

Syllabus

Course Information:

- Title: General Biological Chemistry
- Designator and Number: **CHEM 470/570, BIOS 470X/570X**
- Credit Hours: 3
- Term: Summer 2015
- Course Location: LaT 201

Instructor Contact Information:

- Gary M. Baker, Associate Professor and Director of Graduate studies
Department of Chemistry and Biochemistry
- Office Location: LaT 426
- Communication: Email: gbaker@niu.edu; Office hours: Immediately after class MTuW.

Course Description:

- Topics covered include practical compound and macromolecular structures and properties, thermodynamics of protein-ligand and protein-protein interactions, enzyme and transport kinetics, catalytic mechanisms, and bioenergetics. Demonstrated proficiency in related areas of pre-requisite General and Organic Chemistry is mandatory. Relevant course resources are distributed on Blackboard.

Student Learning Outcomes:

- Included in files posted in the Content section of Blackboard.

Student Assessment:

Various activities/small projects will be scheduled throughout the summer term, totaling 80 points, that all students are expected to complete. Details will be posted on Blackboard. Some may be in class and others will require time spent out of class. There are also four exams, each 80 points. Total points possible = 400.

- Level 400 students - Letter grade cutoffs:

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| A: 380 and above | C+: 288 to 312 |
| A-: 360 to 379 | C: 260 to 287 |
| B+: 344 to 359 | D: 220 to 259 |
| B: 328 to 343 | F: 219 and below |
| B-: 313 to 327 | |

- Level 500 students - Letter grade cutoffs:

Important: C-, D, F, and WF have the same impact as a "U" for graduate students.

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| A: ≥ 380 | C+: 296 to 311 |
| A-: 360 to 379 | C: 272 to 295 |
| B+: 344 to 359 | C-: 256 to 271 |
| B: 328 to 343 | |
| B-: 312 to 327 | |

Course Resources:

- **Textbook:**
None is required, but students may use online resources to supplement the resources on Blackboard.
- **Blackboard:**
Content files and web links will be posted in the Content section. Learning objectives will be posted in Announcements and updated for each lecture.
- **Databases:**
Accessed using a web browser: Protein Data Bank (PDB), Enzyme Structures Database (EC-PDB), PubChem; perhaps others.

Course Policies and Recommendations:

- Students should review relevant materials after each class session. Pacing is important, especially given the accelerated summer schedule.
- Regular class attendance is strongly recommended.
- Only one makeup exam will be allowed, and only if the instructor determines your reason to be valid (i.e. attending a conference because you're presenting a poster or talk; a medical emergency; vehicular accident; etc.). Reasons such as oversleeping or previously scheduled vacation are not valid. The instructor will also require proof of your reason for a missed exam. This documentation must be provided at least one week before the scheduled exam, or within a reasonable time frame in the event of an unforeseen conflict (i.e. vehicular accident or emergency hospitalization). Please note that the death of a friend or family member is a common reason offered by students that miss exams, but one that many students are unable to validate.
- Success on exams will depend on your ability to apply core concepts to various problems, including ones that you may not have seen before. Excessive reliance on memorization will limit your performance in this course.
- Exam format involves several different types of questions or problems. Some will require a written response that must be scientifically accurate, clear and level appropriate. Others will assess your command of relevant vocabulary or require a calculation that is logically and clearly presented. You may be asked to draw and label a graph, or to analyze a graph or table of data. The ability to write clear structural formulas with correct valence and formal charges, or interpret structures that are given to you using different conventions is also an expectation. General and Organic Chemistry knowledge and comprehension are integral to the discussion of biochemistry and must be evident in student responses.

[Americans with Disabilities Statement.](#)

- Please read and comply with this statement if you require any type of accommodation due to a disability.

Academic Integrity (AI) Statement:

- All students are required to comply with all relevant Academic Integrity (AI) standards. Relevant links can be found [here](#). All students are advised to take the NIU student tutorial on AI if they haven't already.

Proposed Course Schedule:

- Specific learning objectives will be updated in the Announcements section on Blackboard during and after class to give students a clear study guide. All exams are aligned with these objectives, but it is a student responsibility to emphasize reflective study (ask how or why; make connections), and to not rely solely on memorized algorithms.

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| <p>Exam 1: Thu, June 25</p> <ul style="list-style-type: none">• Review of solution chemistry, including use of units and their conversions to correctly calculate drug dosages given by injection or infusion. Structure and properties of practical compounds, such as nutrients and pharmaceuticals. These discussions will be extended to include biological macromolecules. Properties include isomerism, geometry, solubility, resonance, and acid-base, and the role of these properties in normal function, disease, and rational drug design. <p>Exam 2: Thu, Jul 9</p> <ul style="list-style-type: none">• Protein structure and function relationships. The Perutz model. Methods of studying and analyzing protein-protein and protein-ligand interactions. Thermodynamic and kinetic properties of monomeric and oligomeric (allosteric) protein systems. Role of cofactors. | <p>Exam 3: Thu, Jul 23</p> <ul style="list-style-type: none">• Enzyme structure and methods of kinetic analysis for characterizing the affinity of orthosteric and allosteric drugs bound to target enzymes and their modes of binding (competitive, uncompetitive, or mixed). Mechanisms of catalysis, including the role of general acids and bases in substitution, addition, and elimination mechanisms. Transition state stabilization, diffusion control, and induced fit. <p>Exam 4: Thu, Aug 6</p> <ul style="list-style-type: none">• Interactions of carbohydrates, lipids, and nucleic acids with proteins; role in disease. His-Pro Rich Glycoprotein (HPRC) and cis-platin. |
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The scope and depth of coverage of individual topics will depend on the outcomes of various formative assessments given throughout the semester. Student proficiency with various concepts of general and organic chemistry is essential and provides the foundation for many biochemical discussions.