BISC 330L Biochemistry
4 Units
Spring Semester—MWF—Time: 11:00-11:50 a.m. (Section 13023), 12:00-12:50 p.m. (Section 13024)

Location: THH 101

Instructor: Dr. Grayson Jaggers
Office: ZHS 256
Office Hours: Tuesday 1-2:30pm
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Instructor: Dr. Lin Chen
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Office Hours: Tuesday 1-2pm
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Instructor: Dr. Fabien Pinaud
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Office Hours: Tuesday 1-2pm
Contact Info: Tel: (213) 740-2262, Email: pinaud@usc.edu

Course Description

Learning Objectives
1. Relate covalent and non covalent interactions to their importance in biological interactions and structures.
2. Identify the amino acids and their chemical properties. Analyze how their presence in a protein changes its overall characteristics.
3. Identify the levels of structure in proteins and describe the stabilization of these structures.
4. Describe the structure and mechanism of representative enzymes in biochemical pathways.
5. Interpret plots of enzyme kinetic data both with and without inhibitors.
6. Describe the primary catabolic and anabolic pathways pertaining to the following molecular classes (Glycolysis, Citric Acid Cycle, Electron Transport, Oxidative Phosphorylation, Pentose Phosphate Pathway, Light and Dark Photosynthetic Reactions, Calvin Cycle, Gluconeogenesis, Glycogenesis, Glycogenolysis and Beta-Oxidation):
   a. Carbohydrates
   b. Lipids
7. For each pathway in 6, identify the key regulatory points, the energetics of the reactions, the enzymes and the chemical transformations involved. Analyze how energetic changes and hormonal signals modify the reactions and change the active pathways.
8. Identify important characteristics of lipid membrane structure and compare mechanisms of
molecular transport across membranes.
9. Evaluate how organismal energy state and hormonal signals modify activation and inhibition of different biochemical pathways.
10. Compare major cellular signaling pathways (Tyrosine kinase receptors, G-protein coupled receptors and steroid receptors).
11. Interpret biochemical data tables.

Prerequisite(s): CHEM 322A (Organic Chemistry)

Course Notes
The course is composed of a lecture and laboratory component. Students must also enroll in a quiz section in order to take midterm exams. All lecture slides will be posted on Blackboard throughout the semester. Lab manual will be provided on Blackboard.

Required Readings and Supplementary Materials
Berg, Tymocko & Stryer, BIOCHEMISTRY (8th, 2015)
BISC 330L Lab Manual (Provided for you online)

Description and Assessment of Assignments
Midterms will include a mixture of short-answer, multiple-choice, and mathematical questions. Laboratory assignments are described in the laboratory syllabus and lab manual.

Grading Breakdown
The course grade will be based upon 1000 possible points:

- 250 pts. Midterm 1
- 250 pts. Midterm 2
- 250 pts. Final Exam
- 250 pts. Laboratory (see lab syllabus for specific assignments)

Exam Dates:
- Midterm 1: Tuesday February 13, 4:00-4:50pm (Lectures 1 – 12)
- Midterm 2: Tuesday March 27, 4:00-4:50pm (Lectures 13 – 28)
- Final Exam: May 8, 4:30-6:30am (Lectures 29 – 43)

Grading Scale
Course final grades cutoffs are set at the end of the term. However, in order to receive a grade of C- or better, students are expected to earn a minimum of 500 points, out of a total of 1000 possible.

Grading Timeline
Midterm scores are typically posted one week after the exam date.

Additional Policies

Missing Midterm Exam: In case a midterm exam must be missed for legitimate reasons, discuss the situation with the course instructor prior to the exam, if possible. If an exam is missed for an emergency or for a valid health reason (with written documentation), the scores of the other two exams will be prorated to comprise your total point score. Rules governing exams are given in more detail in your Student Contract, which is also posted on the class website: https://blackboard.usc.edu.
Midterm Exam Regrade: In the event an error is made in the grading of your exam, written submittal of a description of the error with the exam should be returned to Dr. Mathews or your lab TA within a week after receiving your graded exam. After this time period, exams will not be regraded.

Lectures: It is important to attend all of the lectures during the course and to take good notes for study. Prior to attending each lecture, it is important to have read the appropriate portions of the textbook. However, many of the lectures will contain new and additional information that is not in the textbook. Examinations will be based mainly on information given in the lectures. In studying for examinations, complete and accurate lecture notes are of prime importance.

The lecture slides posted on the course Blackboard internet site (https://blackboard.usc.edu), may contain material that is not in the lectures—and the lectures may contain information that is not conveyed in the Blackboard lecture summaries. The lecture slides, as posted on Blackboard, and the textbook are intended to be helpful, but auxiliary to the lectures. All course material, information, announcements and grades will be posted on Blackboard until the end of the semester.

Email Communication: To ensure privacy, only student’s USC email accounts may be used for email communications. Students are responsible for understanding the content of email messages that the instructor sends to their USC accounts. Therefore, each student must check their USC email regularly and make sure their account is not over quota, so new messages can be received.

Lecture Schedule:

<table>
<thead>
<tr>
<th>Wk.</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan. 8 (LC)</td>
<td>Introduction: chemistry of life process</td>
<td>1.1-1.2</td>
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<td></td>
<td>Jan. 10</td>
<td>Water, pH and acid/base equilibria</td>
<td>1.3</td>
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<td></td>
<td>Jan. 12</td>
<td>DNA discovery &amp; genomic revolution</td>
<td>1.4</td>
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<td>2</td>
<td>Jan. 15</td>
<td>No Lecture – Martin Luther King’s Birthday</td>
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<td></td>
<td>Jan. 17</td>
<td>Amino acid structures &amp; properties</td>
<td>2.1</td>
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<td></td>
<td>Jan. 19</td>
<td>Primary structure of proteins</td>
<td>2.2</td>
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<tr>
<td>3</td>
<td>Jan. 22</td>
<td>Primary structure of proteins</td>
<td>2.3</td>
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<td></td>
<td>Jan. 24</td>
<td>Tertiary &amp; quaternary structures</td>
<td>2.4 - 2.6</td>
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<td>Jan. 26</td>
<td>Protein purification methods</td>
<td>3.1</td>
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<tr>
<td>4</td>
<td>Jan. 29</td>
<td>Amino acid analysis &amp; sequencing</td>
<td>3.2</td>
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<td>Jan. 31</td>
<td>Protein structure determination</td>
<td>3.6</td>
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<td></td>
<td>Feb. 2</td>
<td>Protein structure determination</td>
<td>4.1 - 4.2</td>
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<td>5</td>
<td>Feb. 5</td>
<td>DNA replication &amp; gene expression</td>
<td>4.3 - 4.4</td>
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<td>Feb. 7 (FP)</td>
<td>Enzymes: Basics</td>
<td>8.1 - 8.2</td>
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<td>Feb. 9</td>
<td>Enzymes: Transition State</td>
<td>8.3</td>
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<td>6</td>
<td>Feb. 12</td>
<td>Enzymes: Michaelis-Menten; Inhibition</td>
<td>8.4 - 8.5</td>
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<td>Feb. 14</td>
<td>Enzymes: Catalytic Strategies</td>
<td>9</td>
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<td>Feb. 16</td>
<td>Enzymes: Regulatory Strategies</td>
<td>10</td>
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<td>7</td>
<td>Feb. 19</td>
<td>No Lecture – President’s Day</td>
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<td></td>
<td>Feb. 21</td>
<td>Carbohydrates</td>
<td>11</td>
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<td>Feb. 23</td>
<td>Lipids and Cell Membranes</td>
<td>12.1 – 12.3</td>
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<tr>
<td>8</td>
<td>Feb. 26</td>
<td>Lipids and Cell Membranes</td>
<td>12.4 – 12.6</td>
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<td></td>
<td>Feb. 28</td>
<td>Membrane Channels &amp; Pumps</td>
<td>13</td>
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<td></td>
<td>Mar. 2</td>
<td>Signal Transduction Pathways</td>
<td>14</td>
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### 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 Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). 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](http://policy.usc.edu/scientific-misconduct).

**Support Systems:**
- **Student Counseling Services (SCS)** – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. [engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

- **National Suicide Prevention Lifeline** – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. [www.suicidepreventionlifeline.org](http://www.suicidepreventionlifeline.org)

- **Relationship and Sexual Violence Prevention Services (RSVP)** – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. [engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

**Sexual Assault Resource Center**
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

*Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086*
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

*Bias Assessment Response and Support*
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

*The Office of Disability Services and Programs*
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

*Student Support and Advocacy – (213) 821-4710*
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

*Diversity at USC*
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

*USC Emergency Information*
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

*USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.*
Provides overall safety to USC community. dps.usc.edu