MEDS4027 – Course Syllabus (all of this information is available on the Blackboard site for this course)

General Information

MEDS4027, given in the fall semester, will introduce to the class the structure and function of proteins and nucleic acids. In addition, the biosynthesis of DNA, RNA and proteins will also be discussed. The objective is to understand how these large molecules are regulated and used physiologically. The class begins with a discussion of protein structure and protein folding. Proteins perform the majority of functions within a cell. Mutations in proteins frequently lead to disease. In order to understand these diseases it is important that the function of the protein is understood, at a molecular level. The environment plays a critical role in how a protein folds and behaves, thus considerable time will be spent discussing the properties of water, and how water’s properties help to drive the folding of proteins into their final structure. Once protein folding is understood the class will examine the hemoglobin molecule in detail, to understand how different protein subunits can communicate with each other and aid in a physiological function, the transport of oxygen from the lungs to the tissues. After the discussion of hemoglobin, we will move to the topic of enzyme kinetics, mechanisms, and modes of regulation of enzyme activity. Enzymes catalyze all the reactions that occur in cells, and over 99% of the enzymatic activity in cells is due to proteins. Thus, to understand the biochemical reactions that occur within cells, it is important to understand how the enzymes work, at a molecular level. Of particular importance in this section is how enzyme activity is regulated. Frequently different enzymes will catalyze reactions that go in opposite directions. If both enzymes were active at the same time a futile cycle would be developed, and a reaction pathway would not be able to go in the direction intended. The regulation of enzyme activity will prevent this from occurring. Once enzymes are understood we will end the quarter discussing the function of DNA and RNA, and the biosynthesis of these large polymers. Enzymes are important in the synthesis of these information-containing molecules, and having the background in enzymes will enable our discussion of nucleic acids to go at a rapid pace. Protein synthesis (translation) will also be discussed, as will molecular techniques aimed at understanding gene expression.

Classroom Sessions

The class will meet in the Medical Sciences Building, room E155, on Tuesdays and Thursdays, starting at 4:30 pm. Most classes will end at 5:55 pm, but on exam days the class will go until 6:30 pm. The first class will begin at 4:30 pm, on August 23, 2016.

Office hours are by appointment in MSB 2253. I can meet after class on most days, and before class through October. Extra office hour sessions will be held before exams.
Podcasts

All of the lectures of the MEDS4027 course will have the audio portion of the lecture available from the audio files section of the course. The podcasts are usually loaded immediately after class. There is an initial test audio file, which is from a number of years ago (it references Autumn 2009). If you can successfully download that file, your podcasts should be set up correctly.

There have been times that the recording system has failed - in those cases I will post the corresponding lecture from the previous year, which will be similar to what we discuss this there (but not identical).

Problem Sets

There are 8 problem sets which be discussed during the course. The schedule indicates on which date these problem sets will be discussed in class. The problem sets are designed to help the student learn how to solve problems in biochemistry, and resemble questions that will appear on examinations. The answers to the problem sets are not collected from students, nor are they posted.

Practice multiple-choice questions

There is a link in Blackboard that will take you to "exams" to test your knowledge on practice questions. After you do the test (or part of the test) you can see if you answered correctly or not, and see an explanation of the correct answer. These quizzes can be taken multiple times, and while you will see a score for them in the gradebook, they do not contribute to your grade - they are here for you to practice on. These questions are good for testing your overall knowledge, but are probably a little easier than the questions you will see on exams (there is little medical relevance to these practice questions, but they do test biochemistry). As this is new this year, please give me your feedback as to whether these are helpful or not.

Animations

A number of animations have been developed to help students learn certain aspects of biochemistry. Animations on DNA synthesis and repair, Protein synthesis, and the Polymerase Chain Reaction. The animations are available from the following link: [http://homepages.uc.edu/~lieberma/new_animations/MG6010_animations_3.html](http://homepages.uc.edu/~lieberma/new_animations/MG6010_animations_3.html)
Examinations and Grading

There will be four exams during the quarter, the first worth 100 points (September 20, 2016), the second 100 points (October 25, 2016), the third exam, also worth 100 points (November 22, 2016) and the fourth exam, which will be a cumulative exam over the entire quarter (150 points, given December 8, 2016, tentative date until the registrar releases the final exam schedule). Students are expected to take the exams when scheduled. Any unexcused absence will result in a grade of zero for that exam, and absences must be approved in advance. If ill, a doctor’s note will be required to have a valid absence from an exam, and the doctor must have been seen on the day of the exam.

It is anticipated that the course will be graded on a curve, but there are certain targets that will guarantee a passing grade. A final score of 405 points or more will guarantee an A; a final score of 360 points or more will guarantee a B; a final score of 315 points or more will guarantee a C; and a final score of 270 points or more will guarantee at least a D. Thus, even if all students score above 405 points for the year, all students will receive an A. If the exams are more difficult than anticipated, then these numbers may drop, but there is no guarantee that such an adjustment will occur.

Textbook

The textbook for the entire year will be Stryer’s Biochemistry (the authors are Jeremy Berg, John Tymoczko and Lubert Stryer), seventh edition, published by WH Freeman, Inc. It should be available either in the University Bookstore or at Dubois Bookstore. This is the Stryer with the Grey cover (first author is Berg). In past years the bookstore has not had sufficient copies - you can also purchase the book from Amazon.com - http://www.amazon.com/gp/product/0716787245/sr=8-1/qid=1154447125/ref=pd_bbs_1/104-6152150-3341510?ie=UTF8

This book will be used for both semesters this year - MEDS4027 and MEDS4028.

The 8th edition has been published, but the 7th is sufficient for our needs, and can be obtained for less money than the current 8th edition. Older editions of Stryer are also acceptable. The only difference will be chapter numbers, but that is easily figured out. You can even use the 5th edition if necessary. The texts will supplement the lecture material and provide information in a way that is different from the classroom. By absorbing two views of the material it will be easier for the students to understand, and to see the big picture.
Supplemental Instructor

There is one supplemental instructor for the course, Juliana Madzia. She will lead a review of course material twice each week, and will also have office hours for you to ask him questions about the material. More details will be forthcoming on the first day of class. There is a section of Blackboard labeled “Supplemental Instruction” in which the discussion problems for each session will be posted.