CHEM 151/251-01: BIOCHEMISTRY I
FALL 2011
LECTURE TIME: Tu Th, 9:40-11:00 am, Chemistry building, G-07

INSTRUCTOR: Lystranne Maynard-Smith, Ph.D.
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OFFICE HOURS: Tues and Thurs (11:10 am -12:30 pm); Others by appointment.

TEXTBOOK: Biochemistry, 4th Ed. Voet and Voet
TEXTBOOK WEBSITE: http://bcs.wiley.com/hebcs/Books?action=index&itemId=0470570954&bcsId=6123

Online Homework:
If purchasing Wiley Plus access separately, please use following website to register. After registering, use login page.
https://www.wileyplus.com/WileyCDA/

Class Website:
Chem 151-01 http://edugen.wileyplus.com/edugen/class/cls230608/
Chem 251-01 http://edugen.wileyplus.com/edugen/class/cls230609/

PREREQUISITES:
Organic chemistry II (Chem 142). Note having taken the prerequisite is not sufficient. Biochemistry includes information from organic and general chemistry. You should know about pH, buffers, pKa, thermodynamics, enthalpy, entropy, reaction rates, functional groups, chirality, basic organic reactions and terminology and how to write organic mechanisms. Though these topics will be reviewed briefly in Biochemistry I, if you are not familiar with them, this will be an extremely difficult course.

COURSE OBJECTIVES:
This is the first of a two-semester biochemistry course. This course serves as an introduction to biochemistry and as a prerequisite for Chem 152. The course examines topics such as:

1. Biological equilibria and thermodynamics
   a. Acid-base equilibria
   b. Thermodynamics of binding and recognition
2. Biological structures and interactions
   a. Fundamental building blocks (amino acids, carbohydrates, lipids, nucleotides)
3. Biological Reactions
   a. Kinetics and mechanisms of biological catalysis
   b. Introduction to metabolism

EXPECTED LEARNING OUTCOMES:
Below are listed some major learning outcomes for this course (in no particular order):

1. Students will be able to perform pH calculations (Henderson-Hasselbalch equation), predict the charge and protonation state of biomolecules in physiological solution, and describe their behavior and function in terms of their state.
2. Students will master the basic principles of protein structure. They will be able to recall identify, and sketch all 20 amino acids, and classify them according to their properties.
They will be able to recall, define and identify primary, secondary, tertiary and quaternary structure.

3. Students will master the basic principles of nucleic acid structure and function. They will be able to recall, identify, and sketch the nucleic acid bases. They will be able to recall and identify the differences between purines and pyrimidines, and between bases, nucleosides and nucleotides.

4. Students will master the principles of Gibbs Free Energy. Students will be able to make quantitative and qualitative predictions of the outcome of a reaction. This includes being able to perform calculations involving $\Delta G$ and $\Delta G^\circ$.

5. Students will be able to recall and explain in writing the significance of $k_{cat}$, $V_{max}$, and $K_m$ for enzyme kinetics.

6. Students will be able to recall and describe the structures and roles of carbohydrates and lipids and membranes in the cell.

7. Students will be able to solve problems using the core principles of metabolism.

8. Students will be able to recall and define a number of important biochemical terms.

**HOMEWORK:**

Online homework will be regularly assigned throughout the course using Wiley Plus. It is important that you attempt and complete the homework. You are encouraged to work collaboratively on the homework, and you will receive some points for completing all the questions, even if your answers are incorrect. Please be advised that questions on the quizzes will be very similar to those assigned as homework, so it is in your best interest to do the homework.

**Note:** Memorization only of an equation or graph will not enable you to do well in this class. It is essential that you genuinely understand what the material means. Many homework problems will require you to problem solve, and that may include recognizing and locating what extra information you need to have in order to solve the problem.

**EXAMS AND QUIZZES:**

There will be 5 in-class quizzes throughout the semester. One quiz can be dropped. There will be **NO MAKE-UP QUIZZES**. Each quiz will be approximately 30 minutes long, and will cover material from lecture and assigned homework problems.

There will be 3 in-class exams. There will be **NO MAKE-UP EXAMINATIONS**. If you miss an exam, it will be given the same percentage grade as your final exam grade. In other words, you can miss ONE exam, but in doing so, you place all your bets on the comprehensive final at the end of the semester.

**FINAL EXAM IS SCHEDULED FOR MON, DEC 12, 8:00-10:00 AM.**

**PROJECT**

There will be two parts to your project. The first part you can start immediately.

Part 1:

You are required to describe:

1. Where you want to be in two or three years (Seniors-2 years, Juniors/Grad Students -3 years)
2. Why you want to be there.
3. Produce a timeline describing the steps that will allow you to achieve your goals. Start your timeline from Fall 2011. Describe why each step is important to you reaching your goal.
Part 2:
The second part will be a group project. Each group will be assigned a science article describing or highlighting chemical biology techniques used in current research. Students will be tasked with sourcing the referenced peer-reviewed journal article, and preparing a short 10-15 minute presentation describing the technique, and how it is used in article. Students will also be tasked with performing literature searches to locate more examples of given biological techniques, and how it has been used in current research to solve biological problems.

Students will be assigned to groups via the instructor ONLY! Prior to in-class presentation, students will submit presentation documents and references to instructor via email.

Graduate Students:
Graduate students will have individual projects. Graduate students are expected to do a better job and have more in-depth discussion about additional examples and current research.

All students are encouraged to consult early and often on their project with the instructor.

PROJECT SUBMISSION DEADLINE: MONDAY, NOV 28, 11:59 pm. (Late submissions will be docked points!)
In-class presentations will occur by lottery on Tues, Nov 29 or Thurs, Dec 1.

PERFORMANCE EVALUATION:
Important Dates:
- Quiz 1: Thursday, Sept 1
- Quiz 2: Tuesday, Sept 13
- Exam 1: Thursday, Sept 22
- Quiz 3: Tuesday, Oct 4
- Quiz 4: Tuesday, Oct 18
- Exam 2: Thursday, Oct 27
- Quiz 5: Tuesday, Nov 8
- Exam 3: Thursday, Nov 17
- Project Presentations: Tuesday, Nov 29
- Project Presentations: Thursday, Dec 1

Grading:
- Final: 200 pts
- Project: 150 pts
- Exams: 450 pts
- Quizzes/homework: 200 pts
- Total: 1000 pts

Grading Scale: A>900, B 800-899, C 700-799, D 600-699, F < 600

Incomplete Grades – All students must take the final exam. The only exception will be for a student who has an adequately documented emergency. A student who does not take the final exam, but has an adequately documented excuse will receive a grade of I/F. This grade can only be removed if the student takes a make-up final examination before the end of the next semester that the student is enrolled.

CLASSROOM BEHAVIOR:
1. You are expected to be ON TIME.
2. All cellular phones and other electronic devices (iPods etc) must be silenced or placed in vibration mode for the duration of the class.
3. Please ensure that contact information (for example, email address on BisonWeb) is updated and current.
4. Classroom discussion should be respectful and civilized and relevant to the topic being discussed. This also extends to online discussions.
5. Disruptive behavior (excessive talking, answering cell phones, verbally abusive to instructor or other students, refusing to comply with directions, etc) will not be allowed. After two warnings, student exhibiting disruptive behavior will be asked to leave the class.

AMERICAN WITH DISABILITY ACT (ADA) COMPLIANCE
Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students in need of accommodations due to a disability should contact the Office of the Dean for Special Student Services for verification and determination of reasonable accommodations as soon as possible after admission to the University, or at the beginning of each semester. The Dean of the Office of Special Student Services, Dr. Elaine Heath, can be reached at (202) 238 2420.

STUDENT CODE OF CONDUCT
Howard University expects that a student’s conduct will be in accordance with accepted standards of behavior. In keeping with this expectation, a student may be disciplined for academic offences, particularly cheating and/or plagiarism. For further details view the Student Reference Manual for Fall 2011 (page 38) at http://www.howard.edu/academics/courses/default.asp.