Syllabus: Advanced Optics Laboratory I. Opti471A

Syllabus
Advanced Optics Laboratory (Senior Lab)
Optical Sciences: OPTI 471A
Fall Semester, 2016

Professor:
Professor Euan McLeod, College of Optical Sciences, Room 623
520-626-7212; euanmc@optics.arizona.edu

Lectures: Mondays, 10:00 - 10:50 in Meinel 432

Laboratory: Meinel 454

Laboratory Sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Day</th>
<th>Time</th>
<th>TA</th>
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<tr>
<td>A</td>
<td>M</td>
<td>2:00 – 5:50 pm</td>
<td>Jay Voris</td>
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<td>B</td>
<td>M</td>
<td>6:00 – 9:50 pm</td>
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<td>C</td>
<td>T</td>
<td>8:00 – 11:50 am</td>
<td>David Sommitz</td>
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<td>D</td>
<td>W</td>
<td>2:00 – 5:50 pm</td>
<td>Goutham Gunanjipalli</td>
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<td>E</td>
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<td>8:00 – 11:50 am</td>
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Class Web Site: D2L

Prof. McLeod’s Office Hours: Tuesday 1:00 – 2:00pm or by appointment.

Teaching Assistants:
David Sommitz: dsommitz@gmail.com
Jay Voris: jvoris@optics.arizona.edu
Goutham Gunanjipalli: ggunanjipalli@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. 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.

Exams: There will be a midterm quiz and a final exam.
Filmed lab summaries
Every week each group will record a 4-minute video oral lab summary. 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. Excerpts will be shown in class.

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 comprehensive lab report that includes detailed descriptions of the procedures, data and analysis (including error analysis) as well as references to relevant literature. The last day to hand in this report is December 5th.

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

Prelab and postlab questions
- Prelab questions are to be handed in at lab (454) before you start that week’s lab.
- Post lab questions are due at the lecture after the lab.
- Prelab questions for the first two weeks of labs can be handed in together with their respective post lab at lecture.
- Questions are graded on a scale of 0-10 points. Three points per problem will be deducted for late homework.
- Homework solutions will be available in lecture 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 design problems.

**Lab Schedule**

Eleven labs related to optical test and measurement are scheduled. Labs are available for setup for two weeks at a time. Each section is divided into the A groups which start each two week period with the first lab listed (Lab 1, Lab 3, ...), while the B groups start with the second lab listed (Lab 2, Lab 4,...). In the second week of the two week period the groups switch places to do the lab that they didn’t do during the first week. The following lab schedule is subject to change.

- August 22 - Lecture 1: Expectations, Error Analysis, Curve Fitting, Lab Orientation
- August 29 – Lecture 2: Lab 1 – Monochromators and Spectrophotometers
- September 7 – No Lecture – Labor Day Holiday
- Two weeks starting Monday, September 12th
  1. Monochromators and Spectrophotometers (Lecture 8/29)
  2. Incoherent Sources (Lecture 9/12)
- Two Weeks starting Monday, September 26th
  3. Mueller Matrix Polarimetry (Lecture 9/19)
  4. Acousto-optic Modulators (Lecture 9/26)
- Two Weeks starting Monday, October 10th
  5. Sagnac Interferometer (Lecture 10/3)
  6. Faraday Effect and Stress Optic Coefficient (Lecture 10/10)
- October 17 – Mid-term exam
- Two Weeks starting Monday, October 24th
  7. Fluorescence (Lecture 10/24)
  8. Polarizing Interferometer (Lecture 10/24)
- Two Weeks starting Monday, November 7th
  9. Geometrical Optical Tests: Foucault, Star and, Schlieren Tests (Lecture 10/31)
  10. Fiber Coupling & Splicing, Optical Isolators, and Optical Circulators (Lecture 11/7)
- Two Weeks starting Monday, November 14
  11. Modelocked Fiber Laser (Lecture 11/14)
  Note: No Lecture on November 21
- Nov. 28 – Review lecture
- Dec. 5 – In class final
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 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.

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.