

Special Topic-Electronic Spectroscopy (CHEM 7640) 1 Credit

Professor: Yi Rao

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Office Hours: Wednesday (3:00 -5:00 pm)

Class meeting place & time:

Friday (5:00 – 6:25 pm, in-person, Widtsoe 330)

Course Description: The goal of this course emphasizes basic concept and applications of electronic spectroscopy. The topics of the course include light-matter linear interactions, energy diagram of electronic transitions, light sources, detectors, linear electronic spectroscopy, fluorescence spectroscopy, time-resolved electronic spectroscopy, and time-resolved fluorescence spectroscopy.

Course Objectives: This class is designed to introduce you to basic concept of electronic spectroscopy, optics, and detection techniques used in modern analytical chemistry. Topics are considered both from the perspective of the underlying physics as well as from the perspective of applications into condensed phases within the scientific community. Students will be expected to think critically about each topic through two time-resolved experiments and in-class discussion.

Required textbooks and other materials:

- No
- Additional materials will be distributed
- Reference books:
 1. *Symmetry and Spectroscopy*, Daniel C. Harris and Michael D. Bertolucci, Dover Publications, Inc., New York.
 2. *Principles of Fluorescence Spectroscopy*, Joseph R. Lakowicz, Third Edition, Springer.
 3. *Spectra of Atoms and Molecules*, Peter F. Bernath, Third Edition, Oxford University Press.

Course Fees: No.

Attendance is mandatory. If you miss more than three meetings for the entire semester, your grade will drop one letter grade and you will forfeit all extra bonus points

Homework: Homework will be assigned. Due dates for these assignments will be made when homework is announced.

Grading: Grades are based on scores obtained on attendance, homework, in-class-discussion, two reports, and a final exam. The final quiz is 30 points.

Maximum Points	Task
40	Attendance
20	Homework
20	Reports
20	Final exam
100	Total Points

Tentative Grading Scale

A: 100-90% B: 89-80% C: 79-70% D: 69-60% F: below 60%

Course Withdrawal: Students may withdraw from Chemistry 7640 as outlined in the on-line edition of the Utah State University General Catalog (see: <http://catalog.usu.edu/content.php?catoid=4&navoid=489> Dropping_Courses).

Additional Provisions: The administration of Chemistry 7640 will adhere strictly to the USU Academic Policies outlined in the on-line edition of the Utah State University General Catalog (see: <http://catalog.usu.edu/index.php>). The complete code of Policies and Procedures for Students can also be viewed online at: <http://catalog.usu.edu/content.php?catoid=12&navoid=3139>.

Disability Statement: In accordance with the Americans with Disabilities Act, reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation in Chemistry 7640. A student who requires an accommodation must contact the Instructor. The disability must be documented by the Disability Resource Center. In cooperation with the Disability Resource Center, reasonable accommodation will be provided for students with Disabilities. Course material may be requested in alternate formats through the Disability Resource Center.

Tentative Course Outline for CHEM 7640 (Nonlinear Optical Spectroscopy)

- Basic principle of light-matter interactions
- Optical processes and energy diagrams of molecules
- Light sources and working principles
- Detectors and signal collections
- Electronic and fluorescence spectroscopy
- Time-resolved electronic spectroscopy
- Time-resolved fluorescence spectroscopy

Tentative Schedule

Week 1: February 11th

Week 2: February 18th

Week 3: February 25th

Week 4: March 4th

Week 5: March 11th

Week 6: March 18th

Week 7: March 25th

Week 8: April 1st (Lab, 3 hours)

Week 9: April 8th (Lab, 3 hours)

Additional Provisions: The administration of Chemistry 7640 will adhere strictly to the USU Academic Policies outlined in the on-line edition of the Utah State University General Catalog (see: <http://catalog.usu.edu/index.php>). The complete code of Policies and Procedures for Students can also be viewed online at: <http://catalog.usu.edu/content.php?catoid=12&navoid=3139>.

Disability Statement: USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the Disability Resource Center (DRC) as early in the semester as possible (University Inn # 101, 435-797-2444, drc@usu.edu). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations. In accordance with the Americans with Disabilities Act, reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation in Chemistry 3090. A student who requires an accommodation must contact the Instructor. The disability must be documented by the Disability Resource Center. In cooperation with the Disability Resource Center, reasonable accommodation will be provided for students with Disabilities. Course material may be requested in alternate formats through the Disability Resource Center.

COVID-19 Classroom Protocols

In order to continue to provide various forms of face-to-face instruction at USU, and to limit the spread of COVID-19 during the pandemic, students are asked to follow certain classroom protocols during the Spring 2022 semester. Face coverings are strongly encouraged in all classrooms and teaching laboratories.

- Strongly encourage you to wear masks. This will help maintain in-person sessions through the semester.
- Strongly encourage you to get vaccinated and upload their proof of vaccination at aggiehealth.usu.edu. This will help them get released from quarantine quickly by the case containment team if exposed to COVID-19. USU will hold [weekly vaccine clinics](#) throughout September.
- Maintain a 6-foot distance in the classroom, office, laboratory, or other teaching space.

- Stay home if they are sick or suffering even mild symptoms of illness and to get a free COVID-19 test. Students who are sick should be referred to [get tested](#) as soon as possible.

Academic Freedom and Professional Responsibilities

Academic freedom is the right to teach, study, discuss, investigate, discover, create, and publish freely. Academic freedom protects the rights of faculty members in teaching and of students in learning. Freedom in research is fundamental to the advancement of truth. Faculty members are entitled to full freedom in teaching, research, and creative activities, subject to the limitations imposed by professional responsibility. USU Policy 403 further defines academic freedom and professional responsibilities.

Academic Integrity - "The Honor System"

The University expects that students and faculty alike maintain the highest standards of academic honesty. The Code of Policies and Procedures for Students at Utah State University (Student Conduct) addresses academic integrity and honesty and notes the following:

Academic Integrity: Students have a responsibility to promote academic integrity at the University by not participating in or facilitating others' participation in any act of academic dishonesty and by reporting all violations or suspected violations of the Academic Integrity Standard to their instructors.

The Honor Pledge: To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity". Violations of the Academic Integrity Standard (academic violations) include, but are not limited to cheating, falsification, and plagiarism

Plagiarism

Plagiarism includes knowingly "representing by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." The penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and referral to psychological counseling.

Grievance Process

Students who feel they have been unfairly treated [in matters other than discipline, admission, residency, employment, traffic, and parking - which are addressed by procedures separate and independent from the Student Code] may file a grievance through the channels and procedures described in the Student Code: Article VII Grievances

Sexual Harassment

Utah State University is committed to creating and maintaining an environment free from acts of sexual misconduct and discrimination and to fostering respect and dignity for all members of the USU community. Title IX and USU Policy 339 address sexual harassment in the workplace and academic setting.

The university responds promptly upon learning of any form of possible discrimination or sexual misconduct. Any individual may contact USU's Affirmative Action/Equal Opportunity (AA/EO) Office for available options and resources or clarification. The university has established a complaint procedure to handle all types of discrimination complaints, including sexual harassment (USU Policy 305), and has designated the AA/EO Director/Title IX Coordinator as the official responsible for receiving and investigating complaints of sexual harassment.

Withdrawal Policy, "I" Grade Policy and Dropping Courses

If a student does not attend a class during the first week of the term or by the second class meeting, whichever comes first, the instructor may submit a request to have the student dropped from the course. (This does not remove responsibility from the student to drop courses which they do not plan to attend.) Students who are dropped from courses will be notified by the Registrar's Office through their preferred e-mail account.

Students may drop courses without notation on the permanent record through the first 20 percent of the class. If a student drops a course following the first 20 percent of the class, a W will be permanently affixed to the student's record (check General Catalog for exact dates).

Students with extenuating circumstances should refer to the policy regarding Complete Withdrawal from the University and the Incomplete (I) Grade policy in the General Catalog.

Assumption of Risk

All classes, programs, and extracurricular activities within the University involve some risk, and some involve travel. The University provides opportunities to participate in these programs on a voluntary basis. Therefore, students should not participate in them if they do not care to assume the risks. Students can ask the respective program leaders/sponsors about the possible risks a program may generate, and if students are not willing to assume the risks, they should not select that program. By voluntarily participating in classes, programs, and extracurricular activities, students do so at their own risk. General information about University Risk Management policies, insurance coverage, vehicle use policies, and risk management forms can be found at <http://www.usu.edu/riskmgmt/>.

Mental Health

Mental health is critically important for the success of USU students. As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. Utah State University provides free services for students to assist them with addressing these and other concerns. You can learn

more about the broad range of confidential mental health services available on campus at Counseling and Psychological Services (CAPS).

Students are also encouraged to download the “SafeUT App” to their smartphones. The SafeUT application is a 24/7 statewide crisis text and tip service that provides real-time crisis intervention to students through texting and a confidential tip program that can help anyone with emotional crises, bullying, relationship problems, mental health, or suicide related issues.