WIDENER UNIVERSITY
DEPARTMENT OF BIOCHEMISTRY

BCH 452 Biochemistry II Syllabus Spring 2008

Monday, Wednesday, Friday, 10-10:50 AM, KH 315

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Office Hours: Mon 2-3, Tues 1-2,
Wed 2-3:30, Fri 9-10, 11-12
and by appointment

Prerequisite: BCH 451

Text and materials: *Fundamentals of Biochemistry,* 2nd edition by Donald Voet, Judith G. Voet and Charlotte W. Pratt, John Wiley and Sons, Hoboken, New Jersey, 2006. You may also find other Biochemistry textbooks such as Voet and Voet's *Biochemistry*, 3rd edition or Berg, Tymoczko and Stryer's *Biochemistry*, 6th edition useful. You should be familiar with Widener's Interlibrary Loan program as it may be necessary to request additional articles to complete the projects portion of your coursework. Plan to prepare in advance for the time necessary to request and review requested articles.

Office Hours: Monday 2:00-3:00, Tuesday 1:00-2:00, Wednesday 2:00-3:30, Friday 9:00-10:00 and 1:00-2:00 and by appointment. You are welcome to stop by my office at any time when the door is open for help. I also can be reached by email or phone to answer questions or arrange additional meeting times that are more convenient for you.

Course Communications: Email will be sent to your Campus Cruiser account; forward your messages to the account that you use most often. Announcements may be made in class. You are responsible for any announcements in class even if you are not there.

Course Description: This is the second course in a two semester sequence in the fundamentals of biochemistry whose major goals are: 1) to introduce the language of biochemistry and 2) to provide an understanding of the physical, chemical and biological context in which biochemistry takes place. Topics covered are bioenergetics and intermediary metabolism: glycolysis, the citric acid cycle, electron transport and oxidative phosphorylation, photosynthesis, glucose and glycogen metabolism, fatty acid catabolism, lipid biosynthesis, amino acid metabolism and the synthesis and degradation of nucleotides.

Course Goals: In addition to the major goals listed in the course description above, course goals include: 1) the development of problem solving and critical analysis skills, 2) the strengthening of communication skills in both an oral and written format, 3) the discovery and exploration of a variety of resources for problem solving, 4) the identification of the relevance of biochemical phenomena to everyday life and 5) the understanding of the conceptual organization of the major metabolic pathways and their connections to one another. Please note that memorizing biochemical pathways and structures is not an objective of this course. The level of attainment of these goals will be evaluated by class discussions, oral presentations, problem sets worked on as a group and individually, written projects and a final paper.

Grading: The course will be graded on the +/- system as follows:

Attendance, Preparation, Participation	5%
Problem Sets	35%
Midterm Individual Problem Set	10%
Original Case Study Project Written Report	20%
Original Case Study Class-led Discussion	10%
Newborn Screening Project Paper	10%
Newborn Screening Project Presentation	10%

Attendance, Preparation, Participation: ***Attendance is required.*** Whether working as an individual or in a team, your participation and input are essential to your learning and that of the class. Initial exposure to the field of metabolism entails a large body of material in the form of chemical reactions and structures that can be tedious and difficult to learn by simply watching someone talk about it. Rather than listen to a formal lecture each class period, we will have interactive discussions about the chapter material and problem sets. The degree of interaction and effectiveness of class time is dependent on your individual preparation. Therefore, this portion of your grade is subjectively based on your class performance and participation in the form of discussions and asking and answering questions.

Problem Sets: There are no formal exams in this class. Instead, problem sets will provide an assessment of your understanding of the material and they represent the major portion of your grade. You are expected to be familiar with the chapter material before our initial discussion on Mondays when Problem Sets will be distributed. Problem sets are typically due each Friday, preferably at the beginning of class, unless otherwise noted in class. Wednesday and Friday class periods will be spent working on and discussing the problem set as a team. I encourage teamwork because research has shown that students working in groups learn more, understand more and remember more. However, you are to process the group effort by yourself and submit your problem sets individually with the answers in your own words. Additionally, the Midterm Problem Set is to be completed individually with no input from other students. Problem Set solutions should be insightful, well thought-out, clear, organized, neatly written or typed and **include structures**. After you have given some initial thought to the problems, you may want to use additional resources besides your textbook such as the Internet, primary or secondary literature and other students. While Wikipedia can be used as a starting point, you will get much more out of the problem sets if you research deeper. Properly cite all of your sources. The preferred format for referencing citations is:

Book	Authors, *Title of Book, Edition*, Publishing Company, location, date of publication, pages used.
Journal Article	Authors, (Date) Title of Article. Journal Title Vol (No): pages.
Website	Title of webpage. www.webaddress.com, (accessed mm/dd/yr).

Original Case Study Project: Some of the Problem Sets will involve questions centered around a case study that is based on actual medical cases of metabolic diseases. You should use the format of these case studies as a model for this assignment. You will write an original case study on any topic in metabolism and lead an interactive class discussion on it. The topic is of your choosing and should be something that you are interested in or passionate about because you will do significant research on it to become the class expert. Inspiration for the topic can come from newspaper

articles, television shows, historical events, urban legends or primary and secondary literature regarding general biochemical subjects such as vitamins, coenzymes, antibiotics, toxins, pigments, membranes, hormones, etc. Once you have a topic in mind, research the primary and secondary literature to get a deeper understanding of the science behind it and to identify the most important and interesting concepts. Topics should be initially researched and a one paragraph summary of your topic should be submitted to me for approval by **Friday, February 29**. You may get approval earlier to ensure your first choice of topics.

Your case study will build a story based on the important concepts of your topic and should appeal to and interest your peers. You must include at least 3 or 4 questions that will spark discussion, illustrate the main points and stimulate additional research. You may also include 1 or 2 additional questions that require students to work on their own outside of class to further understand the topic.

You should design the case study to be completed in one class period with students working together as a team. It should be 1 or 2 pages in length and draw from a variety of sources. You will also include 2 to 3 pages of teaching notes that provide pertinent background including structures and pathways, the main learning objectives of your topic in relation to the field of biochemistry, expected student responses, possible leading questions to get the discussion flowing and citations of your resources. You will turn in the written portion of your case study on the day of your class-led discussion. A rubric for the written portion of the case study will be distributed separately.

After researching and writing your case study, you should be an expert on the topic. On the day of your class-led discussion, your peers will receive your written case study without the teaching notes. Your class-led discussion essentially places you in the role of professor and you will facilitate the understanding of your topic through the use of your case study. You will not be giving a formal presentation of your topic but rather you will teach your peers by guiding them through the case study, providing input when necessary and helping the group work together. You will be evaluated on the effectiveness of your class-led discussion by me and by your peers. A rubric for the in-class discussion will be distributed separately.

Newborn Screening Project: Currently the State of Pennsylvania mandates the screening of all newborns within 48 hours of birth for six different metabolic disorders. Many more metabolic disorders exist and a full panel of over 50 different disorders can be screened for privately for under $100 (www.pediatrix.com/body_screening.cfm?id=1681). For this assignment, you will choose one of the metabolic diseases and write a 3 to 6 page paper. You will give a 20 minute formal presentation to the class on your disorder. To avoid duplicates, I must approve of your choice **by April 11**. You may get approval earlier to ensure your first choice. Details of the paper and the basis for grading will be distributed separately.

Make-ups: It is not possible to make up work. If you must miss a class, notify me in advance as soon as possible because it may be possible/essential to make adjustments to the schedule.

Grievance policy: Please refer to the student handbook, the science office or myself if you have a problem.

Course content and schedule: Below is a **tentative** schedule of topics that will be covered. Alterations to the schedule may be made as necessary and we may leave out significant portions of some chapters or address topics not covered in some chapters.

Date	Topic	Reading
January 14, 16, 18	Energy Drinks; Introduction to Metabolism	Ch 13.1-13.2
January 21	**No class – MLK Day**	
January 23, 25	Introduction to Metabolism	Ch 13.3-13.4
January 25	**Energy Drink Problem Set Due & Discussion**	
January 28 30, Feb 1	Glycolysis	Ch 14.1-14.5
February 1	**Glycolysis Problem Set Due**	
February 4, 6, 8	Gluconeogenesis	Ch 15.4
February 8	**Gluconeogenesis Problem Set Due**	
February 11, 13, 15	The Citric Acid Cycle	Chapter 16
February 15	**TCA Cycle Problem Set Due**	
February 18, 20, 22	Electron Transport and Oxidative Phosphorylation	Chapter 17
February 22	**ETC & Oxidative Phosphorylation Problem Set Due** Receive Midterm Individual Problem Set	
February 25, 27, 29	Photosynthesis (In class problems only, no problem set due)	Chapter 18
February 29	**Midterm Individual Problem Set Due**	
March 3, 5, 7	**Spring Break**	
March 10, 12, 14	Pentose Phosphate Pathway and Glycogen Metabolism	Ch 14.6, Ch 15.1-15.3
March 14	**PPP & Glycogen Metabolism Problem Set Due**	
March 17, 19	Lipid Metabolism	Chapter 19.1-19.5
March 21	**No Class – Spring Holiday**	
March 24, 26, 28	Cholesterol Metabolism	Chapter 19.7
March 26	**Lipid Metabolism Problem Set Due**	
March 28	**Lipid Metabolism Seminar at Penn; leave at 2 PM**	
March 31	***Original Case Study Project Student-led Discussions***	
April 2	**Cholesterol Metabolism Problem Set Due**	
April 4	**No Class – Fly Meeting**	
April 7, 9	***Original Case Study Project Student-led Discussions***	
April 11	**No Class – NCUR**	
April 14, 16	Amino Acid Catabolism	Chapter 20.1-20.4
April 18	**No Class – Student Projects' Day**	
April 21, 23, 25	Amino Acid Biosynthesis	Chapter 20.5-20.6
April 21	**Amino Acid Catabolism Problem Set Due**	
April 28, 30	***Newborn Screening Project Presentations*** **Amino Acid Biosynthesis Problem Set Due**	