

Syllabus – The Chemistry of Enzymes

Course Instructor

Instructor: Dr. Graham Moran
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Weekly Schedule

Lecture: Tu/Th 8:00-9:15 AM

Zoom - <https://luc.zoom.us/j/3482716392>

Office Hours: happy to zoom anytime just send me an email and I'll send you an invite.

Email: You must use your Loyola email address for all communication during this course, especially official communication regarding grades. Emails from outside sources can be blocked by spam filters.

Course Materials: Please install KinTek Explorer 10: <https://www.kintekexplorer.com/downloads/>
Course materials will be made available from: sakai.luc.edu

Optional textbooks:

1. Biomolecular Kinetics: A Step-by-Step Guide **Clive R. Bagshaw. CRC Press**
3. Kinetic Analysis for the New Enzymology **Kenneth A. Johnson**
<https://kintecorp.com/book/kinetic-analysis-for-the-new-enzymology>

Grading

4 Problem Sets	100 points each
Final Exam	<u>100</u> points
Total	500 points

Problem Sets: Problem Sets will give you the opportunity to practice/prepare for the final exam. You may work together to discuss solutions, but you must turn in your own work. There really is nothing to be gained by relying on your classmates for answers.

Tentative Problem Set Due Dates: September 10th, October 6th, October 29th, December 3rd.

Final Exam : Saturday, Dec 12 at 9AM-11AM.

The final exam is cumulative. All topics discussed are fair-game on the final.

You will have exactly 2 hours to complete the exam. Additional time will not be granted, even if you arrive late. **THERE ARE NO MAKE-UPS FOR ANY COURSE REQUIREMENTS. PLAN ACCORDINGLY**

Instructors may not reschedule final exams for a class for another day and/or time during the final exam period. There can be no divergence from the posted schedule of dates for final exams. Individual students who have four (4) final examinations scheduled for the same date may request to have one of those exams rescheduled. If a student reports having four final examinations scheduled for the same date, students should be directed to e-mail a petition to Lester Manzano, Assistant Dean for Student Academic Affairs, CAS Dean's Office (lmanzan@luc.edu).

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 personally meet and obtain a signature from either 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.

Final Grades

Final grades will be given after combining both parts of this course. A guideline for grades is shown below. At minimum, you will receive the grade indicated.

A = 90–100%	C+ = 65–69%
A– = 85–89%	C = 60–64%
B+ = 80–84%	C– = 55–59%
B = 75–79%	D = 50–54%
B– = 70–74%	F = 0–49%

Class time: Class periods will be the *primary source* of information for this course. Remember, any questions not addressed during lecture can be addressed via zoom office hours or email. If you miss a period, please get the notes from another student in class.

Class (Zoom) Etiquette

- Come to class on time.
- Mute your microphone during lecture
- I'd prefer you leave your camera on, but the space you are in is yours, so you can decide.
- Mute other electronic devices.

Recording of Zoom class meetings: In this class software will be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. All recordings will become unavailable to students in the class when the course has concluded. *Students will be required to turn on their cameras at the start of class. Students who have a need to participate via audio only must reach out to me to request audio participation only without the video camera enabled.* 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 helps promote open and robust conversations and mitigates concerns that comments made within the context of the class will be shared beyond the classroom. 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.

Course Topics

- Topic 01: What the heck is going on ? I
- Topic 02: What the heck is going on ? II
- Topic 03: Kinetic Simulation – Learning KinTek Explorer
- Topic 04: Computer Modeling of Kinetic Data
- Topic 05: Ligand Binding
- Topic 06: Transient State Kinetics I
- Topic 07: Transient State Kinetics II
- Topic 08: Physical Interactions in Enzymes
- Topic 09: Notions of Enzyme Catalysis
- Topic 10: The Use of Isotopes in Enzymology
- Topic 11: Group Transfer, Redox, Monooxygenation
- Topic 11: Group Transfer, Redox, Monooxygenation
- Topic 12: Case Study-Renalase
- Topic 13: Case Study-Dihydropyrimidine dehydrogenase
- Topic 14: Dioxygenation, Substitution, Carboxylation
- Topic 14: Dioxygenation, Substitution, Carboxylation
- Topic 15: Case Study-HPPD
- Topic 16: Decarboxylations, Isomerizations, Eliminations & Additions
- Topic 16: Decarboxylations, Isomerizations, Eliminations & Additions
- Topic 17: Case Study - Cytosolic Isocitrate Dehydrogenase
- Topic 18: Aldol Reactions, Formylations, Methylations, Rearrangements

Academic Integrity: 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/advising/academicintegritystatement/>

A basic mission of a university is to search for and to communicate the truth as it is honestly perceived. A genuine learning community cannot exist unless this demanding standard is a fundamental tenet of the intellectual life of the community. Students of Loyola University Chicago are expected to know, to respect, and to practice this standard of personal honesty. Academic dishonesty can take several forms, including, but not limited to cheating, plagiarism, copying another student's work, and submitting false documents.

Any instance of dishonesty (including those detailed on the website provided above or in this syllabus) will be reported to The Chair of The Department of Chemistry & Biochemistry who will decide what the next steps may be. Anything you submit that is incorporated as part of your grade in this course (problem set, exam, etc.) must represent your own work. Any students caught cheating will, **at the minimum**, receive a grade of "zero" for the item that was submitted and this grade will be incorporated into your final grade. If the cheating occurred during a course exam, the incident will be reported to the Chemistry Department Chair and the College of Arts and Sciences administration. Depending on the seriousness of the incident, additional sanctions may be imposed.

Dropping and Withdrawal

Be aware of the following dates in the semester:

September 4th : Last day to withdraw without a mark of a "W."

September 9th: Last day to withdraw with a 100% Bursar credit

September 23rd: Last day to withdraw with a 50% Bursar credit

September 30th: Last day to withdraw with a 20% Bursar credit

November 2nd: Last day to withdraw with a "W" grade, thereafter a "WF" will be assigned

Disabilities: Students with a university-documented disability should contact me immediately. If your disability requires that quizzes and exams be taken outside of the scheduled time or place, please consult: www.luc.edu/sswd/. Services for Students with Disabilities (SSWD) serves students with disabilities by creating and fostering an accessible learning environment.

Student Accommodations: If you have any special needs, please let me know in the first week of classes. The university provides services for students with disabilities. Any student who would like to use any of these university services should contact the Student Accessibility Center (SAC), Sullivan Center, (773) 508-3700. Further information is available at <http://www.luc.edu/sac/>.

Loyola University Absence Policy for Students in Co-Curricular Activities (including ROTC):

Students missing classes while representing Loyola University Chicago in an official capacity (e.g. intercollegiate athletics, debate team, model government organization) shall be allowed by the faculty member of record to make up any assignments and to receive notes or other written information distributed in the missed classes. Students should discuss with faculty the potential consequences of missing lectures and the ways in which they can be remedied. Students must provide their instructors with proper documentation (develop standard form on web) describing the reason for and date of the absence. This documentation must be signed by an appropriate faculty or staff member, and it must be provided as far in advance of the absence as possible. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to give the student the opportunity to take the examination at another time.

(<https://www.luc.edu/athleteadvising/attendance.shtml>)

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.

Changes to Syllabus: There may be changes to the syllabus during the semester. These changes will generally involve progression, the sequence of topics will remain unchanged.

The Course Schedule**Section 1**

Aug.	25	Topic 01: What the heck is going on ? I	
	27	Topic 02: What the heck is going on ? II	Problem Set I
Sep.	1	Topic 03: Kinetic Simulation – Learning KinTek Explorer	
	3	Review	
	8	Topic 04: Ligand Binding	
	10	Topic 04: Ligand Binding	Problem Set I Due
	15	Review	Problem Set II
	17	Topic 05: Transient State Kinetics I	
	22	Topic 06: Transient State Kinetics II	
	24	Review	
	29	Topic 07: Physical Interactions in Enzymes	
Oct.	6	Topic 08: Notions of Enzyme Catalysis	Problem Set II Due
	8	Review	Problem Set III

Section 2

	13	Topic 09: The Use of Isotopes in Enzymology	
	15	Topic 10: Group Transfer, Redox, Monooxygenation	
	20	Review	
	22	Topic 11: Case Study-Kynurenine monooxygenase	
	27	Topic 12: Case Study-Renalase	
	29	Topic 13: Case Study-Dihydropyrimidine dehydrogenase	Problem Set III Due
Nov.	3	Topic 14: Dioxygenation, Substitution, Carboxylation	Problem Set IV
	5	Review	
	10	Topic 15: Case Study-HPPD	
	12	Topic 16: Decarboxylations, Isomerizations, Eliminations & Additions	
	17	Topic 17: Case Study - Cytosolic Isocitrate Dehydrogenase	
	19	Topic 18: Aldol Rxn, Formylations, Methylations, Rearrange/Review	
Dec.	1	Review	
	3	Review	Problem Set IV Due
	12	Final Exam (9:00 – 11:00 am)	