Course Description
CHEM 4354: A capstone course for the biochemistry major which allows the student to obtain practice in biochemical techniques. 3 semester hours – 1 hour lecture per week

CHEM 4054: Co-requisite to CHEM 4354. 0 semester hours - 6 hours lab per week. Lab fee required.

Course Prerequisites and Co-requisites: Prerequisites: CHEM 4152, CHEM 4352, and CHEM 4164.

Program Learning Outcomes:
1. The student will learn the chemical basis of biochemical techniques in detail.
2. The student will integrate knowledge with critical thinking to solve problems.
3. The student will perform qualitative/quantitative biochemical experiments using modern instrumentation.
4. The student will articulate scientific information through oral communication.
5. The student will articulate scientific information through written communication.

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 Objectives:
• to receive training in laboratory procedures, biosafety, research conduct and ethics, and bioinformatics
• to explain the theory and background relating to the techniques
• to explain problem solving and analytical thinking,
• to explain scientific record keeping and communication

Student Learning Outcomes: Upon completion of this course, the student will have
• applied biochemical techniques (PLO 3)
• developed problem solving capabilities (PLO 2)
• developed scientific communication skills. (PLO 4, 5)

Outline of Topics (approximate course time):
General Biochemical lab skills and Safety/Ethics (week 1)
Balance and pH probe: Making a protein solution and check concentration, match with literature data.
Transformation (week 2-3)
Spectroscopy I (electronic UV/Vis, Fluorescence, CD, week 4-5)
Spectroscopy II (vibrational FTIR, week 6)
Protein expression series (week 7-12)
Chromatography (week 7-12)
Gel Electrophoresis (agarose and PAGE) week 7-12
Enzyme Kinetics (week 7-12)
Team work-group work/discussion (1 lab period)

Class Syllabus

Spring 2024
CHEM 4354_001/4054_001_5175
Biochemical Techniques

<table>
<thead>
<tr>
<th>Instructor's Name</th>
<th>Dr. Bidisha Sengupta</th>
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</thead>
<tbody>
<tr>
<td>Department</td>
<td>Chemistry &amp; Biochemistry</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:bidisha.sengupta@sfasu.edu">bidisha.sengupta@sfasu.edu</a></td>
</tr>
<tr>
<td>Office</td>
<td>Math 112</td>
</tr>
<tr>
<td>Office Hours</td>
<td>Mon. - 4:00-5:00pm; Tues. -10 am -12 noon; W - 11:00 am -12:00pm</td>
</tr>
<tr>
<td>Class Time</td>
<td>R, 12:30 – 1:20 p.m. (F2F) and 2:00 - 4:50 p.m.; F, 1:00 – 3:50 p.m. (F2F)</td>
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<tr>
<td>Classroom</td>
<td>Math 130 (lecture) and Chem 301 (lab)</td>
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<tr>
<td>Course Drop Date</td>
<td><a href="https://www.sfasu.edu/registrar/registration-information/dates-deadlines">https://www.sfasu.edu/registrar/registration-information/dates-deadlines</a></td>
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Required Texts and other materials:
1. Any standard biochemistry and molecular biology laboratory textbook can be consulted.
2. Additional resources available online.
3. Research Notebook (Scientific Notebook Company – O64P, $10)
4. Calculator
5. Graphing materials

Method of Evaluation:
- 2 Module Lab reports 50 pts each, (lowest grade dropped) 50 pts.
- 1 formal written report 50 pts, (on HPLC/optical spectroscopy on biomolecules pertinent to modules in this course). This report should be written just like a professional research review article. 50 pts.
- 2 take-home exams (due on Feb 27, April 30). 90 pts.
- 5 Quizzes / 20 pts 100 pts.
- Short formal presentation on a selective research technique pertinent to the class. 40 pts.
- Comprehensive Final exam 50 pts
- Professionalism and Class Participation (positive attitude, timed assignments, ready prelab 20 pts.
- Total 400 pts.


Module
1. Lab safety skills, Pipetting skill testing
2. Transformation (50 points, detailed lab report)
3. Chromatography (TLC, HPLC)
4. Spectroscopy I UV/Vis, Fluorescence, CD (50 points, combined lab report)
5. Spectroscopy II (FTIR, Raman)
6. Protein purification series

Module: Each module will consist of a related set of experiments performed, tentatively, over a period of 1-2 weeks or several weeks depending on the content of that particular module (see course calendar below).

Laboratory Notebook: At the end of each module, laboratory notebooks will be turned in by noon on Monday following lab. It will be graded and available for pick-up by noon, Wednesday of the same week. Late submission of lab notebook will result in 20% point deduction for each day.

General laboratory notebook outline
1. Title
2. Date
3. Name(s) of Partner(s) if applicable
4. Short but relevant introduction with references if necessary (reference citation should follow ACS journal guideline)
5. Procedure: List of reagents (give the source of the reagents) and brief description of preparation, flowchart, bullets, diagrams if needed.
6. Expected results
7. Actual results (data) presented in appropriate format
8. Discussion and Conclusion
9. Continuity – what to do next

Criteria for grading laboratory notebook
1. Organization – see above
2. Legibility
3. Neatness
4. Amount of content
5. Reproducibility
Hint on keeping a good lab notebook: write rough draft entries in a scratch notebook and transfer into your lab notebook as soon as possible so as not forget important details.

**Generation of working protocols:** Students may be required to generate a working protocol that must be approved by the professor. Students will not be allowed to do those experiments without approved protocols.

**Formal Written Reports:** Students will be required to submit a formal scientific report on their projects. The paper is to be 12-font size, Times New Roman font with one-inch margins all round. Pages are to be numbered in the lower right-hand corner of the sheet. A minimum of 10 **peer-reviewed journal** articles are to be used. The paper should follow the format in the journal Biochemistry author’s guidelines [https://pubs.acs.org/doi/full/10.1021/acsguide.40303](https://pubs.acs.org/doi/full/10.1021/acsguide.40303). Form report will contain techniques discussed in Spectroscopy I and II or chromatography modules. Points will be deducted if the Biochemistry journal format is not followed in the write-up.

**Short presentation:** Students will be required to give a 20-min oral presentation on either use of spectroscopy or chromatography in research. Semi-formal dress is required on the day of the presentation.

**Professionalism:** This includes keeping deadlines, promptness to lab, good lab behavior, following instructions, proper lab attire, hair tied back etc.

**Attendance Policy:** Two or more unexcused absences will result in an ‘F’ for the course. Absences may be assigned to anyone that disrupts class/lab, sleeps in class/lab, or consistently comes in late or leaves early.

**Academic Honesty Policy:** Cheating in any form will result in an ‘F’ in the course and further action by the University. Plagiarism in any form is not tolerated and will be punished severely.

**Academic Disabilities Policy:** If you have a certified disability, registered with the Office of Disability Services at 468-3004 and need accommodations for this course, it is your responsibility to notify me by the third class day.

**Academic Integrity**

Please read the [Student Academic Dishonesty](#) policy. Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to:

- using or attempting to use unauthorized materials on any class assignment or exam;
- falsifying or inventing of any information, including citations, on an assignment;
- helping or attempting to help other student(s) in an act of cheating or plagiarism.

Plagiarism is presenting the words or ideas of another person as if they were one’s own. Examples of plagiarism include, but are not limited to:

- submitting an assignment as one's own work when it is at least partly the work of another person; submitting a work that has been purchased or otherwise obtained from the Internet or another source;
- incorporating the words or ideas of an author into one's paper or presentation without giving the author credit.

Penalties may include, but are not limited to, reprimand, no credit for the assignment or exam, resubmission of the work, make-up exam, failure of the course, or expulsion from the university.

**Classroom Behavior Policy:**

- Unexcused absences may be assigned to anyone that disrupts class, sleeps in class, or consistently comes in late or leaves early. This is college; everyone is expected to behave professionally.
- **Phone must be turned off during class/lab. After one interruption, any subsequent phone interruption will be assigned an unexcused absence.**
- **Text messaging is a disruption. Anyone text messaging during class will have an unexcused absence assigned to them. Read Attendance Policy Section for how this can affect grades.**
- The student code of conduct policy is located at: [http://www.sfasu.edu/policies/student-code-of-conduct-10.4.pdf](http://www.sfasu.edu/policies/student-code-of-conduct-10.4.pdf)
- Professional behavior is expected at all times and includes coming to class prepared and on time.
- If there is a switch to remote learning, Zoom will be utilized and students should behave as though they are in class – cameras on, microphone muted unless asking a question, etc.
- **Learning biochemistry and techniques is NOT a spectator sport.** It takes involvement and participation in learning. Preparation for class should take 2-3 hours of study for every hour in class and includes:
  - reviewing material from previous class & reading material before coming to class
  - practicing active recall, understanding terms, making connection between concepts, quizzing yourself
- Contribute to class discussions and group assignments.
Absences may be assigned to anyone who disrupts class. Read Attendance Policy Section for how this can affect grades.

- Bring a scientific calculator.
- Silence phones and put away unless we are using them as a part of class.
- Be courteous and respectful of other students and instructor.
- 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.

**Students Success**

Your academic achievement naturally depends on your level of involvement in this course. You improve your chances of success if you:

- complete readings and assignments, attend all lectures, take advantage of office hours, participate in activities and discussions, study regularly, make use of available resources, and ask questions. Do not hesitate to ask for help. I am invested in your education and academic success, and will provide appropriate assistance as requested. I make myself available during office hours, but feel free to drop by or make an appointment. There will be no extra credit opportunities for this course – focus your attention on the course.

*It is always expected that you will do your own work. Do not ask another instructor for assistance in assignments. You are expected to write your own answers on assignments. Copying other student’s (current or previous) work is academic dishonesty. Copying or communicating with other students during quizzes or exams is cheating. Using sources without correct documentation and paraphrasing is plagiarism. For any form of academic dishonesty, a student will receive a zero as the grade on the item. Depending on the severity of the cheating, a student may also receive an F in the course, and I will recommend suspension from the university when I submit the Report of Academic Dishonesty to the dean’s office. Additionally, I will send a letter of concern to department chair/unit head of a student’s major and/or attribute.*

**Withheld Grade - SFA Policy 5.5**

At the discretion of the instructor of record and with the approval of the academic unit head, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. See the link to the policy for the full policy.

**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 in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

**SFA Mental Health Statement**

SFA values students’ mental health and the role it plays in academic and overall student success. 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:**
  - SFASU Counseling Services
    - www.sfasu.edu/counselingservices
  - 3rd Floor Rusk Building
    - 1041
  - SFASU Human Services Counseling Clinic
    - www.sfasu.edu/human/services/139.asp
  - Human Services Room 202
    - 936-468-2401

- **Crisis Resources**
  - Burke 24-hour crisis line 1(800) 392-8343
  - Suicide Prevention Lifeline 1(800) 273-TALK (8255)
    - 936-468-741
  - Crisis Text Line: Text HELLO to 741-741

**COVID-19 INFORMATION**

Please visit https://www.sfasu.edu/covid19 for detailed information about Covid-19 protocols on SFA campus.

**Tentative Course Calendar**

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<tr>
<th>Week</th>
<th>Activities/Experiment/Module</th>
<th>Comments</th>
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| Jan 18 | -Introduction, planning and class discussion  
-articles assigned for reading  
- Laboratory Safety Certification:  
-Visit [http://labsafetyworkspace.org/](http://labsafetyworkspace.org/) on Safari or Firefox. The training video requires the use of Adobe Flash Player that is not always supported on Google Chrome. Login to create a free account at the website hosted by Dartmouth College and New Hampshire INBRE.  
-Test of basic laboratory skills: -pipetting skills- Instructions for  
-protein molar concentration and buffer calculations –group discussion on research paper  
-Dr. Sen to provide lead points | -Students upload certificate in dropbox by Jan 24.  
-Students read article and |
<p>| Jan 19 | | |</p>
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<tr>
<th>Date</th>
<th>Event Description</th>
<th>Notes</th>
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<tr>
<td>Jan 25</td>
<td>pGLO-Transformation module (discussion, lecture, watch video in D2L)</td>
<td>Note: discussion</td>
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<td>Jan 26</td>
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<td>Students submit lab report on pGLO Module by Feb 12</td>
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<td>Feb 1</td>
<td>Discuss about any pGLO results, Quiz 1 on transformation</td>
<td>Prelab, UV/Vis, Fluorescence on protein and DNA</td>
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<td>Feb 2</td>
<td>Start Spectroscopy I module</td>
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<td>Feb 8</td>
<td>Discuss Spectroscopy I result, continue with experiments,</td>
<td>CD on proteins and DNA</td>
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<td>Feb 9</td>
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<td>Feb 15</td>
<td>Start Spectroscopy II module, Quiz 2 on Spectroscopy I</td>
<td>FTIR on protein</td>
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<td>Feb 16</td>
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<td>Feb 22</td>
<td>-Continue Spectroscopy II module</td>
<td>Raman on protein</td>
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<td>Feb 23</td>
<td>Quiz 3 on Spectroscopy II, Basic experiment on Thin Layer chromatography</td>
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<td>Feb 29</td>
<td>Bioinformatics lab</td>
<td>TLC on amino acids</td>
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<td>Mar 1</td>
<td></td>
<td>Students submit take-home exam 1 by Feb 27</td>
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<td>Mar 7</td>
<td>Discuss Bioinformatics lab</td>
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<td>Mar 8</td>
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<td>Mar 14, 15</td>
<td>Spring break</td>
<td>Students submit draft of formal report by Mar 7 at the D2L dropbox. It will be counted in midterm grade.</td>
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<td>Mar 21, 22, Apr. 4, 5, 11, 12</td>
<td>Quiz 4 on Bioinformatics Modules on– Protein Expression and Purification Series, Chromatography, Gel Electrophoresis and Enzyme Kinetics</td>
<td>-Note: this part of the course will involve pre-lab preparations -Combined Lab report due on these modules by Apr 24</td>
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<tr>
<td>Apr 18, 19</td>
<td>Quiz 5 on Protein Expression and Purification Series, Chromatography, electrophoresis, PAGE, Enzyme kinetics</td>
<td>-Take-home exam 2 due by May 6</td>
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<tr>
<td>Apr 25, 26</td>
<td>Short presentations, Final exam.</td>
<td>-Students submit formal report by April 27.</td>
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</table>

Note: this syllabus is subject to change at the discretion of the instructor. The instructor will duly inform students of any changes to the syllabus.

**Syllabus Acknowledgement Statement**
I have read and understood the policies outlined in the course syllabus. I agree to abide by and follow the policies. I have been advised that if I can’t agree to follow the policies outlined in the course syllabus, I should withdraw from the course.

__________________________________________  __________________
Signature                                      Date

PRINT NAME
READ the syllabus thoroughly. Print this page, sign and save as a pdf. Then upload the pdf in dropbox by Jan 25, 2024.

Dr. Bidisha Sengupta, Jan 18, 2024.