CHEM 6273 Syllabus

Fall 2026

Instructor Information

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General Course Information

Description

CHEM6273 covers analytical techniques (tools and approaches) used at the interface of chemistry and biology. The general goal of this class is to understand the workings and application of different techniques as well as appreciate how combination of techniques in Chemistry and Biology can be applied to query mechanistic workings of complex biological systems (systems levels interrogations). Theory and applications of different techniques is taught via lectures. Additionally, hands-on training on various instruments (flow cytometers, fluorescence microscopes, and mass spectrometers) is provided. Homework typically entails analysis of data acquired during hands on training on the instrumentation.

Prerequisites

Familiarity with the fundamental aspects of nucleic acids, proteins, and biological small molecules will be useful. These concepts are briefly reviewed in first two-three lectures. There is no prerequisite for this course.

Course Goals and Learning Outcomes

- Fundamental knowledge of techniques used in analytical biochemistry and their applications such as
  - Recombinant DNA technology
  - Methods for protein expression
  - Methodologies for and applications of incorporation of non-natural amino acids in proteins
  - Fluorescence microscopy
  - Flow cytometry

  - Yeast hybrid systems
  - Phage display systems
  - Surface Plasmon resonance
  - Fluorescence polarization
  - Isothermal titration calorimetry
  - Mass spectrometry
  - Recombinant DNA
  - Genome sequencing technologies
- Ability to understand and analyze flow cytometry, fluorescence microscopy, and mass spectrometry data
- Ability to read and understand literature in the chemical biology field.

Required Course Materials

There are no required materials for this course. All the materials will be provided via canvas.

Grading Policy:

Description of Graded Components

The overall course grade consists of 6 assignments and 3 exams. Assignments will account towards 30% of grade and the exams will account towards 70% of the grade. The final assignment has bonus questions to improve your grade. A total of one week will be provided to attempt and submit homework assignments.

6 Assignments	200 points
Exam 01	100 points
Final Exam	100 points
Total	400 points

Your final grade will be assigned as a letter grade according to the following scale:

A 90.0 – 100%
B 80.0 – 89.9%
C 70.0 – 79.9%
D 60.0 – 69.9%
F Less than 60.0%

Course Policies

Attendance and/or Participation

Students will attend two lectures per week and participate in discussion and hands on training on the instrumentation as commensurate with registered credit hours.

Academic Integrity

Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty will result in immediate consequences as outlined in the university's academic honor code: https://policylibrary.gatech.edu/student-life/academic-honor-code

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Course Schedule

This is a tentative course schedule. We will make all attempts to adhere to this schedule. Any changes will be announced in class and via announcements on canvas.

Date	Topic
Aug 24 (M)	Introduction to course, biological small molecules, nucleic acids, and proteins
Aug 26 (W)	Analyses of DNA, RNA, and protein 1
Aug 31 (M)	Real time qPCR
Sep 2 (W)	Analyses of DNA, RNA, and protein 1 and Recombinant DNA technology
Sep 7 (M)	DNA sequencing and applications
Sep 9 (W)	Recombinant protein expression
Sep 14 (M)	Incorporation of non-natural amino acids
Sep 16 (W)	Incorporation of non-natural amino acids
Sep 21 (M)	Alpha fold: protein structure
Sep 23 (W)	Molecular evolution lab
Oct 5 (M)	Fall Break
Oct 7 (W)	Incorporation of non-natural amino acids
Oct 12 (M)	Column chromatography
Oct 14 (W)	Basics of Mass Spectrometry
Oct 19 (M)	Mass spectrometry data aquisitionn
Oct 21 (W)	Basics of Mass Spectrometry
Oct 26 (M)	Mass spectral fragmentation analysis
Oct 28 (W)	Mass spectral fragmentation analysis
Nov 2 (M)	Flow cytometry lecture
Nov 4 (W)	Flow cytometry data acquisition
Nov 9 (M)	Flow cytometry Data Analysis
Nov 11 (W)	Fundamentals of Fluorescence in Chemical Biology
Nov 16 (M)	Applications of Fluorescence in Chemical Biology
Nov 18 (W)	Presentations Day 1
Nov 23 (M)	Presentations Day 2
Nov 25 (W)	Student Recess
Nov 30 (M)	Fluorescence Microscopy-1
Dec 2 (W)	Lab visit: Fluorescence Microscopy
Dec 7 (M)	Applications of Fluorescence in Chemical Biology
Dec 9 (W)	Phage display and yeast two hybrid systems