# BISC 330L BIOCHEMISTRY – USC SPRING 2016
## Lecture Syllabus

**Topics**: Biochemical bonds and reactions. Interactions with water molecules. Structure/function of DNA, RNA, proteins, lipids and carbohydrates. Enzyme kinetics and mechanisms. Enzyme cofactors and vitamins. Enzyme regulatory strategies. Glucose oxidation and ATP production: glycolysis, citric acid cycle & oxidative phosphorylation. Glucose and $O_2$ production by photosynthesis in plant chloroplasts. Ribose biosynthesis from glucose by pentose phosphate pathway. Mastery of these topics will provide students with a solid foundation in basic biochemical principles.

**Prerequisites:** BISC 320L (Molecular Biology) and CHEM 322A (Organic Chemistry)

**Professors:**

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**Required Text**: Berg, Tymocko & Stryer, BIOCHEMISTRY (8th, 2015)
Subscription to LaunchPad for Berg's Biochemistry
BISC 330L Lab Manual (available in USC Bookstore)

**Course Grades:**
The course grade will be based upon **1100** possible points:
250 pts. Midterm 1
250 pts. Midterm 2
250 pts. Final Exam
100 pts. In-class/Homework assignments (Students must purchase a subscription to Macmillan Launchpad on-line program associated with the textbook to participate.)
**Launchpad link**:
http://www.macmillanhighered.com/launchpad/berg8e/2633627
250 pts. Laboratory (see lab syllabus for specific assignments)
**Lectures 25, 28, 31, 34, 37, 40, and 43** will have an audio section that should be read and listened to at home before coming to lecture that day. There will be quiz questions on Blackboard associated with the at-home portion of the lecture and an in-class assignments on those days.. These lectures are labeled in **BOLD** on the syllabus.

## TENTATIVE LECTURE SCHEDULE

| LECTURER, DATE | SUBJECT | CHAPTER |
|---|---|---|
| Jan 11 (LC) | Introduction: chemistry of life process | 1.1-1.2 |
| 13 | Water, pH and acid/base equilibria | 1.3 |
| 15 | DNA discovery & genomic revolution | 1.4 |
| **18** | **NO LECTURE - Martin Luther King Day** | |
| 20 | Amino acid structures & properties | 2.1 |
| 22 | Primary structure of proteins | 2.2 |
| 25 | Secondary structure | 2.3 |
| 27 | Tertiary & quaternary structures | 2.4-2.6 |
| 29 | Protein purification methods | 3.1 |
| Feb 1 | Amino acid analysis & sequencing | 3.2 |
| 3 | Protein structure determination | 3.6 |
| 5 | DNA & RNA structure & purification | 4.1 – 4.2 |
| 8 | DNA replication & gene expression | 4.3 – 4.4 |
| 10 (FP) | Enzymes: Basics | 8.1-8.2 |
| 12 | Enzymes: Transition State | 8.3 |
| **15** | **NO LECTURE - Presidents Day** | |
| 17 | Enzymes: Michaelis-Menten; Inhibition | 8.4-8.5 |
| 19 | Enzymes: Catalytic Strategies | 9 |
| 22 | Enzymes: Regulatory Strategies | 10 |
| 24 | Carbohydrates | 11 |
| 26 | Lipids and Cell Membranes | 12.1 - 12.3 |
| 29 | Lipids and Cell Membranes | 12.4 – 12.6 |
| Mar 2 | Membrane Channels & Pumps | 13 |
| 4 | Signal Transduction Pathways | 14 |
| 7 (CB) | Introduction to Metabolism | 15 |
| 9 | Introduction to Metabolism | 15 |
| 11 | **Glycolysis** | **16** |
| **14-18** | **NO LECTURES - SPRING RECESS!** | |
| 21 | Regulation of Glycolysis | 16 |
| 23 | Gluconeogenesis | 16 |
| 25 | **Glycolysis and Review** | **16** |
| 28 | The Citric Acid Cycle | 17 |
| 30 | The Citric Acid Cycle | 17 |
| Apr 1 | **Oxidative Phosphorylation** | **18** |
| 4 | Oxidative Phosphorylation | 18 |
| 6 | Oxidative Phosphorylation | 18 |
| 8 | **Oxidative Phosphorylation** | **18** |

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|---|---|---|
| 11 | Photosynthesis | 19 |
| 13 | Photosynthesis | 19 |
| 15 | **Photosynthesis** | **19** |
| 18 | The Calvin Cycle | 20 |
| 20 | The Calvin Cycle | 20 |
| 22 | **The Pentose Phosphate Pathway** | **20** |
| 25 | Glycogen | 21 |
| 27 | Fatty Acid Metabolism | 22 |
| 29 | **Review for Exam 3** | **N/A** |

**Exam Dates**

There will be 3 exams, including the final. Each exam is worth 250 points.

Exam 1 – TUE Feb 16 4:00 – 4:50pm. This exam covers lectures 1-12.
Exam 2 – TUE March 29 4:00 – 4:50pm. This exam covers lectures 13-28.
Exam 3 – THURS. May 5 11-11:50am This exam covers lectures 29-43.

**Statement on Academic Conduct and Support Systems**

**Academic Conduct**
Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards*https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu/ or to the *Department of Public Safety* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

**Support Systems**
A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for

international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.htmlprovides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu/will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.