I. GENERAL INFORMATION

A. COURSE DESCRIPTION - This course is designed to provide the student with the basics of (i) biomolecules and their structures, (ii) bioenergetics, mechanisms and kinetics, and (iii) major metabolic processes. This course assumes that the student has a strong background in Chemistry and understands chemical reactions and mechanisms. It is recommended that the student has completed Organic Chemistry.

B. COURSE DAY/TIME/LOCATION - Wednesday (03)
- 6:00 - 8:30 PM
- McDonnell 362

C. INSTRUCTOR - Wilhelm S. Cruz, Ph.D. (cruzws@biology.wustl.edu)

D. TEACHING ASSISTANTS - Craig Smith, Ph.D. (CSmith22@wustl.edu)
- Bradley Suda (bradleysuda@gmail.com)

John L. Tymoczko, Jeremy M. Berg, and Lubert Stryer
(Previous editions are acceptable)

F. REVIEW SESSIONS - Weekly, review sessions covering the material discussed in lecture will be offered by the Teaching Assistant. Attendance is optional. The date, time, and location T.B.D..

II. GRADING - The course grade will be based upon of three exams and a group presentation. A standard grading scale will be implemented (i.e., A=90% and above, B=80%-89%, C=70%-79%, D=60%-69%, F=59% and below). Scores at the upper 2% of each letter grade will be given a "plus" (+); for example, a 98% = A+. There are no "minus" (-) letter grades.

A. EXAMS
1. There will be three, in-class exams given on the dates indicated. Collectively, 90% of your course grade is attributed to these three exams.
   A. Your two highest exam score will be worth 70% (35% each) of the course grade.
   B. Your lowest exam score will be worth 20% of the course grade.
2. The exams are not cumulative and will only cover the lectures indicated.
3. The exam format will be short-answer/definitions/mechanisms, essay, and problem-solving.
4. Graded exams can be picked-up in the Natural Sciences Learning Center (NSLC) in the LIFE (not Lab) SCIENCES building (which is next to the greenhouse off Forsyth).
5. EXAM PROCEDURES:
   - All electronic devices (cell phones, tablets/laptops, calculators, etc...) must be turned OFF and placed securely in your backpack.
   - Pencil/pen containers must be placed in your backpack.
   - All backpacks must be place in the front of the room.
   - The only items allowed at your desk will pens, pencils, and erasers. Cans, bottled water, and other beverage containers will not be permitted at your desk during the exam.
   - Restroom breaks will NOT be allowed during the exam.
6. **ALTERNATE EXAM DATES:**
   - Special requests to take an exam **PRIOR** to the scheduled exam date will be considered.
   - Late exams are **NOT** permitted. However, in cases of a medical emergencies, **only** a late exam can be granted if:
     A. Notification is given **prior** to the start of the exam.
     B. Documentation, specific to the medical emergency, is provided within 24 hours of scheduled exam day/time.

7. **REGRADERS:**
   - Exam regrade requests must be **written** and submitted within 7 days after the exams are returned.
   - Prior to submitting a regrade request, compare your answer to answer key (posted on Blackboard)
   - The written regrade request should point to the specific question and answer. For example, "The answer key for Question #3 states.... My answer states....".
   - Regrade requests that just state, "Please regrade Question X" will not be regraded.
   - **NOTE:** A subset of exams will be photocopied prior to returning them. Any alteration to an answer to be regraded will result in a "0" (zero) on the exam and will that exam will count as one of the two higher exam scores.

**B. GROUP PRESENTATIONS** - 10% of your course grade is attributed to the group presentation. These presentations are designed to have the student (working with a group of students) explore, research and present a topic of Biochemistry that is clinically relevant. Each groups will present a brief 20-30 minute PowerPoint presentation. Suggested topics are listed below. A group may choose a topic not listed, however, make sure that the presentation can answer the questions noted at the end of this section.

A group will consist of 2 students. You are allowed to choose the members of your group. If you are unable to find a group, you will be assigned to a group. **The deadline for forming a group and selecting a topic is January 27, 2016 at 9:00 PM.**

Suggested presentation topics *(as scheduled below).*

**Week 4 Presentation Topics:**
1. Familial Hypercholesterolemia & Endocytosis (Ch. 1)
2. Tay-Sachs Disease & Lysosome Function (Ch. 1)
3. Kwashiorkor & Dietary Amino Acids/Proteins (Ch. 3)
4. Transmissible Spongiform Encephalopathies (prion disease) & Protein Folding (Ch. 4)
5. Hutchinson-Gilford & Lipid-Attachments to Proteins (Ch. 11)

**Week 9 Presentation Topics:**
1. Gout & Allosteric Enzymatic Regulation (Ch. 7)
2. Sickle-Cell Anemia & Hemoglobin (Ch. 9)
3. I-cell Disease & Glycosylation (Ch. 10)
4. Lactose Intolerance & Lactose Metabolism (Ch. 16)
5. Cataracts & Galactosemia/Galactose Metabolism (Ch. 16)

**Week 14 Presentation Topics:**
1. Beriberi & Pyruvate Metabolism (Ch. 18)
2. Leber Hereditary Optic Neuropathy & Electron Transport Chain (Ch. 21)
3. Hers disease & Glycogen Storage (Ch. 24)
4. Von Gierke disease & Glycogen Storage (Ch. 25)
5. Pompe disease & Glycogen Storage (Ch. 25)

Make sure that your group presentation can answer the following questions:
1. **What is the disease? What are the clinical symptoms?**
2. What is the epidemiology? How is it transmitted? Who are susceptible? How many are afflicted?
3. **What is the biochemical/molecular cause?**
4. How is the disease treated? Surgery? Medication?
5. Current basic science/pharmaceutical research investigating/treating this disease?
## III. COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Date (Wednesday)</th>
<th>Topics</th>
<th>Assigned Reading</th>
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| 1    | Jan. 20          | - Introduction to the course  
- Review of Basic Biochemistry (Molecular Interactions, DNA and DNA Replication, RNA synthesis in prokaryotes, and Protein Synthesis)  
- Amino Acids | Chapters 1, 2, 3, 33, 34, 36, & 39 |
| 2    | Jan. 27          | - Proteins and Protein Structure  
- Protein Biochemistry Techniques  
- Recombinant DNA Techniques | Chapters 3, 4, 5, & 41 |
| 3    | Feb. 3           | - Determining a Protein Sequence  
- Lipids  
- Membrane Structure and Function | Chapters 11 & 12 |
| 4    | Feb. 10          | Student Presentations | |
| 5    | Feb. 17          | EXAM I (Weeks 1 - 4) | |
| 6    | Feb. 24          | - Enzyme Action  
- Kinetics and Regulation  
- Mechanism and Inhibitors | Chapters 6, 7, & 8 |
| 7    | Mar. 2           | - Hemoglobin  
- Carbohydrates  
- Digestion | Chapter 9, 10 & 14 |
| 8    | Mar. 9           | - Glycolysis  
- Gluconeogenesis  
- The Citric Acid Cycle | Chapter 16, 17 & 18 |
|      | Mar. 16          | SPRING BREAK - NO CLASS | |
| 9    | Mar. 23          | Student Presentations | |
| 10   | Mar. 30          | EXAM II (Weeks 6 - 9) | |
| 11   | Apr. 6           | - The Electron Transport Chain  
- ATP Synthesis | Chapters 19, 20 & 21 |
| 12   | Apr. 13          | - Signal Transduction Pathways  
- Glycogen Synthesis  
- Glycogen Degradation  
- Regulation of Glucose Metabolism | Chapters 13, 24, & 31 |
| 13   | Apr. 20          | - Regulation of Glucose Metabolism (continued)  
- Fatty Acid Synthesis and Degradation | Chapters 25 & 27 |
| 14   | Apr. 27          | Student Presentations | |
| 15   | May. 4           | EXAM III (Weeks 11 - 14) | |