Biology/Chemistry 401 -- Advanced Biochemistry **Spring 2011**

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Welcome to what I hope will be one of the most challenging -- and rewarding -- classes of your college career! Please view this syllabus both as an introduction to the course and as an explanation of why I have designed the course this way. I'll be frank -- my syllabi tend to be long ("syllabooks", perhaps), and probably more long-winded than necessary, but I feel that it is very important that you understand my educational philosophy in order to get the most out of this class. So please read the whole thing, so that you have a good sense for what is coming in the next fourteen weeks. And please let me know if there is anything in this syllabus that you either don't understand or don't agree with. It is my belief that you will be in the best position to learn Biochemistry if we can honestly discuss both the learning process and the content of the course.

What I want to achieve in this course this semester:

Fundamentally, I want to help you learn to *think* like a Biochemist, and learn to *learn* like a Biochemist. What does that mean? It means I want to...

- give you a *true working familiarity* with the logical approach to asking questions about your world that we term "the scientific method". That methodology is far more than a set of steps for designing laboratory experiments. It is a way of interacting with life and with information.
- give you an appreciation for how scientific questions are asked and answered, from the initial idea to the description of the project to the delineation of a detailed, workable experimental plan.
- stimulate your hunger for information about the biochemical world.
- give you the confidence to pick up any scientific journal article, extract the information you need from it, and share your analysis of the article with others.
- equip you with some of the tools you will need to teach *yourself* about other aspects of biochemistry as you encounter them in your future journeys. These tools will include techniques for finding information, techniques for performing experiments, and techniques for analyzing and presenting your data.
- give you tools and motivation to *critically* investigate your world for the rest of your life. If you want to do what it takes to acquire those tools, we will have lots of fun together and you will be richly rewarded intellectually (and on your transcript!).

Fundamental to my approach to this class is a firm belief in the Liberal Arts approach to learning. At its core, this philosophy states that learning is not so much a process of accumulating information as a process of developing ways to examine and make sense of information. Therefore I most decidedly do NOT view my role as teacher to be the person who tells you all there is to know about the subject of biochemistry. Rather, I strive to be the person who encourages you to think critically about biochemical information, who helps you to construct your own view of the natural world.

In keeping with the goals described above, the most important elements of your grade in this course will depend on how sophisticated your biochemical logic is, and on how well you can learn new information. That is to say, I will be looking not so much at how well you have mastered the specific material covered in class, but rather how well you have mastered the tools a working scientist uses to learn and analyze new information.

To excel in this class, you will have to

- prepare for each class
- read and listen *critically* and ***question what you don't understand*** or don't believe
- listen actively and think creatively
- be willing to take chances, be willing to be wrong in front of your classmates
- take the initiative to prepare more than the minimum for any class or assignment, ask questions that you'll never get the chance to show me you can understand, and practice on your own. These activities are ones you'll engage in privately, but their outcome will be a sophistication and scientific comfort level that will be clear.

To support you, I will

- talk as little as possible, and ask lots of questions
- structure this class to optimize your engagement at every level
- do my best to give you frank feedback frequently
- give plentiful low-cost-to-failure exercises
- be available for those students who take the initiative to seek me out. I have set aside 3 hrs of flexible "office hours" per week. I will also be available for half an hour after every class to answer questions, respond to issues raised in class, and design homework exercises based on what we did in that specific class. That's an additional two hours per week during which you can ask me questions or bounce ideas off of me. Use it!

Who I am and how to get in touch with me:

Instructor: Peter Kuhlman
Office: Chamberlin 201
Phone: 587-6698
(this line gets forwarded to my cell phone, so it's your best bet in an emergency)
E-mail: kuhlman@denison.edu

Course resources:

Text: *None*. In this class we will be learning about biochemical science at the true cutting edge. As the cutting edge is, by its very nature, a moving target, no textbook can present a good picture of it. Nevertheless, textbooks can give you useful background information and can summarize important experimental findings. Consequently, you will be using a variety of texts, including the textbook you used in your introductory biochem class, to sketch the outlines of each scenario and technique we explore. Then, to fill in that picture, our class sessions will rely primarily on published research and review papers.

Laboratory Manual: Your laboratory experiments will be true experiments and not tried-and-true exercises. Therefore a key element of the laboratory experience will involve learning how to design experiments so that the results are as informative as possible. Moreover, there will be times when different individuals in your lab group will be conducting very different experiments, and your group may be doing things that no other group is doing. Due to this dynamic situation, there will be no lab manual *per se*. Rather, I will provide you with the instruction manuals for any commercial kits that we use for your projects, and I will introduce you to print and online resources for other biochemical techniques. I may be able to share with you my notes for some experiments, and you will need to seek out protocols for some experiments. It is my hope that by the end of this course you will be comfortable with the steps required to replicate an experiment from a published paper without ever having done that sort of experiment before.

People: In this course you may be going boldly where you (and I!) have never gone before, but you will not be in true *terra incognito*: there will always be people at Denison or somewhere in the world who have studied this material and done similar experiments before. And that's the case with most of the knowledge and most of the experiments we encounter in our scientific lives. Therefore it's important that you begin to appreciate how to go about finding and contacting the people who know what you need to know. We won't spend a lot of time on this aspect of experimental science, but hopefully we'll get you started…

Course meeting time:

Mondays, Wednesdays, and Fridays from 9:30 to 10:20 a.m. , and 10:30 to 11:20 a.m., in Talbot 229.

Labs will meet on Mondays and Fridays from 1:30 to 4:30; for part of the semester we'll meet in Talbot 229, and the rest of the time we'll be up in the actual lab. We'll start out with several weeks of classroom meetings during "lab" time, and in the latter part of the semester, your individual experimental responsibilities may require visits to the lab outside of scheduled class time. Because of the structure and goals of this class, we'll be doing some "lab" things during times we're scheduled to be in the classroom, and some "classroom" things during times we're scheduled to be in the lab. Real life and real science are like that -- they rarely conform to tidy segregation of tasks.

Class focus and format:

The first semester of Biochemistry was largely concerned with the nature of biological macromolecules and the interactions of proteins with small molecular ligands. In most biological systems, macromolecules do not act as isolated players, but rather perform roles in complex coordinated responses to stimuli. The principles of protein structure and function that you learned in the first semester course, however, still govern the behaviors and interactions of the individual players in these systems. I hope that you will enjoy seeing both the application of concepts that you've already mastered as well as the expansion of your biochemical world to encompass fascinating new phenomena.

In the classroom this semester, we will explore the theme of the biochemical basis of learning and memory. To explore this fascinating and dynamic subject area in an effective way, the semester will be divided into two topical blocks: an introduction to the tools and techniques that a modern biomolecular scientist uses to ask questions about the world, followed by a series of focused case studies that I hope will provide you with a productive entry into the study of memory at the molecular level. To accompany this classroom investigation, you'll be spending time in the lab learning to design and carry out experiments of the sort that a practicing biomolecular scientist might use to study the formation and storage of memories -- the types of experiments that you will be reading about this semester. Unfortunately, we won't be able to conduct memory research per se, but one of the unifying aspects of the immense field that we call Biochemistry is the commonality of techniques applied to very different problems. It is my hope that by designing and conducting experiments to probe problems that are accessible to us, you will gain a richer understanding of the ways the same techniques are applied to problems in neurobiology. I'll say more on that below.

In topical block two, you'll be an active participant in the teaching and learning process. As we begin our investigation of each sub-topic, I'll lead the first meetings, which will serve as an introduction to the history of investigation in the field, some key discoveries, and current hot issues. With the stage thus set, we'll have several class periods in modified "journal club" style, basically a detailed critical discussion of a research paper or group of papers on a particular aspect of the topic. Each group of papers on a particular line of investigation will be our dominant focus for one week, roughly as follows:

- you'll be given some background reading (such as a review article or passage in your text book)
- you'll read the research paper(s)
- together with one or more of your classmates, you'll be assigned a piece of the paper (such as a key experiment, or a technique the authors used, or a critical piece of background information) to become our class "expert" on. In class, you'll help your classmates master this information, too. You'll be graded on your preparation on a simple three-point scale (acceptable, inadequate, or excellent).
- in class, we'll go through the paper together, exploring the experiments presented, along with the authors' motivations, interpretations, and conclusions. This will probably take two days per paper.

- after we go through the paper, we'll sometimes spend an additional day to review the key points of the paper, and to explore
    - questions the paper has left unanswered
    - related information from other papers
    - other experiments you could design to follow up on this study
    - common themes that linked the different papers in this section with each other and with other biochemical phenomena

You might ask why I plan to spend so much of the semester *not* standing in front of the class. Am I really so lazy that I'm finding a way to get out of teaching? While I'll readily admit to being lazy, the real reason that I'm making these sessions such a major feature of the class is that I believe that an excellent way -- perhaps the best way -- for you to *really* learn about a topic is to have to teach someone else about it. Moreover, sessions such as these -- telling fellow scientists about research results -- are a key part of the life of almost all working scientists, whether they are researchers, clinicians, educators, or managers. These sessions are thus a key part of my strategy for reaching the goals of this class, and I will try to give you enough feedback on your part in them to make them an optimal learning experience.

Given the nature of this class, and with each of you playing a key role in leading the class discussion on multiple occasions, it is important that you be an active participant in all class discussions. Most emphatically, that does NOT mean that every comment you make has to be "right". On the contrary, we often learn much more from our mistaken ideas than from our correct ones. Accordingly, as I assess your participation, I will be looking only for evidence (a) that you are reading the background material and the papers and (b) that you are thinking about the subject matter.

To test your growing analytical sophistication, I will hand out problem sets roughly every two weeks throughout the semester that will take the place of exams for this course. The final exam will also be similar in approach to these exercises, but it will consist of a one-hour oral interview.

If you *must* be absent from any class or laboratory session, please see me beforehand if at all possible, and in any case be prepared to **rigorously** justify your absence (for example, with supporting documentation from Student Health or the Academic Support office). Unexcused absence on a day when you are scheduled to lead the class discussion will inconvenience the entire class and result in a score of zero for that day. Failure to complete a graded problem set will result in a score of zero for that assignment.

Playful competition

Our class is broken up into two sections this semester to increase the interaction that each of you can have with me and with each other. Nevertheless, I still view this very much as ***one class***. A number of the students in our class will spend class time with one group of you, and lab time with another group, and I hope that you can all serve as resources for the other students.

Another way to interact with students in the other section will be through the posing of challenge questions. I'll say more about this in class as the semester gets underway, but the basic idea is that:

- challenges will be based on material that we are studying in class at the time, and should be designed along the lines of the questions I will pose to you -- designed in other words to push your classmates to deeper understanding of the subject we're exploring
- challenges should be submitted to me on Friday of each week (once we get into the science of learning and memory proper, around week 5); I will review them over the weekend and post them to the other section of the class on Monday; you'll then have until Friday to respond to challenges posed to your section
- I will give points both for posing a challenge, and for answering it; more sophisticated challenges (and answers) will get more points
- the class section with the lower aggregate score at the end of the term will have to help me prepare refreshments for our end-of-term research proposal reviewing sessions

Laboratory:
The laboratory portion of this course will primarily be an opportunity for you to learn how to develop a careful experimental plan to address a question that's of interest to you. You'll be doing this in groups over the course of the semester.

Formulating a Plan of Attack. Major portions of your energy and your grade this semester will revolve around the creation of an experimental plan. The formulation of this plan will be modeled after the process scientists follow in proposing a line of investigation to a funding authority. You will be expected to identify a question you'd like to explore, to aggressively research what is known about the topic, to propose a novel series of experiments intended to answer some well-defined questions about the topic, and to carefully justify both the questions and the experiments. Crafting your proposal will take much of the semester.

Written analysis. There will be no "lab reports" *per se* for this course. We will have two informal oral lab progress reports in class to discuss what each group has accomplished and what problems they have encountered. At the second oral progress report, I will request a (brief) written summary of your results and conclusions, and reasonable next steps.

It is generally accepted that we learn best when we can make mistakes and learn from them with low penalty for failure. Accordingly, I will ask you to hand in drafts of the key portions of your project proposal, and you'll receive feedback on the proposal both from me and from your peers. You will then be able to make modifications based on the comments you've received before handing in the final product. Your final, polished Proposal will be due on Monday, May 3rd.

If you aren't comfortable with your sophistication as a scientific writer, I encourage you to come by and talk with me well before your Proposal is due. In addition to any guidance that I can give you, the Denison Writing Center has several books on writing in the Sciences which may prove useful to you. (See below for more on scientific writing.)

Proper laboratory Attire is a very important way to minimize the potential danger to you of accidents that can occur in any laboratory. Therefore, I will insist that you observe the following clothing guidelines AT ALL TIMES:

- glasses or goggles must be worn while you are within the laboratory
- no open-toed shoes are allowed in the laboratory
- no shirts that expose your midriff nor above-knee skirts, shorts, or dresses are allowed in the laboratory unless they are worn underneath a lab coat.

If you cannot meet these requirements in the lab, I'll send you back to your room to change your clothing. I don't do this to aggravate you or because I want to enforce a particular style of dress, but rather because I believe that it is far more important to be safe in lab than to be fashionably dressed in lab.

Learning from your mistakes
I believe very firmly that learning is an iterative process; very few of us get things exactly right the first time through, and there is often a great opportunity for learning in repeating an assignment after receiving feedback on it. This philosophy underlies much of my approach to grading and point values for assignments in this class. I want you to feel that you can learn and benefit from your mistakes, that you'll be rewarded for getting it right the second time around. Accordingly, if you ever want to revise an assignment and submit it for reconsideration, you are welcome to come and discuss that with me. And for *any* assignment on which you receive a grade of 50% or less, you are strongly encouraged to revise and submit the assignment for regrading.

In the same vein, if you receive any assignment back on which any part of one of your answers has been marked in orange highlighter, you should interpret this as an invitation to revise your answer and

submit it for regrading. Typically this will indicate that I had trouble understanding the logic behind your answer, or felt that you answered a different question from the one I asked. In any event, this indicates that I think you have a better grasp on the material than your answer shows, and I'd like to give you another chance to demonstrate your mastery.

In any resubmission situation, please

- ensure that you include the original graded version of the assignment so that I can compare my original comments with your revised version. Resubmissions that are not accompanied by the original version will not be regraded. I **strongly** encourage you to make a copy of your original assignment before giving it back to me, so that you can study from it. Resubmissions get the lowest priority on my grading to-do list, and I won't guarantee getting them back to you before the end of finals week.
- ensure that you carefully address the deficiencies of the original. I try to put care and time into the comments on your assignments when I hand them back, with the intent that my comments will help you think more carefully about your work. Revised versions that come back to me with the original problems un-addressed are likely to receive a less-than-generous review. If you have any questions about my comments, by all means come to talk with me about them *before* making your revisions.
- be aware that I grade at least as stringently on revisions as on the originals -- on the revision, I assume that you understand my expectations, so I am less likely to give you the benefit of the doubt when your intent or procedure is not clear from your work.
- understand that your final grade for the assignment will be the average of your original and revised grades. With a substantial improvement over the original assignment, this can make a very meaningful difference in your overall grade.

Finally, it would be naive to think that simply copying down answers off of someone else's paper, or off of the answer key, constitutes learning from your mistakes. While I won't be able to judge whether a correctly revised answer shows that you've *really learned* the subject matter, *you* should be able to make that assessment. I strongly encourage you to ask yourself that question honestly every time that you hand in revised answers. If you aren't honest with yourself about this, you could get a rude surprise on the final exam, which is worth more points than all the problem sets put together, and on which you only get one opportunity to show me what you truly have learned.

Due dates and deadlines

Let's face it. We're all busy, and we all find ourselves in the nasty situation from time to time where we have more things to do than we have time to get them done. It's a very real part of the modern lifestyle. With that in mind, and in an effort to avoid holding you to a standard that's higher than the one to which I hold myself, here's my policy on handing things in on time: if you hand any assignment in after the deadline but before I have time to grade it, there will be no cost for your tardiness. If you hand in an assignment after the due date, and up to one week *after I have graded* that assignment for your classmates, there will be an automatic 12% deduction in your score (that is, the max you can get for a late submission is 88% instead of 100%). I hope that you never find yourself turning things in later than that, but if you do, your score will drop an additional 12% for every additional week *after I grade* the assignment.

Scientific Writing

Several of the assignments for this course involve writing. In science, as in nearly all aspects of professional and personal life, clear and effective communication skills are a tremendous asset. I encourage each of you to take advantage of the campus Writing Center to improve your written communication skills. Although there is a widespread perception that writing in the sciences is somehow "different" from writing in other disciplines, I regard that as a myth. Styles certainly differ between fields, but the fundamentals of good communication are nearly universal. The Center is a free resource available to all Denison students. Student writing consultants from many majors help writers one-on-one in all phases of the writing process, from deciphering the assignment, to discussing ideas, to developing an argument, to finalizing a draft. Because proofreading is a last step in that process, writers should leave plenty of time for getting their ideas right before expecting proofreading help. Consultants also can help writers with personal documents, like job and internship applications. The Center is located on the fourth floor of Barney-Davis Hall; satellite locations are on the third floor of the Library (the Main level) and the first floor of Fellows near the Computer Lab. Appointments between 4 p.m. and 9 p.m., Sunday through Thursday, can be made in the Barney location by phoning 587-JOT1. The satellite locations are drop-in; check the website at http://www.denison.edu/writingctr/ for those hours.

Special Needs

Different students come to this class with different training, different backgrounds, and different abilities. If you feel that because of personal factors you would benefit from some modification of course procedures, such as special test-taking arrangements, I ask that you contact me privately *at your earliest convenience*. I will work with you and with the Academic Support and Enrichment Center (Doane Hall, room 104) to optimize your learning experience. Certain accommodations will require verification of disability based on documentation on file in the Academic Support office.

Academic and personal honesty

My fundamental assumption about this class is that you are here to learn. All feedback that I provide you, all learning opportunities that I set up, are predicated on that assumption. For you to effectively learn, and for me to effectively advise you on your learning, you must be honest with me and with yourself about what you do and do not know. I will attach no stigma to your admission that you don't understand something. Indeed, that admission is the first step down the road to mastery of this course.

In 2008, the DCGA and the Denison University faculty signed off on a set of policies envisioned and largely crafted by Denison students. This set of policies, known as the Code of Academic Integrity, "provides a means of assuring that values essential to learning—trust, responsibility, and ethics—are promoted and maintained by all members of the Denison community." (this quote is taken from the description of the Code at http://www.denison.edu/about/integrity.html) I encourage you to become well acquainted with the Code; it not only governs how Denison deals with academic dishonesty (more on that in a minute), but it also provides a call to take greater personal responsibility for creating the learning environment that you want to experience at Denison.

If the atmosphere of trust and learning that I try to create in this class is compromised by individuals behaving in an academically dishonest manner -- for instance, passing off someone else's work as their own -- I will be deeply disappointed and quite upset. Academic dishonesty is tantamount to intellectual theft. This standard applies to all work ranging from simple lab assignments to the final exam. I recommend that you carefully read the Denison University Code of Academic Integrity (at the URL listed above), the Academic Dishonesty Policy as printed in the student handbook, and the section in the Bedford Handbook entitled "Citing sources" on pages 592-608. Neither ignorance nor carelessness is an acceptable defense in cases of plagiarism.

The grade penalty associated with a confirmed case of dishonesty will ordinarily be a score of zero for that assignment; I do not accept resubmisions in cases of academic dishonesty. Furthermore, by

Denison policy, I must refer every act of academic dishonesty to the Associate Provost, and violations may result in failure of the course, suspension, or expulsion.

Don't be foolish. Engaging in dishonest behavior in order to bring your grade up from a B to an A, or to save yourself some time, is simply not worth the cost. It saddens me every time that I catch a student cutting corners like this, because the cost is so disproportionate to the potential gain. And I'm sorry to say that I've had to turn in at least one student for academic dishonesty every semester for the past several years. Don't join their ranks. Be proud of what you've learned, not what you've gotten away with. Be honest.

How will your learning be assessed?

As I currently envision the course (and subject to feedback from you), there will be a variety of opportunities for you to demonstrate to me your mastery of course concepts; these will probably add up as follows:

Preparation for class assignments, small assignments	8 pts x 16 sessions =	144 pts
Challenge questions (participation in 2 challenges is expected; participation in more than two earns extra points)	8 pts x 2 rounds =	16 pts
Lab projects		
research proposal		100 pts
in-class reports on proposal	10 pts x 2	20 pts
evaluation of laboratory engagement and effectiveness		20 pts
Take-home problem sets	30 pts x 5 =	150 pts
Final oral exam (focusing on the interpretation of experimental data)		200 pts
Subjective evaluation of attitude and performance (reflecting engagement in the class, responsible contribution to collaborative class sessions, contribution to Cool Science Fridays, lab progress reports, response to constructive criticism, etc)		50 pts
TOTAL		700 pts

Please note:

- The problem sets account for less of your course grade than the final exam. I've done this for three reasons. First, it reduces the stress associated with each problem set. I hope that you will take these as opportunities to think and to learn. Second, it allows you to learn from your mistakes -- you can do poorly on a problem set, but if you learn what you did wrong and you address your deficiencies, then you will have the chance to score well on the final and come out of the class with a grade that reflects *what you learned in the end*. Third, this scoring system reflects my belief that what you know at the end of the semester is really important -- I don't want to reward you for mastering material for one problem set and then immediately forgetting it. Rather, I want to reward you for truly learning the material and for integrating each new topic into your mental picture of how the world works.

- I hope that this will be abundantly obvious as we go along, but let me state it explicitly here: I make no distinction between "class" concepts and "lab" concepts in this course. Indeed, I expect you to fully integrate these two portions of the class in your "lab" and your "class" assignments.

- Grades will be assigned *roughly* according to the scale below. Note that I may change the scale so that it more accurately reflects what I feel to be the performance of members of the class. For instance, if everyone does poorly on the problem sets and if I conclude that it is because I did something wrong, then I will likely adjust all grades upward from the following distribution. On the other hand, if I think that the final exam is sufficiently challenging but everyone does very well and is earning "A" marks, then I will be pleased as punch and am *un*likely to change the scale. For the most part, you may consider these to be the most demanding standards that I am apt to apply.

90% and up	flavors of A
80 to 89%	flavors of B
70 to 79%	flavors of C
60 to 69%	flavors of D
below 60%	F

- Finally, I wish to make clear my interpretation of letter grades.
  First, let me say I recognize that the way we assign grades in American higher education is not perfect, or even wonderful. It is, however, a necessity of our education system, and a way to allow communication between student, faculty, and outside constituents -- employers, med school admissions committees, etc -- about how well you met the goals of this class. I will try very hard to ensure that all grades that I give in this class are based on careful, principled evaluation. I also try to ensure that I apply fair standards to all students in my class. Again, however, I recognize that there are many desirable learning attributes -- persistence, creativity, and positive outlook, to name only a few -- that aren't well captured in a simple letter grade. If you ever ask me for a narrative evaluation or letter of recommendation, I'll be sure to comment at length on these other facets of learning.

  Second, and in the same vein, I want to acknowledge up front that I don't give grades for effort, per se. Hard work, diligence, and motivation are indispensable for good learning. But they don't, in themselves, *constitute* good learning or high achievement. And those are the things that are primarily reflected in my grading. Let me give a few examples that may illustrate what I mean. Not everyone, for instance, can play in the (W)NBA when they grow up, regardless of whether they've wanted to be a professional basketball player all their life or not. Nor can everyone be a doctor, or a stand-up comic, or an opera singer. You must have aptitude AND attitude AND a whole lot of effort. Other things will have to be sacrificed along the way. Many of us decide that those sacrifices are not worth the goal. And that is OK; choosing not to devote yourself solely to Advanced Biochem this spring will not make you a failure in my eyes, and it shouldn't make you view yourself as a failure either.

  I view an "F" as a strong indication that the level of preparation and/or commitment brought to the class by a student are incompatible with the goals of this course. I hope not to give your class any "F"s.
  I view a "D" as an indication that a student is passing the class, but performing well below my standards and failing to achieve a substantial portion of the course goals. Usually, this means that the student is performing well below her or his true abilities. I hope not to give your class any "D"s.
  I view a "C" as notice that the student is doing only a fair job. Frequently, this means that the student is present but not motivated or engaged. A "C" student is doing adequately but probably came to the class with insufficient preparation and/or has not committed the personal resources to learn effectively.
  I view a "B" as a very respectable grade. The student to whom I give a "B" may be trying very hard though still struggling with mastery of the material, or may be working less hard and stopping short of achieving excellence.
  I view a "B+" as an indication that a student is doing a truly good job. This grade indicates to me that the student is expending significant care and effort to ensure that s/he is learning the material.

I view an "A-" as a very good grade. I do not give this grade lightly or without evidence that a student is nearly approaching mastery of the material; this grade indicates that a student has met my expectations for the course.

I view an "A" as an indication of true excellence. In order to achieve an "A" in my course, a student must demonstrate to me that s/he has not only committed the necessary resources to master the material, but also that s/he is *aggressively engaging the questions that we explore*. This is a grade to be proud of, a grade to be earned by serious work and mental sharpness.

In Advanced Biochemistry, an A will only be earned by mastering the technical aspects of the course, *and also* showing initiative and curiosity beyond the immediate necessity of an assignment.

Approximate **course calendar**

(please see revised calendar for updated class schedule)