

CHEM 6180: Special topics in Analytical Chemistry: Bioanalytical Chemistry

Fall 2023, Syllabus

Introduction of the courses

The activity of life relies on the function of biomolecules in cells. Analysis of biomolecules based on bioanalytical chemistry methods allow to understand the function of life, malfunction that cause diseases, and precise diagnostics. This course aims to stimulate interdisciplinary thinking and discussion covering advanced topics in bioanalytical chemistry methods for biomedical research.

The topics will include: the introduction of structure and function of biomolecules (DNA, RNA, and proteins), DNA synthesis, purification and amplification, analytical methods based on gel electrophoresis, mass spec, imaging, flowcytometry, sequencing. We'll then further cover the state of art analytical technologies for single cell genomics, transcriptomics, and proteomics.

Course objectives

1. Understand the basic function of biomolecules.
2. Understand the principles and applications of the frequently used bioanalytical methods.
3. Know the current frontier methods for bioanalysis.

Instructor

Fan Hong,
Office: CLB 201
Phone: 4807669458
Email: fanhong@ufl.edu

Class Periods

M/W/F 9:35 – 10:25 AM
Location: FLI 0109

Office hours

Office hours: by appointment

Textbook

There is no required textbook for the course. Supplemental reading from current literature will be provided.

Grading criteria

- (20%) Class participation and contributions to discussions.
- (20%) Class assignments
- (20%) Presentation of a critical review of current publication(s).
- (20%) Written materials of 2-page research proposal.
- (20%) Final presentation of research proposal.

Scheme

- 100-90% (A)
- 90-85% (A-)
- 84-80% (B+)
- 79-75% (B)
- 74-70% (B-)
- 69-65% (C+)
- 64-60% (C)
- 59-55% (C-)

Policy related to class attendance.

Participation in our class is fundamental since improving oral conversation skills is a key objective of the course. Students are expected to attend all the course. Punctuality is recommended. Cell phones should be silent during class time. If you must miss class, please contact me in advance.

Feedback of the course

Students are expected to provide feedback on the quality of the instruction in this course by completing on-line evaluations at <https://evaluations.ufl.edu>. Evaluations are open two or three weeks before the end of the semester.

Lecture Topics

1. The introduction of biomolecules: DNA, RNA, proteins.
2. The chemical mechanism and biological function of DNA, RNA, and proteins.
3. Gel electrophoresis for bioanalysis.
4. DNA, RNA, in vitro analysis PCR reaction and sanger sequencing.
5. Sensitive nucleic acid analysis with isothermal amplification.
6. Immune assay for protein analysis.
7. Mass spec for bioanalysis.
8. DNA and RNA fluorescence in situ hybridization.
9. Protein analysis by immunofluorescence and flow cytometry.
10. Next generation sequencing technologies.
11. Protein analysis based on next generation sequencing, and multi-omics.
12. Spatial genomics, and transcriptomics.
13. Spatial proteomics.
14. Frontier of bioanalysis .