

# Biochemistry



## CHE 334 – BIOCHEMISTRY – BLOCK 3 (2008)

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### *Course Overview and Objectives*

Biochemistry occupies a funky zone between biology, which everyone thinks they understand, and chemistry, which everyone loves to hate. While the name itself suggests that biochemistry is more specialized than either biology or chemistry alone, we can more formally define it as a science that uses molecular theories/concepts to analyze the molecular behavior of biological systems or macromolecules. It is a chemical explanation of life's process, and this is the perspective from which we shall approach this course.

I broadly view biochemistry as a discipline focused on four major themes: 1) the nature and biosynthesis of proteins, 2) pathway regulation and integration, 3) energy flux, and 4) transmission of biochemical information. This particular biochemistry course will focus on the themes 2 and 3—pathway regulation and integration, and energy flux. This allows us to focus on the mechanistic details of how cells and tissues metabolize nutrients in the context of their physiological state. More specifically, when you have finished this course, you should be able to...

- differentiate among the regulatory mechanisms used for controlling metabolic pathways,
- illustrate how metabolic pathways interact within a cell as well as between tissues,
- explain the metabolic changes of a cell or tissue in response to physiological states.

Even though there are only three course objectives, they are quite broad and inherently complex but nevertheless can be addressed by using the following focus questions.

1. How does the body coordinate tissue metabolism in response to physiology?
2. How is glucose availability to cells and tissues controlled?
3. What is the metabolic fate of glucose and how does it relate to energy production?
4. What metabolic alternatives exist when glucose is not plentiful?

We will be using these focus questions to guide us towards the specific information needed to accomplish the course objectives. For any of the systems we encounter in this class, I am expecting you to develop (more) fluency in dealing with both the molecular details and the physiological implications for the organelle or organism.

The text for this course is *Lehninger Principles of Biochemistry - 5th ed. by Nelson and Cox* (WH Freeman and Co. ISBN 978-0-7167-7108-1). We will be focusing mainly on the chapters dealing with metabolism and signal transduction, but as with most textbooks, it will serve as a reference book to help refresh your memory about general knowledge that you encountered in the prerequisite courses.

The assigned readings support the lectures by providing basic information that you are responsible for. Do not expect the lecture to cover everything in the book, there simply isn't time. If you encounter concepts in the text that are not clear to you, however, take it upon yourself to help direct the class discussions and seek clarification. Remember, if you don't understand something, I can guarantee that there are others who are also having trouble.

## Course Assignments and Grading Policies

Exams – There will be 2 exams intended to assess your factual understanding and ability to apply those facts. You can best prepare by seeking conceptual connections and completing the homework problems. I will not collect or grade homework, but we can use it to help direct our attention during class lectures.

Lab – The primary objective in lab is for you to develop independence in setting up reliable experiments. Can you take a written procedure and consistently obtain the result you are expecting and subsequently describe the procedure and results in written form? I will be using the following activities to assess your independence.

- *Keeping a lab notebook* – This should be a dedicated notebook with “permanent” pages. I will not collect these but will simply ask to see them periodically and give you verbal feedback.
- *Making a “substantial” effort* – Developing a lab is not trivial. It requires an immense amount of start-up effort mainly due to the fact that you have to document and assess if things are working at each step. Therefore, you can expect to spend 10-15 hrs a week on the lab. Exactly how much time you have to spend depends on how well you plan. Thinking about the procedure in advance helps you avoid time-wasting mistakes and to know what kind of data to collect.
- *Lab Report* – This is a formal report of your work and follows a standard format which we will discuss in greater detail when we are ready for it. Even though you will be working with a partner on the lab, you are responsible for submitting your own lab report.

Research Proposal – Simply knowing a bunch of stuff and doing tedious work in the lab is not what being a scientist is about. Rather, it is our ability to make broader connections that furthers our collective understanding of biochemistry and enables us to make the scientific advances that improve lives. Your assignment is to prepare a 12-15 page research proposal that relates to a molecular explanation or mechanism of a biological process. I will provide you with more explicit instructions in another document.

**Final grades will be determined on a straight percentage basis (the approximate distribution is below), which means there is no curve.**

Point distribution	
Exam 1	100
Exam 2	100
Lab work	25
Lab report	75
Proposal	100
total	400 pts

Grade scale			
A	94-100%	C+	77-80%
A-	90-94%	C	73-77%
B+	87-90%	C-	70-73%
B	83-87%	D+	65-70%
B-	80-83%	D	60-65%

## Academic Dishonesty

Part of the professional expectations for all scholars is to explicitly acknowledge the ideas, observations, or data created by others. Failing to do so is a form of academic dishonesty, and academic dishonesty is an extreme form of disrespect towards your peers and mentors. In its most general definition, academic dishonesty involves passing other people’s ideas or information as your own original work. Obvious examples include actions such as plagiarism (copying, paraphrasing, or stitching) or cheating on exams; however, there are other examples of academic dishonesty (an how to avoid them) that are outlined in your student handbook.

Students misrepresenting their work in this course (i.e. plagiarizing or cheating) will automatically fail the assignment and depending on the circumstances may receive a failing grade for the course. Violations of the College’s policies on academic dishonesty are also referred to the Registrar and the Dean of the College and will be dealt with as described in the student handbook.

A word about plagiarism... Collaboration is a great way to learn, and I strongly encourage you to work with others to help you understand the concepts. Nevertheless, I will expect you explain what you know in your own

words. Copying verbatim, paraphrasing, or simply creating a cooperatively written document simply shows that you don't take much pride in your work and makes it hard to convince others you are a valuable colleague to work with. Remember that this is not just about "getting through the class"; this is about you developing as an individual.

### ***Other Course Policies***

**Meeting Times** We will have a formal class section every day from 9-11 am focusing on lecture and problem solving. The afternoons are reserved for lab with a structured session between 1-3 pm. It may be necessary for you to work in lab outside of class depending how efficient you are in planning and executing your project.

**Office Hours** I have an open door policy and am happy to stop what I am doing to answer your questions (unless I am helping another student). I am generally either in my office (WestSci 215) or in my lab (WestSci 207). You may also contact me to schedule a more specific time.

**Due Dates** Due to the short time frame of our block semesters, **I do not accept late assignments.** I will, however, arrange alternative deadlines for situations in which you have a college-sanctioned event (athletics, choir, band, etc.) that conflicts with the deadline or if you are facing some extenuating health circumstance. **Any alternative deadline must be arranged prior to the original deadline**, preferably at the time the assignment is given.

**Exams** There are 2 short answer/essay type exams intended to gauge your knowledge of course content and how well you can apply it to solving a problem. Exams will be available only on the day scheduled and **there will be no make-up exams if you happen to miss one.**

**Attendance** I do not officially require attendance simply because showing up for a meeting is "professional" behavior, and at this point in your life, being a student is your profession. Although it is possible to never miss a class, there are times when certain extenuating circumstances (i.e. illness or family emergencies) prevent us from meeting our professional obligations. If you find yourself in this situation, it is **your responsibility to notify me before the actual class meeting time that you will not be attending class.**

In the event that you need a late withdrawal on the 15<sup>th</sup> day, your attendance record is one of the things that I consider in deciding if you have made a "determined effort" to participate in the class. In the interest of defining "determined effort" with respect to attendance, **it is unlikely that you would miss more than two classes during the block.**

**Withdrawals** You may withdraw from any course on the 15<sup>th</sup> day of the block but only if 1) you have met the course attendance policy, 2) that you have completed all assignments, labs, and exams due on or before the 15<sup>th</sup> day, and 3) that you have, *"in the instructor's opinion, made a determined effort to learn the material, complete the work, and participate in class"*.

**Special Needs** If you require academic adjustments because of a documented learning disability or health-related concern, **it is your responsibility to ensure that you have 1) documented your needs with the Registrar, and 2) notified me within the first 3 days of the block.** Accommodating students with special needs includes things such as help in taking notes, extra time for exams, or supervised tutorial support—it does not include opportunities for extra credit, different grading schemes, or alternative assignments. If you suspect you might have a learning disability but have not been diagnosed, you should consult with the Registrar or the Director of Counseling.

**iStuff** I will admit that I am starting to show my age on this one, but I am concerned about the social disruptions that are caused by the use of cell phones and other electronic devices. Classrooms are a social learning environment, and I ask that you respect this environment by not using various *iStuff* while you are in class.