

## Loyola University Chicago

**Principles of Biochemistry: CHEM 361; Sec. 005; Monday, August 24, 2020 – Saturday, December 12, Fall 2020; Lecture: T, R: 03:00 PM – 04:15 PM; Discussion: 006 Mondays, 04:10 PM – 05:00 PM; 007 Mondays, 05:30 PM – 06:20 PM; [Link to academic calendar](#) ONLINE: required availability for synchronous sessions: SEE SCHEDULE; TIME ZONE: All times listed in this syllabus correspond to the local time in Chicago, Illinois (Central Time Zone) Prerequisite: CHEM 222 or 224(226);**

**Instructor:** Donald May; Contact: [dmay4@luc.edu](mailto:dmay4@luc.edu); Typically e-mails will be answered Monday-Friday within 36 hours of receipt. E-mails sent after 04:00 PM on Fridays will not be read until the next Monday **Office:** Flanner Hall 403 **Times to be announced**

**Required Textbook:** Biochemistry: An Integrative Approach, 1st Edition, John Tansey.

Wiley ISBN: ES8-1-119-32150-7

Not required but recommended *Reference textbooks:*

Dean R. Appling, Spencer J. Anthony-Cahill, Christopher K. Mathews, *Biochemistry: Concepts and Connections;*

Pearson

(2<sup>nd</sup> or 1<sup>st</sup> edition)

Biochemistry, Campbell/ Farrell/ McDougal, 9th ed. (or earlier ed.), Brooks-Cole, Cengage Learning, 2018

Pratt, Cornely, *Essential Biochemistry*, Wiley ISBN: 978-1-119-31933-7 (or any earlier edition)

**Method of Instruction:** Lecture and discussion through synchronous (Zoom meetings; Meeting ID number in SAKAI ZOOM PRO) and asynchronous (Panopto videos also in SAKAI). Lectures and discussions will be supplemented with 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 may be given but are not to be turned in for grading. Discussions may incorporate explanation of theory, review of homework questions, review of or completion of lecture material. Graded exams will be available as soon as possible. Issues with graded exams must be submitted within 48 hours, otherwise no regrade will be considered and scores will be considered final. Any single regrade will be considered the final score and no subsequent regrade request will be considered. Each student must meet course requirements. Students must attend scheduled graded discussions to possibly earn credit: there are no make-up discussion handouts; there are no make-up exams

### **ELECTRONIC MATERIALS (REQUIRED):**

1. Expect to use both a laptop computer and a mobile device (phone, tablet) for connectivity to online resources, including use of a camera or connected webcam during scheduled discussions and exams. (There is a possibility that exams will eventually use the EXAMITY program for proctoring of exam. This is a process which incorporates a single device for proctoring.)

2. Preliminary list of electronic resources:

Loyola email: messages to be sent to the class from Sakai (possibly LOCUS)It , linked to your Loyola UVID

Loyola Sakai login with your Loyola UVID; e-mails may also come from LOCUS

Zoom conferencing: [luc.zoom.us](http://luc.zoom.us) meeting ID & password will be provided, login with Loyola UVID

WileyPlus SEE ACCESS CODE INFORMATION IN SAKAI RESOURCES:

GradeScope: I will upload a course roster and send notification via email prior to first class

CamScanner: free application converts photos to pdf's of your work (alternative: Genius Scan)

Loyola Information Technology Services Support: <https://www.luc.edu/its/support/>

3. Exams & Proctoring will be conducted electronically, additional (free) software downloads may be required

**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. Many concepts build upon previously covered concepts. Discussion handouts with the lowest score be dropped (Ex: best 3 out of 4); with any single, missed discussion handout the associated zero score will be given and will serve as a single dropped score; additional missed discussion handouts will be scored as zero and will not be dropped; Three (3) in-class unit exams; Each unit exam will have 100-150 points possible; There will be multiple-choice questions (20-30) and 3-5 long answer questions of varying point values. The comprehensive final exam will be about 250 points and have a similar format to the unit exams. 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%

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

Total: 100%

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

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

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.

**Exam Dates (tentative): EXAM I: MONDAY, September 21; EXAM II: MONDAY, October 19; EXAM III: MONDAY, November 16; FINAL EXAM: SATURDAY, December 12, 05:30 PM – 07:30 PM**

**Final course grade assigned:** A: 100% – 95.0% A- : 94.9% - 90.0%

B+: 89.9% - 85.0% B: 84.9% - 80.0% B-: 79.9% - 75.0% C+: 74.9% - 70.0% C: 69.9% - 65.0%

C-: 64.9% - 60.0% D+: 59.9% - 55.0% D: 54.9% - 50.0% F: < 50.0%

Students are not allowed to leave the proctor's view during exams. See Academic Integrity Violations. 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 as a single pdf file to be uploaded. **The instructor reserves the right to amend any and/or all constituents, requirements and policies of this syllabus at any time: exam dates; the grading policy, components and scale.**

- **Student Conduct:** Only students officially enrolled in the course may access course materials and components. Students must attend the discussion for which they are officially enrolled. Students are not allowed to share any course materials with anyone outside the class. At all times students are expected to conduct themselves in a mature and professional manner, which includes but is not limited to: treating everyone with courtesy and respect. Students are expected to take care of their personal/professional matters before lectures/discussions/exams since students are not allowed to be un-proctored, through Zoom, during scheduled graded meetings. Panopto videos utilized will be uploaded and made available on SAKAI. Other graded discussion and exam instructions will be given and thus it is expected that students will be on time and ready for the start of each Zoom meeting. It is each individual student's responsibility to meet course requirements, which include: **Required student's full availability during the scheduled times of Lectures and Discussions. Students must attend the discussion Zoom meetings for which they are officially enrolled.**

- **Required:** Windows or Mac computer (these **will not be** compatible: Chromebook, iPad, any other devices)

- **Required:** Webcam (external or built-in in the device), earphones, microphone.

- **Required:** any scanning app (free good Apps: Built-in Notes App in iPhones, free apps: CamScanner, Genius Scanner etc.)

- **Required format of all handwritten submissions is PDF. Other files/formats will not be accepted.**

- **Required:** Stable internet connection for all synchronous meetings and for submission of graded materials.

- **Required:** Smartphone or any mobile device

- **Required:** Reduced noise environment or room. For the exams discussions student are required to be arranged in a room in which they are clearly visible via Zoom and not interrupted and no other people, but the student are present.

- **Required:** Sakai access: all communication will go through Sakai and Zoom synchronous sessions. **It is student's responsibility to follow the announcements, and all policies of the class.**

- **Required:** Sakai, Zoom and Panopto access associated with Loyola UVID (access given automatically for each individual discussion for those officially enrolled ).

- **Required: Wide ruled** composition notebook (25 lines per page ONLY). Any other ruled notebooks will not be read by the homework system and as a result will be graded as Zero.

- **Required:** WileyPlus account. The homework will be given on WileyPlus. The registration flyer with the access code will be posted under Resources on SAKAI by August 21<sup>st</sup>.

- **Recommend but NOT required:** Any digital ink device: such as iPad with Apple Pencil, Surface Pro with any pen, android Tablet with pen, etc. This course was designed in such a way that lack of any of these devices will not affect the performance in the class. This digital device is very useful during group discussions.

- **REQUIRED TEXTBOOK: Biochemistry: An Integrative Approach, 1st Edition, John Tansey. Wiley ISBN: ES8-1-119-32150-7.**

Not all textbook sections will be fully covered or covered in the order encountered in the textbook.

Students engaged in official university off-campus activities will need to make proactive arrangement for missed course assignments, in providing the appropriate signed documentation in advance of the date missed.

### **Accommodations for Religious Reasons**

**If you have observances of religious holidays that will cause you to miss class or otherwise effect your performance in the class you must alert the instructor within 10 calendar days of the first class meeting of the semester to request special accommodations, which will be handled on a case by case basis.**

**Online Classes Recording Statement:** In this class, software may be used to record live class discussions. As a student in this class, your participation in live class discussions will possibly be recorded. Any recordings will be made available only to students enrolled in the class. All/any recordings will become unavailable to students in the class when the Sakai course is unpublished (i.e. shortly after the course ends, per the [Sakai administrative schedule](#)). Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. The use of all video recordings will be in keeping with the University Privacy Statement shown below:

**Privacy Statement:** Assuring privacy among faculty and students engaged in online and face-to-face instructional activities, and as such, recordings of instructional activities occurring in online or face-to-face classes may be used solely for internal class purposes by the faculty member and students registered for the course, and only during the period in which the course is offered. Students will be informed of such recordings by a statement in the syllabus for the course in which they will be recorded. Instructors who wish to make subsequent use of recordings that include student activity may do so only with informed written consent of the students involved or if all student activity is removed from the recording. Recordings including student activity that have been initiated by the instructor may be retained by the instructor only for individual use.

**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. 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, using unauthorized notes or books, communicating with another student, utilizing any on-line resource. Depending on the seriousness of the incident, different sanctions may be imposed. Please note that materials from this course cannot be shared outside the course without the instructor's written permission (as reminded by the CAS Dean's Office memo, Jan. 2020).

Trust and integrity are important qualities in students. All submitted work must represent your own work and your own work only. Academic dishonesty of any kind, such as plagiarism and cheat sheets on exams, will not be tolerated. Any student caught cheating on an assignment in any way will receive at minimum a "zero" for that assignment and be reported to Chairperson of the Chemistry Department and the Dean School of Art and Science. A zero on an exam for cheating will not allowed to be dropped and grading Option 1 will be utilized. For further information regarding the Academic Integrity policy and disciplinary procedures, refer to the Undergraduate Studies Catalog:

[http://www.luc.edu/academics/catalog/undergrad/reg\\_academicintegrity.shtml](http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml).

Academic Dishonesty includes 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 prepares 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:** Watching all recorded lectures and attending all discussions through Zoom 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 viewing recorded lectures and eventually work through the suggested problems before graded assignment dates.

**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 a carbon dioxide molecule produced 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/>

Academic Calendar, [www.luc.edu/academics/schedules](http://www.luc.edu/academics/schedules)

**Important Dates:**

**Monday, September 07: No classes: Holiday (Labor Day)**

**Monday, Tuesday, October 05, 06:**

**Friday, October 30: Last day for "W" otherwise "WF"**

**Monday, November 02: Spring 2021 Registration**

**Monday - Saturday, November 23- 28: 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.

Course Topics Our actual pace and the topics may vary from the schedule: Please see WileyPlus and Panopto Modules' videos for the exact flow of the topics: 1. Chemical Foundations of Biochemistry 2. Amino Acids/Proteins 3. Protein Purification and Sequencing 4. Enzymes: kinetics of biochemical reactions Summer 2020 Loyola University Chicago Page 3 5. Enzymes: Allosterism, Additional regulation 6. Lipids: structure, properties, and function (including selected topics such as membranes, signaling) 7. Energy metabolism (Biochemical Thermodynamics) 8. Sugars: structures and functions 9. Glycolysis/ Gluconeogenesis (including regulation) 10. Pyruvate Dehydrogenase Complex (including regulation) 11. Citric Acid Cycle (including regulation) 12. Electron Transport Chain, Oxidative Phosphorylation 13. Shuttle Mechanisms and Anaplerotic Reactions 14. Pentose Phosphate Pathway 15. Lipid Metabolism 16. Nitrogen Metabolism 17. Integration of Metabolism Reference chapters from the Biochemistry, Campbell/Farrell/McDougal, 9th ed to be covered: 2,3,4,5,6,7,8,15, 16,17,19,20,18,21,23, 24 (embedded in other chapters/topics). Not all textbook sections will be fully covered or

covered in the order the textbook dictates, so focus first on the material that is directly covered in a course structure, lecture, WileyPlus and assigned for homework.

See Tentative Lecture Schedule posted on Sakai under Resources. Students are expected to read related material from any textbook before and after each lecture. Course Outline (tentative / subject to change) The instructor reserves the right to amend any or all of the constituents, requirements and policies of this syllabus at any time.

<u>Week</u>	<u>Date</u>	<u>Chapter</u>	<u>Topic</u>
01	M 08/24 T 08/25 R 08/27		Q&A ZOOM MEETING WATER, pH, Henderson-Hasselbalch equation Weak Acids/Conjugate Bases/Buffers
02	M 08/31 T 09/01 R 09/03		Q&A ZOOM MEETING Amino Acids and Polypeptides Protein Structure and Non-covalent Interactions Amino Acids and Polypeptides Protein Structure and Non-covalent Interactions
03	M 09/07 T 09/08 R 09/10		<b>LABOR DAY HOLIDAY NO MEETING</b> Protein Folding; Hemoglobin, Myoglobin Protein Folding: Hemoglobin (Hb) Myoglobin (Mb)
04	M 09/14 T 09/15 R 09/17		<b>DISCUSSION #01 ZOOM MEETING</b> Enzyme Action & Michaelis-Menten Kinetics Enzyme Action & Michaelis-Menten Kinetics
05	M 09/21 T 09/22 R 09/24		<b>EXAM I</b> Protein purification Enzyme Mechanisms & Regulation
06	M 09/28 T 09/29 R 10/01		Q&A ZOOM MEETING Enzyme Mechanisms & Regulation Enzyme Mechanisms & Regulation
07	M 10/05 T 10/06 R 10/08		<b>DISCUSSION #02 ZOOM MEETING</b> Protein Purification Lipids & Membrane structure
08	M 10/12 T 10/13 R 10/15		Q&A ZOOM MEETING Lipids & Membrane structure; Transport mechanisms Nucleic Acid Structure
09	M 10/19 T 10/20 R 10/22		<b>EXAM II</b> Carbohydrates Glycolysis
10	M 10/26 T 10/27 R 10/29		Q&A ZOOM MEETING Glycolysis Citric Acid Cycle (TCA Cycle)
11	M 11/02 T 11/03 R 11/05		<b>DISCUSSION #03 ZOOM MEETING</b> Electron Transport, Oxidative Phosphorylation Electron Transport, Oxidative Phosphorylation
12	M 11/09 T 11/10 R 11/12		Q&A ZOOM MEETING Glycogen Metabolism, Gluconeogenesis Pentose Phosphate Pathway; NADH/NAD <sup>+</sup> ; FADH <sub>2</sub> /FAD Shuttle systems
13	M 11/16 T 11/17		<b>EXAM III</b> Biosynthesis of Lipid

- R 11/19 Fatty Acid Metabolism
- 14 M 11/23 -11/28 NO CLASS MEETINGS, HOLIDAY (Thanksgiving)**
- 15 M 11/30 Q&A ZOOM MEETING  
T 12/01 Nitrogen Metabolism; Urea Cycle, Alanine-Glucose Cycle  
R 12/03 Integration of Metabolism
- 16 SATURDAY, DECEMBER 12 FINAL EXAM 05:30 PM - 07:30 PM**