Course Syllabus
Chemistry 3438
Physical Chemistry II
Spring 2024

Course Description: Continuation of CHE 3347.

Number of Credit Hours: 4 semester hours - 3 hours lecture

Course Prerequisites and Corequisites: Prerequisite: CHE 3437. Required lab fee.

Program Learning Outcomes:
1. The student will demonstrate knowledge of fundamental content in the basic areas of chemistry: Analytical, Biochemistry, Inorganic, Organic, and Physical.
2. The student will integrate knowledge with critical thinking to solve problems.

General Education Core Curriculum Objectives: There are no specific general education core curriculum objectives in this course. This course is not a general education core curriculum course.

Course Objective: The basic techniques and tools used in the area of Quantum Mechanics will be explained. This includes the prediction of behavior of atomic and molecular systems.

Student Learning Outcomes: Upon completion of this course students will:
• Recognize the need for the field of quantum mechanics.
• Derive and understand the three basic models in quantum mechanics. (PLO 1, 2)
• Recognize and apply basic symmetry to molecular systems. (PLO 1, 2)
• Recognize the role of quantum mechanics and symmetry in spectroscopy. (PLO 1)
• Interpret basic spectra utilizing concepts from quantum mechanics and spectroscopy. (PLO 1, 2)

Outline of Topics (approximate course time):
Quantum Theory (5-15%)
Atomic Structure (5-15%)
Molecular Electronic Structure (5-15%)
Symmetry (5-15%)
Rotational and Vibrational Spectroscopy (5-15%)
Electronic Spectroscopy of Molecules (5-15%)
Magnetic Resonance Spectroscopy (5-15%)
Statistical Mechanics (5-15%)
Course Syllabus
Chemistry 3038L
Physical Chemistry II Lab

Course Description: Continuation of CHE 3037L.

Number of Credit Hours: 0 semester hours - 3 hours lab per week

Course Prerequisites and Corequisites: Prerequisite: CHE 3437. Required lab fee.

Program Learning Outcomes:
2. The student will integrate knowledge with critical thinking to solve problems.
3. The student will perform qualitative/quantitative chemical analyses/syntheses using modern instrumentation.
4. The student will articulate scientific information through oral communication.
5. The student will articulate scientific information through written communication.
6. The student will demonstrate ability to integrate knowledge content, laboratory skill, critical thinking and problem solving, and communication skills via participation in research projects.

General Education Core Curriculum Objectives: There are no specific general education core curriculum objectives in this course. This course is not a general education core curriculum course.

Course Objective: The basic techniques and tools used in the area of Quantum Mechanics will be explained. This includes the prediction of behavior of atomic and molecular systems.

Student Learning Outcomes: Upon completion of this course students will:
- Recognize the need for the field of quantum mechanics.
- Derive and understand the three basic models in quantum mechanics.
- Recognize and apply basic symmetry to molecular systems.
- Recognize the role of quantum mechanics and symmetry in spectroscopy.
- Interpret basic spectra utilizing concepts from quantum mechanics and spectroscopy.

Outline of Topics (approximate course time):
Absorption Spectrum of a Conjugated Dye
Dipole Moments
Absorption/Emission Spectra of Iodine
Research Project
Chemistry CHE 3438/3038L
Physical Chemistry II
Spring, 2024

Instructor: Dr. Alyx S. Frantzen
Phone: 468-2338
Office: MN 119
Office (Student) Hours: MWF 9:00-10:30 am; by appointment
Phone: 468-2338
E-mail: afrantzen@sfasu.edu

Class HoursTR 9:30-10:45 am; T 2:00-4:50 pm; W 12:00-12:50pm

CATALOG DESCRIPTION: Continuation of CHE 3437

PREREQUISITES: CHE 3437 or permission of instructor, Calculus II

CO-REQUISITES: CHE 3038L

REQUIRED TEXTS AND OTHER MATERIALS:
Lide, D.R. editor CRC Handbook of Chemistry and Physics
(The CRC can be any edition, but try to get an edition from the 2000’s-present)

SUPPLEMENTARY MATERIALS:

COURSE GOALS: Students should learn the basic techniques and tools used in the area of Quantum Mechanics. This includes the prediction of behavior of atomic and molecular systems.

STUDENT OUTCOME OBJECTIVES:
Upon completion of this course students will:
• Understand the need for the field of quantum mechanics.
• Derive and understand the three basic models in quantum mechanics.
• Apply basic symmetry to molecular systems.
• Interpret the role of quantum mechanics and symmetry in spectroscopy.

COURSE CONTENT: Chapters from the text will be covered in the following order.
9 QUANTUM THEORY
10 ATOMIC STRUCTURE MOLECULAR ELECTRONIC STRUCTURE
11 SYMMETRY ROTATIONAL AND VIBRATIONAL SPECTROSCOPY
12 ELECTRONIC SPECTROSCOPY OF MOLECULES
13 MAGNETIC RESONANCE SPECTROSCOPY
14 STATISTICAL MECHANICS (IF TIME PERMITS)

COURSE REQUIREMENTS: Exams will be given on Thursday evenings, starting at 6pm (ish). There will be a two hour time limit. The exams will be given on February 8th, March 7th, April 18th, and May 22nd. The final exam will be at the scheduled time, May 9th, 8:00-10:00 am.

Grades for this course will be assigned in the following manner:
Laboratory 30%
5 Exams 60%
Homework/Quizzes 10%
100%

METHOD OF EVALUATION:
Grading scale - A= 90 - 100%; B= 80 - 89%; C= 70 - 79%; D= 60 - 69%; F= below 60%
MAKE-UP POLICY: There will be no make-ups in this class.

ATTENDANCE POLICY: Attendance is probably the single most important study aid in physical chemistry. As such, there is an attendance policy. Excused absences must be documented. The first two unexcused absences will not count against you. Upon the third unexcused absence, each absence will result in the removal of three percentage points from your final average. Attendance is also required at the recitation on Wednesdays at 12 pm.

ABSENCE NOTIFICATION: There is a new policy for the process of absence notification for students. This is through the Dean of Students Office and should be handled as follows:
1. Students are responsible for submitting faculty notification requests and providing supporting documentation substantiating the reason for requests. Requests with no supporting documentation will automatically be denied.
2. SFA’s Student Outreach and Support will review documentation and assess validity. Upon review, SOS will determine the approval or denial of the faculty notification request.
3. SOS will notify students of the faculty notification request determination and will notify faculty members only of approved faculty notification requests.
4. It is the student’s responsibility to provide approved faculty notification requests to faculty members. Additionally, it is at the faculty member's discretion to honor approved circumstantial requests.

ACADEMIC INTEGRITY (A-9.1): The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one’s self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

WITHHELD GRADES SEMESTER GRADES POLICY (A-54):
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the coursework because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will
automatically become an F and will be counted as a repeated course to compute the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5.5.pdf.

**SEMESTER WITHDRAWALS:** Last day to withdraw from the course without obtaining WP or WF grade is April 10th.

**STUDENTS WITH DISABILITIES:**
To obtain disability-related accommodations, alternate formats, and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services promptly may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

**CLASSROOM BEHAVIOR POLICY:** To ensure a classroom environment conducive to learning, any forms of classroom disruptions will not be tolerated (examples but not limited to – talking, use of cell phones/beepers, sleeping, reading other material, eating/drinking). Students who violate these rules will be asked to leave. Repeat offenders will be subject to disciplinary action in accordance with University policies as described in the Code of Student Conduct.

Instructor reserves the right to change the syllabus at any time.

**LAB SCHEDULE:**
There are three required laboratory exercises this semester. You must work with a partner for these experiments. You will find the procedure and supplemental material for each experiment on D2L.
- Dipole Moments
- Absorption Spectrum of a Conjugated Dye
- Absorption/Emission Spectra of Iodine

The reports for all experiments will be full, formal lab reports.

**EXAMS:**
There will be four exams and then a comprehensive final exam. Exams will be given on Thursday evening, starting at 6pm (ish). There will be a two-hour time limit. The final exam will be given at the scheduled time, May 9, 2024, at 8am.

**HOMEWORK:**
I will give you random exercises for homework.

**PChem Project:**
This semester, the PChem Project is going to be a little different. You will be carrying out a research project with the end goal of publishing your results. The projects are experiments that you have already done and have been modified but not published. You will be required to do extensive background literature research on the topics and carry out experiments to determine the limits of the experiments. At the end of the semester, you will present your result and submit a manuscript to The Chemical Educator.
**TIME REQUIREMENTS:** CHEM 3438 is a 4 credit course which meets for 150 minutes of lecture and 180 minutes of laboratory a week for 15 weeks. There is also a weekly 60 minute recitation to work problems and address any additional material. At the end of the semester there is a 2.5 hour final exam. Students have significant materials to read and problem assignments that involve critical thinking and quantitative reasoning. Students are tested over the material throughout the semester and will be given a comprehensive final exam. Students should engage in a minimum of 9 hours (6 for lecture; 3 for lab) of work and study outside of classroom hours to prepare for and succeed in this course.

**COVID-19 INFO:** Campus has returned to normal operations. The updated campus protocols can be found at https://www.sfasu.edu/covid19. Face coverings are not required but are suggested when found in public indoor settings. A student running a fever should attend class via Zoom and should NOT attend a face to face class. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html

**MENTAL HEALTH:**
SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

**On-campus Resources:**
The Dean of Students Office (Rusk Building, 3rd floor lobby)
www.sfasu.edu/deanofstudents
936.468.7249
dos@sfasu.edu

SFA Human Services Counseling Clinic Human Services, Room 202
www.sfasu.edu/humanservices/139.asp
936.468.1041

The Health and Wellness Hub “The Hub”
Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:
Health Services
Counseling Services
Student Outreach and Support
Food Pantry
Wellness Coaching
Alcohol and Other Drug Education
www.sfasu.edu/ethehub
936.468.4008
ethehub@sfasu.edu

**Crisis Resources:**
Burke 24-hour crisis line: 1.800.392.8343
National Suicide Crisis Prevention: text 988
Suicide Prevention Lifeline: 1.800.273.TALK (8255)
johnCrisis Text Line: Text HELLO to 741-741