

COURSE SYLLABUS*

Biology 3513, CRN21487

Biochemistry, Section 901

(Mon & Wed; 2:00-3:15 PM; Buena Vista St. Bldg. DT 3.330)

INSTRUCTOR: **Luis S. Haro, Ph.D., Professor of Cell & Molecular Biology**
OFFICE: **Downtown: FS 4.532; 1604 Campus: SB 4.02.30**
OFFICE HOURS: **Mon 3:15 PM – 4:15 PM, and by Appointment**
OFFICE PHONE: **Downtown: 458-2579; 1604 Campus: 458-5484**
LAB PHONE: **1604: 458-5920**
E-mail: LUIS.HARO@UTSA.EDU



REQUIRED COURSE MATERIALS:

Textbook: **Principles of Biochemistry 4th Edition**, by H. Robert Horton et. al., 2006

Reading List / Problem Sets: **Biochemical Techniques, Research Articles, Reviews**

Companion Website: <http://www.prenhall.com/horton>

Chapter Quiz, Essay Questions, Animations, PDB Molecules and Media Lab.

3-D Glasses: **Anaglyph 3D Glasses** lecture/test viewing of 3D proteins, nucleic acids, etc
buy glasses at Analytical Scientific, 11049 Bandera Rd., San Antonio, TX, 78023, (210)684-7373

Molecular Visualization Software: **PyMOL v1.0** <http://pymol.sourceforge.net/> for **PDB Files**
<http://delsci.com/ep> ;

There is a **Web-CT** Component to this course. Web-CT ID: the last 8 digits of your Banner ID;
Web-CT Password: Birth date entered as MMDDYY, e.g. January 1, 1972 is 01011972.

PREREQUISITES: CHE 2604 (Organic Chemistry 1); CHE 2612 (Organic Chemistry 1 Lab)

RECOMMENDED: BIO 2313 (Genetics); Concurrent enrollment in BIO 3522 (Biochemistry Lab)

COURSE DESCRIPTION / OVERVIEW: Introduction to biochemistry: amino acids, protein structure, enzymes, lipids, metabolism, nucleic acid structure, bioenergetics, and carbohydrates. Major topics covered are outlined in Table 1. Because this course covers such a wide range of topics (many which consist of entire semesters within themselves) some of you may find this course difficult. The importance of **college level reading and study skills** is essential as well as **motivation** from you as a student to succeed.

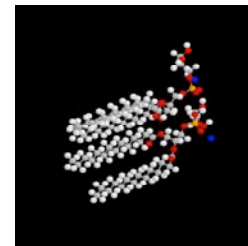
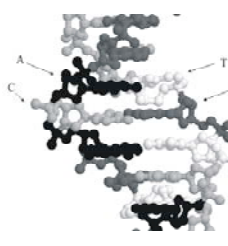
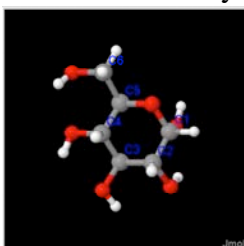
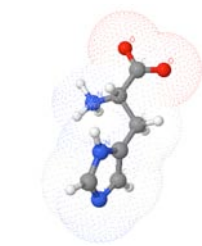
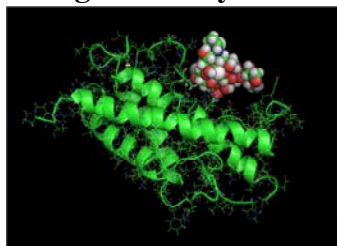


TABLE 1. TENTATIVE COURSE OUTLINE

*We will attempt to follow the Tentative Course Outline, however, the instructor reserves the right to change the syllabus as necessary and will inform students of any changes.

| Date | TOPIC | Tools of Biochemistry/ Topic Sheets | Book Chapters | Chapter Problems |
|--------------------|---|--|------------------|------------------------------|
| January 12 | Course Mechanics | | | |
| January 14 | Functional groups, chemical bonds, water, pH, acid/base reactions (*MLK Holiday Monday January 19) | 1A, 12A, pH, Buffers, 7A | 1, 2 | 2.1 - 2.14 |
| January 21 | Functional groups, chemical bonds, water, pH, acid/base reactions | 1A, 12A, pH, Buffers, 7A | 1, 2 | 2.1 - 2.14 |
| January 26 | Amino Acids | 2A, 5A | 3 | 3.3 – 3.17 |
| January 28 | Protein Structure (primary, secondary, tertiary, quaternary) | 5B, 5C, 5D | 3 | 3.3 – 3.17 |
| February 2 | Protein Structure (primary, secondary, tertiary, quaternary) | 4A, 6A, 6B | 4 | 4.1 – 4.16 |
| February 4 | Protein Function | 13A, 27A, 23A | 4 | 4.1 – 4.16 |
| February 9 | Protein Function | 13A, 27A, 23A | 4 | 4.1 – 4.16 |
| February 11 | Exam 1 | | | |
| February 18 | Monosaccharides, Polysaccharides, Glycoconjugates | 9A | 8 | 8.1 – 8.16 |
| February 18 | Lipids, steroids, fats, biological membranes | 10A | 9 | 9.1 – 9.17 |
| February 23 | Nucleotides, nucleic acids (DNA, RNA) | 4B, 24A, 25B, 25C 25D, 25E, 26A | 19 | 19.1 – 19.17 |
| February 25 | Thermodynamics / bioenergetics | | 1, 10 | 10.1 – 10.16 |
| March 2 | Enzyme Kinetics | 11A | 5 | 5.1 – 5.16 |
| March 4 | Enzyme Mechanisms (*SPRING BREAK MARCH 9-14) | | 6 | 6.1 – 6.16 |
| March 16 | Coenzymes & Vitamins; Loose Ends | | 7 | 7.1 – 7.16 |
| March 18 | Exam 2 | | | |
| March 23 | Metabolism (Introduction) | | 10 | 10.1 – 10.16 |
| March 25 | Glycolysis, Gluconeogenesis (IDEA COURSE SURVEY March 30-April 3) | | 11, 12 | 11.1 – 11.13 12.1 – 12.14 |
| March 30 | Citric Acid Cycle | | 13 | 13.1 – 13.15 |
| April 1 | Electron transport / oxidative phosphorylation | | 14 | 14.1 – 14.11 |
| April 6 | Photosynthesis | | 15 | 15.1 – 15.15 |
| April 8 | Lipid Metabolism | | 16 | 16.1 – 16.16 |
| April 20 | NO CLASS-Dr. Haro Presenting at ASBMB Conference | | | |
| April 22 | NO CLASS-Dr. Haro Presenting at ASBMB Conference | | | |
| April 27 | Amino Acid Metabolism, Nucleotide Metabolism | | 17, 18 | 17.1 – 17.17 18.1 – 18.5 |
| April 29 | Exam 3 | | | |
| | STUDENT STUDY DAYS April 30, May 1 | | | |
| May 8 (Fri) | COMPREHENSIVE FINAL EXAM (100 POINTS) | 7:30 AM - 10:00 AM | | |

TABLE 2. TOOLS OF BIOCHEMISTRY (TB) SUPPLEMENTAL HANDOUTS

| TB # | TOPIC |
|-------------|--|
| | CELLS |
| 1A | Microscopy at Many Levels |
| | PROTEINS |
| 12A | Radioisotopes and the Liquid Scintillation Counter |
| 7A | Immunological Methods |
| 2A | Electrophoresis and Isoelectric Focusing |
| 5A | Ways to Isolate and Purify Proteins and Other Macromolecules |
| 5B | Amino acid Analysis of Proteins |
| 5C | Determination of The N-Terminal and C-Terminal Residues of a Protein |
| 5D | How to Sequence a Polypeptide |
| 4A | An Introduction to X-Ray Diffraction |
| 6A | Spectroscopic Methods for Studying Macromolecular Conformation in Solution |
| 6B | Determining Molecular Weights and the Number of Subunits in a Protein Molecule |
| 13A | Detecting and Analyzing Protein-Protein Interactions |
| 27A | Ways to Map Complex Macromolecular Structures |
| 23A | Radioimmunoassay |
| | CARBOHYDRATES |
| 9A | Sequencing Oligosaccharides |
| | MEMBRANES |
| 10A | Techniques for the Study of Membranes |
| | NUCLEIC ACIDS |
| 4B | Chemical Synthesis of Oligonucleotides |
| 24A | Polymerase Chain Reaction |
| 25B | Gene Cloning |
| 25C | Gene Sequencing with Dideoxynucleotides |
| 25D | Southern Blotting |
| 25E | Site Directed Mutagenesis |
| 26A | Footprinting: Identifying Protein-binding Sites on DNA |
| | ENZYMES |
| 11A | How to Measure the Rates of Enzyme-Catalyzed Reactions |

Class time will consist primarily of lecture and discussion of the chapters and readings assigned. To more meaningfully add to understanding, enhance your performance, and effectively help your participation in discussion, I **expect** each student to **read the material prior to class**. **Do not get behind on your reading! It will be difficult to catch up if you get behind! We will cover approximately two chapters per week! This is an upper division course and the material in the chapters is advanced reading material with complex themes, new terminology, and oriented towards a biochemical-molecular understanding of aspects of biochemistry.**

Many students measure success in a class by the ability to achieve a particular grade (usually an A). My **primary goal** in teaching this class is to introduce you to the field of Biochemistry. My **secondary goal** related to the first goal is that you take the knowledge from this class and apply it to understanding biochemicals and the workings of your own body in *health and disease*. In order for you to achieve success in this class and for me to achieve my goals, we must **work together**.

CALCULATION OF GRADES (400 POINTS)

3 Midterm Exams @ 100 points each = 300 Points
1 Comprehensive Final Exam @ 100 points = 100 points

| GRADE | POINTS SCORED | PERCENT |
|-------|---------------|------------|
| A | 360 - 400 | 90% - 100% |
| B | 320 - 359 | 80% - 89% |
| C | 280 - 319 | 70% - 79% |
| D | 240 - 279 | 60% - 69% |
| F | 0 - 239 | 0% - 59% |

Exams consist of material taken from text reading assignments, supplemental handouts, and material from class presentations. Make-up examinations are given only under certain extenuating circumstances and are generally somewhat more difficult than the regular scheduled exams.

Withdrawal: I hope that you have a complete and enjoyable semester, but some students for various reasons may want or need to withdraw from this course. I urge you to see me as soon as you are having any trouble so that we may possibly find a way for you to succeed. The policy is that withdrawal from class is the student's responsibility. **The last day to drop this course with grade of W is Monday April 27th 2009 if you have fewer than 30 hr. The last day to drop this course with grade of W is Monday, Tuesday March 23rd, 2009 if you have more than 30 hr.**

Final Note: If you have any special circumstances that may interfere with meeting the requirements for this class the way it is outlined in the syllabus, please see me within the first two weeks of class. You may contact me during my office hours, as stated on the front page of this syllabus, or make an appointment. Special circumstances include, but are not limited to, the following: job requirements or child care responsibilities that interfere with class attendance, extreme test anxiety, learning or physical disabilities, English as a second language, etc., please do not ask me at the end of the semester for special consideration due to any problems you have not contacted me about during the semester.

To Summarize: This handout is meant as a helpful guide for you to anticipate the coming semester. Biochemistry can be enjoyable as well as informative. I hope you benefit from this semester and in turn learn more about biochemistry and your own body.