

# Advanced Enzyme Kinetics and Mechanisms

CHEM 385/465

Spring 2018

Dr. Miguel A. Ballicora (Instructor)

**Lectures:** MonWed 7:00 pm – 8:15 pm (Flanner Hall, Room 405).

## Major Themes

This course will be about topics related to modern enzymology, with a special emphasis on enzyme kinetics. The structure of the course will involve lectures by Dr. Ballicora for each of them, intermixed with class discussion. Since this is an advanced course, the instructor may slightly adjust the topics presented to better accommodate class interest and the more suitable pace.

## Reading assignments

There is no official textbook in this course. Most of it will be based on current papers, reviews, and excerpts from different books. The instructor will provide handouts or references when needed. The material covered in class will not be easily covered in the same manner anywhere else, so it is critical to have perfect or near perfect attendance.

## Tentative schedule

In a separate sheet, there is the intended schedule for the lectures. The schedule is tentative as it may slightly change to accommodate the most appropriate lecturing pace. The academic schedule for the University is here <http://www.luc.edu/academics/schedules/>

## Website and professor-student communication

*Sakai* (<http://sakai.luc.edu>) will be used for announcements, grades, and other information. Students are responsible to check *Sakai* as well as the Loyola e-mail account at least once a day. To contact the instructor, the students could send e-mails from their Loyola e-mail account. They should include somewhere in the subject line the word "CHEM385 or CHEM465". Otherwise, it is quite likely that the message may be overlooked. The student could also e-mail the instructor directly from *Sakai* (RECOMMENDED! Since it will automatically add a proper subject line).

## Participation

The instructor strongly encourages the students to participate in class and interact with other classmates after class. To facilitate the communication, a discussion forum will be set up in *Sakai*. Students can post questions, answers to other student questions, and/or anything related to the course.

## Grading

These are the five items that will constitute the final score for the course:

A. Quizzes/Assignments/Discussion work	10%
B. Mid-term examination 1	20%
C. Mid-term examination 2	20%
D. Mid-term examination 3	20%
E. Final <i>cumulative</i> examination	30%

Even though the midterms are not entirely cumulative, some concepts from previous units may be integrated into questions from the new unit.

There will be three different options to compute the final score of the course. All options will be calculated and the student will get the highest of the three.

*Option 1:* Standard calculation based on the weights given above. For instance, if each grading item listed above (A to E) has an individual score of 100 points, the calculation will be  $Course\ Score = 0.1 A + 0.2 (B + C + D) + 0.3 E$

*Option 2:* Worst midterm is dropped. If  $MT_{top}$  is the score of the best midterm and  $MT_{sec}$  is the second best score of the midterms then,  
 $Course\ Score = 0.1 A + 0.26 (MT_{top} + MT_{sec}) + 0.38 E$

*Option 3:* The worst score midterm is replaced by a number based on the final exam performance. If  $X$  is the score of the student in the final,  $X_m$  is the median score of the whole class in the final, and  $MT_m$  is the median score of the whole class in the midterm to be replaced ( $MT_{rep}$ ), then  $MT_{rep} = MT_m X / X_m$ . Of course, this replacement cannot be higher than 100. Once  $MT_{rep}$  is calculated, then  $Course\ Score = 0.1 A + 0.2 (MT_{top} + MT_{sec} + MT_{rep}) + 0.3 E$

The final score of will be rounded, and the letter assigned according to:

Letter	Range
A	92-100
A-	86-91
B+	81-85
B	76-80
B-	71-75
C+	66-70
C	61-65
C-	57-60
D+	53-56
D	47-52
F	46 and below

There will be no make-up examinations under any circumstance for mid-term exams. Options 2 and 3 were designed to contemplate any type of possible problem that will prevent the student to attend one of the midterm exams.

There will be no make-up examination for the final unless there is a **documented** family or medical emergency (or any other compelling reason such as jury duty).

### **Online quizzes and other assignments**

These activities will worth some points that will accumulate throughout the course. There will be at least 10 points worth of accumulated activities, but no more than 20. Those will equal to 10% of the final score of the course (see above). There will be no make-up for any missed quiz or assignment at all.

### **Expected behavior**

Any work from the student must come from his/her independent and honest efforts. A student found cheating will receive an automatic "0" or F at that particular examination (which cannot be dropped). Serious violations of academic integrity may even cause the students to get an F in the course. Any violation must and will be reported to the Chair of the Department and the Dean of the College. They will decide whether further disciplinary action is necessary.

Use of cell phones or any other distracting devices are not allowed in class. During the exams, students are not allowed to use any type of electronic device (laptop computers, cell phones, smart phones, radios, calculators etc.) unless the instructor specifically authorizes them. They should be left at the front of the class and should not be near the student at any time during the tests. Failure to follow this policy may be considered an attempt to cheat and will be dealt

accordingly. Please note the policies about academic integrity from the College:  
<http://www.luc.edu/cas/advising/academicintegritystatement/>

Recording of lectures is not allowed unless specifically authorized by the instructor.

### **Special accommodations**

Students with special accommodations acknowledged by the University that need the instructor's attention such as University-sponsored activities for student athletes, students with learning disabilities etc. should contact the instructor within the first week of class.

### **Amendments**

The instructor reserves the right to correct or amend this syllabus at any time. However, if that occurs, the students will be informed.

### **Instructor's contact information:**

Dr. Miguel A. Ballicora  
Flanner Hall 405 • Phone: 508-3154 • e-mail: [mballic@luc.edu](mailto:mballic@luc.edu)

### **Office hours:**

They will be on Monday and Wednesday from 5:00 to 6:00 pm. Special meeting hours could be arranged by appointment.

**CHEM 385/465, Tentative Schedule**

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Mon	1/15	MLK day	
Wed	1/17	Basic concepts in Enzyme kinetics	1
Mon	1/22	Enzyme Assays	2
Wed	1/24	Enzyme Assays	3
Mon	1/29	Steady state and equilibrium	4
Wed	1/31	Steady state and equilibrium	5
Mon	2/5	Midterm Exam #1	6
Wed	2/7	Derivation of equations	7
Mon	2/12	Derivation of equations	8
Wed	2/14	Derivation of equations	9
Mon	2/19	Inhibition	10
Wed	2/21	Inhibition	11
Mon	2/26	Inhibition	12
Wed	2/28	Midterm Exam #2	13
Mon	3/5	Spring Break	-
Wed	3/7	Spring Break	-
Mon	3/12	Allosterism	14
Wed	3/14	Allosterism	15
Mon	3/19	Allosterism	16
Wed	3/21	Allosterism	17
Mon	3/26	Reaction mechanisms	18
Wed	3/28	Reaction mechanisms	19
Mon	4/2	Midterm Exam #3	20
Wed	4/4	Data processing and fitting	21
Mon	4/9	Data processing and fitting	22
Wed	4/11	Hysteretic enzymes	23
Mon	4/16	Enzyme engineering	24
Wed	4/18	Enzyme engineering	25
Mon	4/23	Special topics	26
Wed	4/25	Review	27
Mon	4/30	FINAL EXAM (7:00 PM)	