
10. Mode-Locked Fiber Laser
11. Schlieren Imaging and Optical Element Testing

### Academic Integrity (<http://web.arizona.edu/~studpubs/policies/cacaint.htm>)

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

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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 academic misconduct.

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.

### **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. (<http://drc.arizona.edu/instructor/syllabus-statement.shtml>).

*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.*