

CHEM 4240/6240 – CHEMICAL BIOLOGY

Spring Semester 2021

Courses: CHEM 4240, CHEM 4240 HON, CHEM 6240

Instructor: Dr. Lei Li

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Prerequisites of the Course:

Undergraduate Students: CHEM 2400 with a C or higher

Graduate Students: One year of Organic Chemistry (CHEM 3410) or equivalent, and one semester of Biochemistry 4600/6600 or equivalent

Required Textbook: Introduction to Bioorganic Chemistry and Chemical Biology, David Van Vranken and Gregory A. Weiss (2012)

Office Hours: I am available to meet online via Webex in iCollege every Thursday 10:00 AM – 11:30AM. Please e-mail in advance if you would like to meet at a different time.

Instruction Mode: Full online. Lectures are asynchronous and will be uploaded to iCollege.

Course Description: “Chemical Biology” is a 3-credit semester course that covers the principles of chemical biology, reactivity of DNA/RNA and proteins, glycobiology, and chemical control of cell signaling. This course is divided into 7 modules according to the textbook. The instructor will focus on explaining the textbook. The students need to read the textbook, attend the lectures, and complete the exams, quizzes, and homework.

Learning Outcomes and Objectives: The objective of the course is to teach students the chemical basis of biological transformation, and the designing principle of developing chemical tools to study biology. The students will learn how to describe a biological transformation using the language of organic chemistry, and how to solve biological problems with chemical tools.

Last day to withdraw is **Tuesday, March 2nd, 2021**

Assessments and Grading: There will be 3 midterm exams and a final exam, 8 quizzes (one per Module), and homework after each topic. The grading will be based on 500 points as detailed below. All assessments are open book. Students may refer to textbooks and lecture notes during the exam and quiz. Note that some questions on the exams will be very similar in format to homework questions. Mastering homework will go a long way towards better performance on exams.

Point Distribution:

Module Quizzes (8-10 question per module)	100
Midterm Exam 1 (Module 1-3)	100
Midterm Exam 2 (Module 3-5)	100
Final Exam (All Modules)	200
Total	500

Grade Breakdown:

Points	Percentage	Grade
475-500	≥ 95%	A+
450-474	≥ 90%	A
425-449	≥ 85%	A-
400-424	≥ 80%	B+
380-399	≥ 76%	B
365-379	≥ 73%	B-
350-364	≥ 70%	C+
325-349	≥ 65%	C
300-324	≥ 60%	C-
275-299	≥ 55%	D
0-274	<55%	F

Modules and Course Schedules ([Finish Quiz by end of each Module](#))

Modules and Exams	Start Date	Assessment Due Date
Module 1: Introduction to Chemical Biology (Chapter 1, 2) <ul style="list-style-type: none"> • Central dogma of modern biology (1.1-1.5) • Common tools in chemical biology (1.6) • The chemical origins of biology (Chapter 2) 	1/11/2021 Monday	1/25/2021 Monday
Module 2: DNA (Chapter 3) <ul style="list-style-type: none"> • DNA structure and reactivity (3.1-3.4) • DNA synthesis (3.5-3.6) • DNA and Genome manipulation tools (3.7-3.8) • DNA Damage and drugs targeting DNA (3.10) 	1/25/2021 Monday	2/8/2021 Monday
Module 3: RNA (Chapter 4) <ul style="list-style-type: none"> • RNA structure and synthesis (4.1-4.2) • mRNA processing and RNA interference (4.3-4.5) • From mRNA to protein (4.6-4.7) • Case Study: Unnatural amino acid incorporation 	2/8/2021 Monday	2/22/2021 Monday
Midterm Exam 1 Release on iCollege, covers Module 1-3	2/23/2021 Tuesday 2:00 PM EST	2/23/2021 Tuesday 6:00 PM EST
Module 4: Peptide and Protein Structures (Chapter 5) <ul style="list-style-type: none"> • Amino acids and peptides (5.1-5.2) • Protein folding and structure (5.3-5.6) • Protein posttranslational modification 	2/25/2021 Thursday	3/8/2021 Monday

Module 5: Protein Function (Chapter 6) <ul style="list-style-type: none"> • Receptor-ligand interactions (6.1) • Enzymes (6.2-6.3) • Protein engineering (6.5) 	3/8/2021 Monday	3/24/2021 Wednesday
Spring Break (3/15/2020-3/21/2020)		
Midterm Exam 2 Release on iCollege, covers Module 3-5	3/25/2021 Thursday 2:00 PM EST	3/25/2021 Thursday 6:00 PM EST
Module 6: Glycobiology (Chapter 7) <ul style="list-style-type: none"> • Carbohydrate structure (7.1-7.3) • Glycoconjugates (7.4-7.5) • Glycan-protein interactions (7.8) • Case study: Glycan metabolic labelling and LYTICs 	3/30/2021 Monday	4/12/2021 Monday
Module 7: Chemical Control of Signal Transduction (Chapter 9) <ul style="list-style-type: none"> • Signal transduction (9.1-9.5) • G protein-coupled receptors (9.6) • Case Study 	4/12/2021 Monday	4/23/2021 Friday
Final Exam Release on iCollege, covers all Modules	4/29/2021 Thursday 2:00 PM EST	4/29/2021 Thursday 6:00 PM EST

Student Integrity Policy: All exams must represent the student's individual, unaided efforts. Receiving unauthorized outside information or offering unauthorized information to another student during an examination is cheating. Any suspected offenses may be referred to the Department of Chemistry and the College of Arts and Sciences for appropriate action. Please refer to GSU's policy on academic dishonesty for more information: <https://deanofstudents.gsu.edu/files/2019/07/Academic-Honesty-Policy.pdf>

Americans with Disabilities Act: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Students who wish to request accommodation for a disability may do so via the Access and Accommodations Center (AACE) at <https://access.gsu.edu/>. Students may only be accommodated upon issuance of a signed Accommodation Plan by the AACE Center (see: <https://access.gsu.edu/testing-services/>) and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

Family Educational Rights and Privacy Act: In keeping with USG and university policy, this course website will make every effort to maintain the privacy and accuracy of your personal information. Specifically, unless otherwise noted, it will not actively share personal information gathered from the site with anyone except university employees whose responsibilities require access to said records. However, some information collected from the site may be subject to the Georgia Open Records Act. This means that while we do not actively share information, in some cases we may be compelled by law to release information gathered from the site. Also, the site will be managed in compliance with the Family Educational Rights and Privacy Act (FERPA), which prohibits the release of education records without student permission. For more details on FERPA, [go here](#).

Course Evaluation: Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.