Hello Welcome

Begin by finding the Content Browser in D2L site for the course and reviewing the contents of the first two folders. These folders contain essential information regarding the course, including the Course Syllabus and the Course Timeline. Students must have a working computer and internet access and need to log in promptly for taking exam, quizzes, managing D2L etc.

1. **Be mindful of the deadlines and due dates in this course.** This important information may be found in the Course Timeline. Our week starts from Tuesday and ends on Monday at 11:30 PM. Be sure that you keep track of this information so that you submit all course requirements in a timely fashion. Failure to complete these assignments in a timely fashion will have a severe impact on your ability to pass this course.

2. **Make sure you are doing the weekly homeworks in Moodle (bsengupta.com/moodle).** Homework points from each week will be updated in D2L.

3. **Do not forget to upload in the drop box an acknowledgement statement that you read and understood the syllabus and will follow the ethical guidelines throughout the course.** Cheating, copying, and talking while taking tests/quizzes/exams is NOT allowed and ethically wrong. **This is due by the end of first week.**

**Chemistry 3336**

Physical Chemistry for Biological Sciences (PCBS)

**Prerequisite:** General Chemistry II 1312

**Required Text:** “Physical Chemistry - Principles and Applications in the Biological Sciences,”


**General References for Physical Chemistry for Biological Sciences Textbooks:**

1. “Physical Chemistry for the Life Sciences” by Peter Atkins; Julio de Paula, OUP Oxford.

<table>
<thead>
<tr>
<th>Name</th>
<th>Dr. Bidisha Sengupta</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Department</strong></td>
<td>Chemistry &amp; Biochemistry</td>
</tr>
<tr>
<td><strong>Email</strong></td>
<td><a href="mailto:senguptab@sfasu.edu">senguptab@sfasu.edu</a></td>
</tr>
<tr>
<td><strong>website</strong></td>
<td><a href="https://d2l.sfasu.edu/d2l/home/425424">https://d2l.sfasu.edu/d2l/home/425424</a></td>
</tr>
<tr>
<td><strong>Phone</strong></td>
<td>936-468-2485</td>
</tr>
<tr>
<td><strong>Office</strong></td>
<td>Bush Building (Math Building) 112</td>
</tr>
</tbody>
</table>

**Class meets**

**Online only, Brightspace D2L:** Handouts will be posted in D2L and bsengupta.com/moodle

**Student Hours**

**In person:**
M 4-5 pm
T 10-12 pm
W 11-12 am

*Outside student hours by appointment only. Email 2 days before meeting.*

**Course Description:** This course is aimed to cover the core aspects of biophysical chemistry
(thermodynamics and kinetics as well as quantum mechanics, spectroscopy, and X-ray diffraction), which are of great importance to students of biology and biochemistry. The course is concerned about the basic physicochemical principles and model systems which are essential to understanding, explaining, and predicting the behavior of biological systems in terms of molecular forces. PCBS is aimed to integrate fundamental concepts of physical chemistry with the structures, functions, and molecular mechanisms of biological processes. Examples will be chosen to illustrate how these principles can be applied to fundamental problems in biology and biochemistry. The emphasis will always be on the underlying principles, and frequently mathematical terms will be used to express these in. Such mathematical statements are valuable as a method of organizing our thinking, and every effort will be made to keep the math as straightforward as possible.

**Course Objectives:** The objectives of the course are to:
(a) familiarize biochemistry/biological sciences students at the advanced undergraduate and beginning graduate level with basic physico-chemical laws, theories, and concepts important to the life sciences,
(b) provide a working knowledge of mathematical methods useful in the life science research, (c) develop a critical perspective on explanation of biological processes and understanding biological systems, and (d) survey the main applications of physical chemistry in the life sciences.

**Program Learning Outcomes:** With the successful completion of this course, students will:
- Understand the energetics of folding of biopolymers in terms of strong and weak interactions and the equations involved in molecular mechanics.
- Apply the laws of thermodynamics to the folding of three-dimensional structures of biological macromolecules.
- Know the physical parameters and equations associated with macromolecules in solution including chemical potentials and equilibria.
- Show proficiency in the analysis of light, x-ray, and neutron scattering and diffraction techniques.
- Appreciate the fundamentals of light interaction with biological macromolecules including absorption, linear and circular dichroism, and Raman spectroscopy.
- Display an expertise in the analysis of fluorescence, fluorescence polarization and lifetimes, and resonance energy transfer associated with chromophores.

**TIME REQUIREMENTS:**
CHEM 3336 is a 3 credit course and typically meets for 150 minutes a week for 4 weeks plus including the examination. Students have significant weekly reading and homework assignments involving critical thinking and quantitative reasoning. Problems and homework assignments will be given. Students are assessed the material via assignments and exams during the semester including a comprehensive final exam. These activities average at a minimum 6 hours of work each week to prepare outside of classroom hours.

**Homework Assignments:**
Homework assignments are an important aspect of the course because they are designed to supplement and enhance the material being taught in class. Homework assignments will consist of the materials in a week. In these assignments, students will need to use the textbook and other sources to supplement the material discussed in class. Any computer capable of connecting to the internet can access the course at bsengupta.com/moodle Enter the following to log into the system:
Select course: CHEM 3336
username: Use your SFA user name (username within SFA email address)
  i.e. SFA email address: lastnamei@jacks.sfasu.edu  username: lastnamei
password: $Sfa plus your student id number with no spaces
  i.e. if your id is 1234567  password: $Sfa1234567 (note $ sign and capital S)

Grading Policy:
Quiz 1  25 points  Monday 9/11  6-11 PM
Quiz 2  25 points  Monday 10/9  6-11 PM
Quiz 3  25 points  Monday 10/30  6-11 PM
Quiz 4  25 points  Monday 11/27  6-11 PM
HW 1  25 points  Monday 9/10  11:30 PM
HW 2  25 points  Monday 10/8  11:30 PM
HW 3  25 points  Monday 10/29  11:30 PM
HW 4  25 points  Monday 11/26  11:30 PM
Independent reading and assignment 50 points  Wednesday 12/2  11:30 PM
Comprehensive Final Exam  100 points  Thursday 12/ 3  6-11 PM
Total points: 350. Grading scale -  A= 90 - 100%; B= 80 - 89%; C= 70 - 79%; D= 60 -69%; F= below 60%

Exam questions will generally base on material from the lectures, assigned readings in text books as well
literature from published research journals.

Attendance Policy. This is an upper-level class. Professional behavior is expected at all times. An
excused absence from an exam will be granted only for documented circumstances meeting the criteria
of the SFASU Missed Class Policy (personal emergencies, including, but not limited to, illness of the
student or of a dependent of the student or death in the family; religious observances that prevent the
student from attending class; participation in University-sponsored activities, approved by the
appropriate University authority, such as athletic competitions, activities approved by academic units,
R.O.T.C. functions, academic field trips, and special events connected with coursework; government
required activities, such as military assignments, jury duty, or court appearances). Appropriate
documentation must be provided before an excuse will be considered. If you have a conflict inform me
as soon as you are aware of the conflict with documentation and arrangements will be made for you to
take the exam early. It is your responsibility to contact me to make these arrangements. For other legal
absences that arise without prior notice (such as medical emergencies), acceptable documentation will be
required if an excused absence is requested. If you are granted an excused absence from an exam
because of an unanticipated documented and qualified legal absence, the missed exam will count as
your dropped exam and two of your other three exams will count towards your course grade.

Academic Honesty: For this course, all exams are closed book and closed note unless otherwise
prescribed. Academic dishonesty includes using notes or books during exams, looking at another student's
test during the exam period, talking during an exam, and plagiarizing/copying in written assignments.
Punishment for academic dishonesty failure of the course, and the incident will be reported to the
Chemistry Department Chair and the Office of the Dean.
Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp
Any student found cheating will be subject to the penalties as stated in the Student Code of
Conduct handbook; including but not limited to a score of zero on exam, expulsion from the class
or expulsion from the University.
## Timeline

These are approximate dates and readings for the course. The course plan is subject to change and will be updated throughout the semester.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Home Work and Quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/28</td>
<td>Concepts from Chemistry Explain the Properties of Biological Molecules, Aqueous System</td>
<td>9/10 HW 1.1</td>
</tr>
<tr>
<td>8/28</td>
<td>Origins of Quantum Theory, Wave Particle duality</td>
<td>9/10 HW 1.2</td>
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<td></td>
<td>Quiz 1  9/11  6-11 PM in moodle</td>
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<tr>
<td>9/12</td>
<td>First law of Thermodynamics, Energy is Conserved, Physical chemistry and bioinformatics scientists</td>
<td>10/8 HW 2.1</td>
</tr>
<tr>
<td>9/12</td>
<td>Second Law of Thermodynamics, Entropy is Increasing Counting Statistics and the Boltzmann Distribution, Third law of Thermodynamics</td>
<td>10/8 HW 2.2</td>
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<tr>
<td>9/12</td>
<td>Free Energy, Chemical Potential and Chemical Equilibria</td>
<td>10/8 HW 2.3</td>
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<td>Quiz 2  10/9  6-11 PM in moodle</td>
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<tr>
<td>10/10</td>
<td>Electrochemistry, Transmembrane Equilibria, Biological Redox Reactions</td>
<td>10/29 HW 3.1</td>
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<tr>
<td>10/10</td>
<td>Optical Spectroscopy, X-Ray diffraction</td>
<td>10/29 HW 3.2</td>
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<td>Quiz 3  10/30  6-11 PM in moodle</td>
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<tr>
<td>10/31</td>
<td>Rates of Chemical Reactions and Molecular Processes</td>
<td>11/26 HW 4.1</td>
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<tr>
<td>10/31</td>
<td>Transition State Theory, e-transfer reactions</td>
<td>11/26 HW 4.2</td>
</tr>
<tr>
<td>10/31</td>
<td>Chemical Kinetics, Enzyme Kinetics, Michaelis-Menten Eqn</td>
<td>11/26 HW 4.3</td>
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<tr>
<td></td>
<td></td>
<td>Quiz 4  11/27  6-10 PM in moodle</td>
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<tr>
<td>12/2</td>
<td>Paper reading and Assignment</td>
<td>Due on 12/2 in D2L</td>
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<tr>
<td>12/3</td>
<td>Final Exam on 12/3</td>
<td>6-11 PM in moodle</td>
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Missing a HW or Quiz for **any reason other than a qualified legal absence** (including but not limited to lack of preparation, travel, transportation difficulties, oversleeping, job conflicts, etc.) will **result in a grade of 0 for the missed exam with no opportunity to make it up. Plan accordingly.**
Academic Integrity (4.1):
CODE OF STUDENT CONDUCT AND ACADEMIC INTEGRITY (10.4):
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.

Any student found cheating will be subject to the penalties as stated in the Student Code of Conduct handbook; including but not limited to a score of zero on exam, expulsion from the class or expulsion from the University.

WITHHELD GRADES SEMESTER GRADES POLICY (5.5):
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 course work 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 for the purpose of computing the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5.5.pdf.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

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/.

**STUDENT WELLNESS AND WELL-BEING:**
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/thehub
936.468.4008
thehub@sfasu.edu

**CRISIS RESOURCES:**
- Burke 24-hour crisis line: 1.800.392.8343
- National Suicide Crisis Prevention: 9-8-8
- Suicide Prevention Lifeline: 1.800.273.TALK (8255)
- johCrisis Text Line: Text HELLO to 741-741

*This course meets educator preparation standards for one or more certification programs; a complete listing of all the educator preparation standards this course meets can be found at: https://sfasu.edu/docs/jacksteach/jacksteach-standards-alignment-chart.xlsx*