Syllabus – The Chemistry of Enzymes

Course Instructor

Instructor: Dr. Graham Moran
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Weekly Schedule

Lecture: Tu/Th 8:30-9:45 AM Flanner Hall Rm 129
Office Hours: Happy to meet or zoom anytime just send me an email.

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

Course Materials: All lecture materials and problem sets will be available for download via sakai - https://sakai.luc.edu/

Please install KinTek Explorer: https://www.kintekexplorer.com/downloads/

Optional textbooks: Any one of these texts would serve as a good reference.

1. Biomolecular Kinetics: A Step-by-Step Guide **Clive R. Bagshaw**. CRC Press ISBN 9781498727235
2. Kinetic Analysis for the New Enzymology **Kenneth A. Johnson. https://kintekcorp.com/book/kinetic-analysis-for-the-new-enzymology**
3. Kinetics of Enzyme Catalysis **Bruce A. Palfey and Rebecca L. Switzer** ACS Publications (e-book) ISBN: 9780841299399

Grading

4 Problem Sets	100 points each
Final Exam	100 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 isn't anything to be gained by relying on your classmates for answers.

Tentative Problem Set Due Dates: September 28th, October 26th, November 11th, December 7th.
Final Exam : Saturday, Dec 18 at 9AM-11AM.

The final exam is cumulative. All topics discussed are fair-game for 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 Amber Miller, Assistant Dean for Student Academic Affairs (amill8@luc.edu).

Prerequisites: 396. Special Topics in Biochemistry. Satisfactory progress toward completion of the core chemistry courses, and Junior or Senior status. Restricted to BIOCHEM and CHEM majors. Course content and prerequisites vary from semester to semester and include advanced topics in biochemistry.

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 during office hours via zoom or email. If you miss a period, please get the notes from another student in class.

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 I
Topic 04: Ligand Binding
Topic 05: Transient State Kinetics I
Topic 06: Transient State Kinetics II
Topic 07: Physical Interactions in Enzymes
Topic 08: What is Enzyme Catalysis ?
Topic 09: The Use of Isotopes in Enzymology
Topic 10: Group Transfer, Redox, Monooxygenation
Topic 11: Case Study-Renalase
Topic 12: Case Study-Kynurenine monooxygenase
Topic 13: Case Study-Dihydropyrimidine dehydrogenase
Topic 14: Dioxygenation, Substitution, Carboxylation
Topic 15: Case Study-HPPD
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
https://www.luc.edu/secondlevelpages/academics/schedules/academics/schedules/fall/academic_calendar.shtml

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: https://www.luc.edu/sac/. 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/.

Masking Statement: In the event the University relaxes its universal requirement for indoor mask-wearing during the Fall 2021 semester, it will remain a principle of this class-section that, out of respect for the health of classmates and others in regular contact with members of our community, in this class we wear masks over nose and mouth at all times we are together in the classroom.

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.	29	Topic 01: What the heck is going on ? I	
	31	Topic 02: What the heck is going on ? II	Problem Set I
Sep.	5	Review	
	7	Topic 03: Kinetic Simulation – Learning KinTek Explorer	
	12	Topic 03: Kinetic Simulation – Learning KinTek Explorer	
	14	Review	
	19	Topic 04: Ligand Binding	
	21	Topic 04: Ligand Binding	
	26	Topic 05: Transient State Kinetics I	Problem Set I Due/ Problem Set II
	28	Review	
Oct.	3	Review	
	5	Topic 06: Transient State Kinetics II	
	10	No Class - Fall Break	
	12	Topic 07: Physical Interactions in Enzymes	
	17	Topic 08: What is Enzyme Catalysis ?	
	19	Topic 09: The Use of Isotopes in Enzymology	

Section 2

	24	Topic 10: Group Transfer, Redox, Hydroxylation	Problem Set II Due/ Problem Set III
	26	Review	
	31	Topic 11: Case Study- Renalase	
Nov.	7	Topic 12: Case Study- Kynurenine monooxygenase	
	9	Topic 13: Case Study-Dihydropyrimidine dehydrogenase	
	14	Topic 14: Dioxygenation, Substitution, Carboxylation	
	16	Review	Problem Set III Due/ Problem Set IV
	21	Topic 15: Case Study-HPPD	
	23	No Class - Thanksgiving Break	
	28	Topic 16: Decarboxylations, Isomerizations, Eliminations & Additions	
	30	Topic 17: Case Study - Cytosolic Isocitrate Dehydrogenase	
	5	Topic 18: Aldol Rxn, Formylations, Methylations, Rearrangements	
Dec.	7	Review	
	9	Review	Problem Set IV Due
	16	Final Exam (9:00 – 11:00 am)	