Biochemistry (CHM 384) Syllabus  
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Location:  HSC 357  
Time:  TTh 9:20-10:50  
office hours:  T 11-12:30, Th 2-3:30  
Text:  LibreTexts (combo):  Biochemistry Online (Jakubowski) and Biochemistry: Free for All (Ahern, Rajagopal, and Tan)

Course Description:  A study of biological systems from a chemistry perspective. The application of chemistry concepts such as bonding, intermolecular forces, stereochemistry, chemical reactions, acid-base chemistry, thermodynamics and kinetics in biological systems such as cells is the emphasis of the course.

Learning Outcomes:  At the conclusion of this course, students will be able to:

1. connect the principles of chemical structure/function relationships, thermodynamics, kinetics, stereochemistry and intermolecular forces with the functioning and study of biological systems (Program Outcome 1)  
2. articulate the relevance of biochemistry to issues in medicine, research and other enterprises (Program Outcomes 3, 4 and 6)  
3. Use data and knowledge to reach conclusions in the context of biochemical problems (Program Outcomes 2 and 4)  
4. Demonstrate professional skills of working independently and as part of a team  
5. Demonstrate proficiency organizing and delivering oral presentations (Program Outcome 5)  
6. Demonstrate proficiency organizing and executing written presentations (Program Outcome 5)

Program Outcomes

1. To acquire appropriate discipline-specific knowledge spanning the areas of Analytical, Biochemistry, Inorganic, Organic, Physical chemistry as well as appropriate supporting courses  
2. To develop skills in modern laboratory methods, instrumentation, and data analysis.  
3. To develop skills in appropriate research techniques including experimental design and scientific literacy.  
4. To critically evaluate and solve relevant problems by applying the knowledge and skills of chemistry and/or biochemistry.
5. To effectively communicate the concepts of chemistry and/or biochemistry using accepted professional standards and language.
6. To demonstrate scientific responsibility, stewardship, and professional ethics as outlined by the American Chemical Society - Chemists Code of Conduct.

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**Course policies**

**Laptops:** It would be very helpful for students with laptop computers to bring them to class regularly. The more computers in class the better for topics such as molecular graphics and bioinformatics tools.

**Group Work:** Students will collaborate in groups to complete assignments and case studies. Work will sometimes be graded on a per group basis and sometimes individually. All members of a group are expected to contribute significantly to each assignment. Dividing the work between group members is not recommended as it may lead to group members not working with each topic or skill. Group member contributions will be assessed by the instructor. Open communication between group members can greatly facilitate teamwork. If a group encounters personal friction, members of that group are expected to work together to resolve it. The instructor is available to help in this process. All communication should be handled in a respectful fashion.

**Activities**

**Pre-topic assignments (LO 1, 4):** These assignments will serve both as reviews of portions of general chemistry, chemical analysis and organic chemistry relevant to the current course topics and as an introduction to the basic ideas of topics to be covered in class. You may have to dig out some chemistry textbooks or search for some general and organic chemistry on the internet to jog your memory. You will be expected to read your biochemistry textbook in advance of each topic covered. The more quickly we move through the review material/introductory material, the more time we can devote in class to points of difficulty and real-world applications of material through case studies.

Students will work on pre-topic assignments as individuals initially, and then with discussion between group members through the OneNote Classroom collaborative space to which you have all been invited. Contributions by each student to the discussions will be graded. Comments that make a significant contribution to the discussion will earn credit.

**Case studies (LO 2-4,6):** Throughout the semester, class time will be devoted to case studies, in which you will work in groups to apply biochemistry methods to solve real biochemical and medical problems. Through these studies you will be able to place your biochemistry material in context and practice using it as doctors and scientists do. Case studies will be completed outside of class and turned in as group work. Groups will
receive the same grades on group work turned in.

**Student Presentation (LO 1, 5):** Students will give a very brief presentation on an amino acid, its properties and role in proteins, and any modifications it undergoes in biological systems.

**Exams (LO 1-3):** Exams may take several forms, including in-class exams and take-home exams. Exams will reflect the content of class. You can expect questions on:
- basic biochemistry foundational knowledge,
- questions requiring you to demonstrate skills relevant to biochemistry and its methods and
- Real-life biochemistry case studies in which you will respond to new situations using your biochemistry knowledge and skills.

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**Resources**

**Your textbook (see above):** Specific reading to accompany each topic is listed next to the topic for each day on the schedule. It will be assumed in class that you have read the day’s material prior to coming to class.

**Desire to Learn:** You are enrolled in this course on D2L. The D2L site will be used to share documents, including assignments, resources and items of general interest.

**e-mail:** You may contact me via e-mail. I will check my e-mail at least once a day, with very rare exceptions possible on weekend days. Please regularly check your Westminster e-mail accounts for updates and announcements from me regarding this course. I will assume you have the information once I have e-mailed it to you.

**Computer-based biochemistry tools**

**Deep View:** Deep View is a molecular graphics program designed for visualization and analysis of biological macromolecules in protein data bank (.pdb) format. We will use it in class and lab. Links to the program and tutorial may be found on the D2L site for this course.

**The National Center for Bioinformatics (NCBI):** This website contains multiple searchable databases of genetic and protein sequence information as well as tools to compare and analyze sequence information.

**Expasy website:** This site offers resources for sequence analysis, sequence comparison, and much more.

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**Grading:** Grades will be based on the following:
Grading Method

Pre-topic assignments and case studies will be graded on a pass/fail basis, with a specified number of passing grades earning different letter grades:

**Pre-topic assignments:**

These will be graded on each student's individual contributions to the OneNote Classroom collaborative document. The grading is pass/fail. The threshold is making a significant contribution to most or all questions in the assignment. A significant contribution might be an initial definition or description, a calculation, a chemical structure or structures, a reaction scheme or mechanism, a derivation, a comment that adds depth, corrects or clarifies a previous comment, a debate over a point between two or more students or a relevant question that demonstrates that some aspect of the question has been considered.

There are 13 total pre-topic assignments:

- For an “A+” grade, you must pass all 13 pre-topic assignments
- For an “A” grade, you must pass 12 of 13 pre-topic assignments
- For a “B” grade, you must pass 10 of 13 pre-topic assignments
- For a “C” grade, you must pass 8 of 13 pre-topic assignments
- For a “D” grade, you must pass 6 of 13 pre-topic assignments
- For anything less, your grade will be scaled between 0 and 59 depending on how many passes were earned

**Case Studies**

Case studies will be graded for each group as pass/fail. A failing case study grade may be resubmitted for credit within 1 week of receiving feedback. The opportunity to resubmit depends on an initial good-faith effort to pass the case study—it is not a way to turn in a case study late!

An individual may fail to earn credit for a case study if credible evidence is presented that the individual did not meaningfully contribute to the intellectual work of completing the case study.

There are 10 case studies:
For an “A+” grade, you must pass all 10 case studies
For an “A” grade, you must pass 9 of 10 case studies
For a “B” grade, you must pass 8 of 10 case studies
For a “C” grade, you must pass 7 of 10 case studies
For a “D” grade, you must pass 6 of 10 case studies
For anything less, your grade will be scaled between 0 and 59 depending on how many passes were earned.

Presentations:

Short amino acid presentations will be graded according to the rubric posted on D2L.

Exams:

Exams will be worth 100 pts. each. The final exam will be a combination of an exam on the material covered since the previous exam (a unit exam, 100 pts.) and a cumulative exam (100 pts.).

Grading scale:

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>93.0 – 100 %</td>
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<tr>
<td>A-</td>
<td>90.0 – 92.9 %</td>
</tr>
<tr>
<td>B+</td>
<td>87.0 – 89.9 %</td>
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<tr>
<td>B</td>
<td>83.0 – 86.9 %</td>
</tr>
<tr>
<td>B-</td>
<td>80.0 – 82.9 %</td>
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<tr>
<td>C+</td>
<td>77.0 – 79.9 %</td>
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<tr>
<td>C</td>
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<tr>
<td>C-</td>
<td>70.0 – 72.9 %</td>
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<tr>
<td>D+</td>
<td>67.0 – 69.9 %</td>
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<tr>
<td>D</td>
<td>63.0 – 66.9 %</td>
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<tr>
<td>D-</td>
<td>60.0 – 62.9 %</td>
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<tr>
<td>F</td>
<td>0 – 59.9 %</td>
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Attendance, assignments, and absences: Attendance in class is highly recommended. Material missed due to absence from class is the student’s responsibility. If an absence occurs on the day an assignment is due, the assignment must still be turned in on time. If an exam is missed for an excused absence, it must be made up within two days of student’s return to campus/class. Excused absences may be due to illness, participation (not spectating) in Westminster-sponsored events, etc. Final decision on potential excused absences rests with the instructor.

Academic Integrity: Plagiarism or cheating is unacceptable in this course and in your profession. Please read Westminster’s Academic Integrity Policy (see Student Handbook). Violations of this policy will result in a failing grade on the assignment, project, or exam and will be reported to Academic Affairs.