

OPTI 468/568: Introduction to Optical Spectroscopy Effective Spring 2014

Description:

The objective of this course is to introduce optical spectroscopy methods that widely used in physics, chemistry and biological sciences, provide knowledge for estimating applicability ranges of various methods, and teach basics of planning and designing spectroscopy instruments.

Prerequisites:

OPTI 370, OPTI 340, ECE 207 or 220

Location and Times:

TBD

Instructor Information:

Professor Leilei Peng
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Expected Learning Outcomes:

- To become familiar with widely-used optical spectroscopy methods (across multiple disciplines).
- To demonstrate ability to select appropriate methods of optical spectroscopy based on applicability.
- To demonstrate the ability to plan and design spectroscopy instruments
- To demonstrate oral presentation skills (graduates only)

Required Texts:

Optical Spectroscopy: Method and Instrumentation, ISBN 0444521267 (Strongly Recommended)

Topics:

1. Basic light-matter interactions: absorption, emission, elastic scatter, Raman scatter, and second harmonic generation.
2. Optical measurements: noise statistics, photon detectors and cameras.
3. Steady state absorption spectroscopy: dispersive absorption spectrometer and Fourier transform spectrometer.
4. Steady state emission spectroscopy: fluorometer.

5. Time-resolved photon detection: time-correlated single photon counting (TCSPC), streak camera, and gated image intensifier.
6. Fluorescence lifetime spectroscopy: time-domain and frequency domain.
7. Ultrafast-pulse measurement methods: autocorrelation and frequency-resolved optical gating (FROG)
8. Time-of-flight measurement methods: Optical Frequency-Domain Reflectometry (OFDR), and Optical Coherence Tomography (OCT)

Number of Exams and Papers:

One midterm exam and one term paper will be required.

Course Policies:

Grading Policy

	<u>Undergraduates</u>	<u>Graduates</u>
Homework:	20%	20%
Midterm Exam:	30%	30%
Term Paper:	50%	30%
Oral Presentation:		20%
Total:	100%	100%

The final grade will be determined according to the cumulative percentage earned such that 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 60% = E.

Graduate students will be required to give an oral presentation during the last week of class on the topic of the term paper.

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.

Attendance Policy

It is important to attend all classes, as what is discussed in class is pertinent to adequate performance on assignments and exams. If you must be absent, it is your responsibility to

obtain and review the information you missed. This is especially important in this course where a substantial amount of course material will emerge through class discussion.

"All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored."

Classroom Behavior

The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.web.arizona.edu/threatening-behavior-students>.

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.