

Loyola University Chicago

PRINCIPLES OF BIOCHEMISTRY: CHEM 361 SEC. 005; Monday, August 30, 2021 – Friday, December 10, Fall 2021

Lecture: M, W, F: 12:10 PM – 01:00 PM CUNEO HALL 109;

DISCUSSIONS in FLANNER 105: 006 M, 08:10 AM – 09:00 AM Flanner 105; 007 M, 09:30 AM – 10:20 AM;

Prerequisite: CHEM 222 or 224(226); Instructor: Donald May; Contact: [dmay4@luc.edu](mailto:dmay4@luc.edu)

Office: Flanner Hall 403; Hours: TO BE DETERMINED

Textbook: Biochemistry, Campbell/ Farrell/ McDougal, 9th ed., Brooks-Cole, Cengage Learning, 2018 Students can purchase the hardcopy, either from the bookstore or through the Cengage website. Students can also purchase the on-line e-text at the following: <https://www.cengage.com/c/biochemistry-9e-campbell/9781305961135PF/>

**Method of Instruction:** Lecture and discussion. Lectures may be supplemented with classroom discussion, use of molecular models, use of multimedia, and/or use of computer based materials as well as individual and/or group problem solving. Supplemental suggested textbook homework problems, for each chapter will be given but are not to be turned in for grading. Discussions may incorporate: a graded discussion handout, explanation of theory, review of homework questions, review of or completion of lecture material. Graded materials will be returned as soon as possible. Issues with graded materials must be submitted/communicated within 3 days of being returned, otherwise scores will be considered final. Students must submit a signed statement requesting a review of the question, although the entire exam is now subject to being re-graded. Any single regrade will be considered the final score and no subsequent regrade request will be considered.

**Grading:** Semester grades will be determined by the following criteria:

Exams will incorporate theory up to and including all lectures/discussions/homework, prior to the exam. Discussion handouts contributing 10% toward the final grade with individual due dates; the lowest score will be dropped; with any single, missed handout the associated zero score will be given and can serve as a single dropped score; additional missed handouts will be scored as zero and will not be dropped; Three (3) in-class unit exams; Each unit exam will have about 150 points possible; There will be 25-30 multiple choice questions and 3-5 long answer questions of varying point values. The comprehensive final exam will be about 250-270 points and have a similar format to the unit exams.

**Exam Dates (tentative): EXAM I: Monday, September 27; EXAM II: Monday, October 25;**

**EXAM III: Monday, November 22; FINAL EXAM: TUESDAY, DECEMBER 14, 01:00 PM – 03:00 PM**

**Final course grade assigned:** A: 100% – 88.0% A- : 87.9% - 83.0%

B+: 82.9% - 78.0% B: 77.9% - 73.0% B-: 72.9% - 68.0%

C+: 67.9% - 63.0% C: 62.9% - 58.0% C-: 57.9% - 53.0%

D+: 52.9% - 48.0% D: 47.9% - 43.0% F: < 43.0%

Final grades will be determined from one of the following exam contribution options, whichever gives the higher grade/percent:

OPTION 1: All three (3) unit exams at 20% each = 60% + final exam 30% = 90%

OPTION 2: Best two (2) unit exams at 20% each = 40% + final exam 50% = 90%

**OPTION 1:** Discussion Homework: 10%

**OPTION 2:** Discussion Homework: 10%

3 Unit Exams@60% + Final Exam@30%

2 Unit Exams@40% + Final Exam @50%

Total: 100%

Total: 100%

No early and no make-up in-class exams; No late discussion handouts. For a single, missed in-class unit exam, Option 2 automatically will be utilized to determine the final course grade. Any subsequent missed in-class exams will be scored as zero. The student must have a valid and verifiable reason for missing the final exam, such as an extreme emergency or serious illness requiring hospitalization, and so forth, to be eligible for a make-up final exam. A make-up final exam will be in a different format. If a verifiable and valid reason cannot be provided, a zero score for the final exam will be recorded. See attached schedule. Students are not allowed to leave during exams. If you leave, you must turn in your exam, and you will be considered finished with the exam. Students must turn in all exam pages when finished. Exams cannot be taken from lecture: see Academic Integrity Violations. Students must bring and present their Loyola I.D. for each exam. The instructor reserves the right to amend any or all of the constituents, requirements and policies of this syllabus at any time.

**Student Conduct:** Only students officially enrolled in the course may attend. Students must attend the discussion for which they are officially enrolled. At all times students are expected to conduct themselves in a mature and professional manner, which includes but is not limited to: treating everyone in class with courtesy and respect, avoidance of extraneous comments and small group discussions during lecture. Eating, chewing gum/tobacco products and drinking (food items) are not allowed. Students are expected to take care of their personal/professional matters before lectures/discussions/exams. Additionally, radios, headphones, cell-phones or similar devices must be in silent mode and are not permitted during lectures/discussions/exams. If a cell phone rings (beeps, buzz, etc.) during discussions or lectures, the student will be asked to leave. Students missing lecture or discussion are responsible for obtaining the notes and related information from a classmate. Any power-point presentation utilized will be uploaded and made available on SAKAI. Not all contingencies can be listed but inappropriate conduct will be addressed. If a cell phone rings (beeps, buzz, etc.) during any exam, the exam will be collected and the student will not be allowed to continue, since this constitutes using an outside resource. Students are expected to take care of any professional/personal issues before the exams. Students are not allowed to leave the room during exams until their exam is handed in for grading. If you leave, you must turn in your exam, and you will be considered finished. Please keep noises and sounds to a minimum. When leaving, be respectful and leave quietly. During exams, only religious caps/ hats/hoods are allowed: non-religious caps, hats, hoods, visors and so forth, will not be allowed to be worn during exams. All personal materials, besides pencils, calculators and erasers, will be put away. Other exam instructions will be given and thus it is expected that students will be on time and ready for the start of the exam. Students engaged in official university off-campus activities will need to plan proactively for missed course assignments, in providing the appropriate signed documentation in advance of the date missed. The visual or audio recording of the lectures and discussions is not allowed generally but exceptions can be made for extraordinary circumstances.

**Academic Integrity:** Consult the Undergraduate Studies Handbook for additional information. All students in this course are expected to have read and to abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, which can be viewed at: [http://www.luc.edu/cas/pdfs/CAS\\_Academic\\_Integrity\\_Statement\\_December\\_07.pdf](http://www.luc.edu/cas/pdfs/CAS_Academic_Integrity_Statement_December_07.pdf) (For on-line homework, students creating multiple accounts will be considered in violation of academic integrity). Anything submitted that is incorporated as part of your grade in this course must represent your own work, unless indicated otherwise. All exams are self-contained: closed book and closed note. No external materials/notes/books or personnel are allowed: no unauthorized resources. During exams, violations include but are not limited to: cell phone ringing, opening a book-bag or back-pack during an exam, using unauthorized notes or books, looking at another student's exam, talking to another student, opening and/or utilizing anything in your book bag without the instructor's consent, taking a copy of the exam from the room and so forth. Students caught cheating will receive a zero score for the exam and this exam will not be allowed to be dropped: Option 1 above will automatically apply. Further actions will also result. Any student found to be in violation or cheating will, at minimum, be given a zero for the assignment/exam contribution and the incident will be reported to the Chemistry Department Chair and the Office of the CAS Dean. Depending on the seriousness of the incident, additional sanctions may be imposed. Academic Dishonesty also includes, but is not limited to, such infractions as:

- Obtaining a copy of tests or scoring devices
- Using another student's answers during an examination
- Providing another student questions or answers to or copies of examination questions
- Having another person impersonate the student to assist the student academically
- Impersonating another student to assist the student academically
- Representing as one's own work the product of someone else's creativity
- Using, or having available for use, notes or other unpermitted materials during "closed book" examinations
- Duplicating any portion of another student's homework, paper, project, laboratory report, take-home examination, electronic file or application for submission as accepting a copy of tests or scoring devices
- Having someone other than the student prepare any portion of the student's homework, paper, project, laboratory report, take-home examination, electronic file or application, other than for a teacher-approved collaborative effort.
- Permitting another student to copy any portion of another student's homework, paper, project, laboratory report, take-home examination, electronic file or application other than for a teacher-approved collaborative effort
- Using any portion of copyrighted or published material, including but not limited to electronic or print media, without crediting the source
- Any other action intended to obtain credit for work that is not one's own.

**Materials from the course cannot be shared outside the course without the instructor's written permission. Students may not be aware of copyright and intellectual property rights.**

**Course Practices Required:** Attending lectures and discussions on time; College-level writing skills on exams; Communication skills for discussion and articulation of questions; Completion of homework and reading assignments. It is recommended that the student read through each chapter before lecture and eventually work through the suggested problems.

**Learning Objectives:** Course introduces bio-molecule monomers, macromolecules, and processes found in living organisms. Content includes structures of amino acids, nucleotides, lipids, and sugars; corresponding macromolecular structures, i.e., proteins, nucleic acids, membranes, and polysaccharides as related to their biological functions; kinetics and mechanism of enzymatic reactions, the central metabolic pathways, the genetic code and developments in biotechnology. Students who successfully complete this course will be able to do the following, at an acceptable level (including but not limited to): Identify and describe biomolecules including carbohydrates, amino acids/proteins and nucleotide/nucleic acids, lipids/lipid bilayer constituents; Choose appropriate buffer system; calculate the ratios of weak acid to conjugate base; determine the pKa from the associated titration curve; Show the major form of an amino acid/polypeptide including the zwitterion, at different pH values; track the fate of an oxygen molecule from inhalation in the lungs, track the fate of a carbon dioxide molecule produced in oxidative decarboxylation reactions and from the TCA cycle, identify the kinetics of an enzymatic process; identify the substrates, enzymes and products in both catabolic and anabolic metabolism; track the fate of pyruvate and acetyl-CoA through the TCA cycle; track the fate and path of two high-energy electrons through the electron transport complexes/respiratory chain, in conjunction with the Chemiosmotic principle of proton translocation utilized in oxidative phosphorylation to synthesize ATP.

**Disability Accommodations:** Students requiring accommodations at the University need to contact the Coordinator of Services for Student Accessibility Center (SAC), Sullivan Center. Accommodations are provided after receiving documentation from SAC Testing and allowance of a reasonable time frame for arrangements (minimally, one week in advance). Accommodations cannot be retroactive. Contact: <http://www.luc.edu/sac/>

**Important Dates:****Monday, September 06: No classes: Holiday (Labor Day)****Monday, Tuesday, October 11, 12: No classes: Fall Break****Friday, November 05: Last day for "W" otherwise "WF"****Monday, November 08: Spring 2022 registration****Wednesday-Friday, November 24-26: No classes: Holiday (Thanksgiving)**

**Course Repeat Rule** Effective with the Fall 2017 semester, students are allowed only THREE attempts to pass Chemistry courses with a C- or better grade. The three attempts include withdrawals (W). After the second attempt, the student must secure approval for a third attempt. Students must come to the Chemistry Department, fill out a permission to register form or print it from the Department of Chemistry & Biochemistry website: <http://www.luc.edu/chemistry/forms/> and obtain a signature from the Undergraduate Program Director, Assistant Chairperson, or Chairperson in Chemistry. A copy of this form is then taken to your Academic Advisor in Sullivan to secure final permission for the attempt

**Lecture Outline (tentative / subject to change)**

Week	Date	Chapter	Topic
01	M 08/30	02	Introduction; Water, pH, pKa
	W 09/01	02	Buffers; Henderson-Hasselbalch equation
	F 09/03	02, 03	Titration Curves; Amino Acids and Polypeptides
02	M 09/06		<b>NO CLASS, Labor Day Holiday</b>
	W 09/08	03	Amino Acids and Polypeptides
	F 09/10	04	Protein Structure and Non-covalent Interactions
03	M 09/13	04	Protein Folding; Hemoglobin, Myoglobin
	W 09/15	04	Protein Folding; Hemoglobin, Myoglobin
	F 09/17	06	Enzyme Action & Kinetics
04	M 09/20	06	Enzyme Action & Kinetics
	W 09/22	05	Protein purification
	F 09/24	05	(Protein purification)
05	M 09/27		<b>EXAM I</b>
	W 09/29	07	Enzyme Mechanisms & Regulation
	F 10/01	07	Enzyme Mechanisms & Regulation
06	M 10/04	08	Lipids & Membrane structure
	W 10/06	08	Lipids & Membrane structure
	F 10/08	08	Lipids & Membrane structure
07	M 10/11		<b>NO CLASS, FALL BREAK</b>
	W 10/13	09	Nucleic Acid Structure
	F 10/15	09	(Nucleic Acid Structure)
08	M 10/18	15	Bioenergetics
	W 10/20	15	Bioenergetics
	F 10/22	16	Carbohydrates
09	M 10/25		<b>EXAM II</b>
	W 10/27	16	Carbohydrates
	F 10/29	16	Carbohydrates
10	M 11/01	17	Glycolysis
	W 11/03	17	Glycolysis
	F 11/05	17	<b>"W" day</b>
11	M 11/08	19	Citric Acid Cycle (TCA Cycle)
	W 11/10	19	Citric Acid Cycle (TCA Cycle)
	F 11/12	20	Electron Transport, Oxidative Phosphorylation
12	M 11/15	20	Electron Transport, Oxidative Phosphorylation
	W 11/17	18	Gluconeogenesis,
	F 11/19	18	Glycogen Metabolism Pentose Phosphate Pathway
13	M 11/22		<b>EXAM III</b>
	W 11/24		<b>NO CLASS, HOLIDAY (Thanksgiving)</b>
	F 11/26		<b>NO CLASS, HOLIDAY (Thanksgiving)</b>
14	M 11/29	21	Fatty Acid Metabolism
	W 12/01	21	Fatty Acid Metabolism
	F 12/03	23	Nitrogen Metabolism; Urea Cycle
15	M 12/06	23	Nitrogen Metabolism; Urea Cycle
	W 12/08	24	Integration of Metabolism
	F 12/10	24	Integration of Metabolism
16	R 12/12		<b>FINAL EXAM: THURSDAY, December 12, 01:00 PM – 03:00 PM</b>