

Chemical Systems III

CLASS MEETINGS

MWF 11:00–11:50 p.m., Olin Room 103

Final Exam Period: Tuesday June 11th, 10:00-11:50, Olin Room 103

INSTRUCTOR

Prof. Scott Horowitz

scott.horowitz@du.edu

Instructor Office Hours

ECS Building, Room 561 (or if not there, in lab Room 505, knock at lab door)

MW 3:00 p.m.–4:00 p.m., or by appointment

COURSE DESCRIPTION

This course is meant to be an introduction to structural biology and biophysics methods. The class will be approximately half lecture on the methods and half discussion of papers using those methods. Required reading will be the primary literature discussed in class.

COURSE REQUIREMENTS

1. Attendance (5% of grade)
2. In-class participation (10% of grade)
3. Reading quizzes (5% of grade)
4. Figure interpretation quizzes (15% of grade)
5. Protein expression and purification simulation (20% of grade, 2/20 from pre-survey)
6. “Solve the structure” (10% of grade)
7. Writing project (35% of grade: 2/35 engagement quizzes, 3/30 lit review deconstruction, 8/30 individual synthesis table, 8/30 group synthesis table, 6/30 group draft, 2/30 group peer revisions, 3/30 group re-revisions, 3/30 class revisions)

LATE WORK/EXAM AND ATTENDANCE POLICY

Late assignments are penalized 10% for each day past the deadline.

If you are unable to attend class due to a legitimate emergency, please contact me via e-mail. If you are not in class for any other reason, you will be marked absent and earn a zero for the day. Students who arrive more than five minutes late will earn 50% attendance for the day.

Date	Subject	Due Dates
1-Apr	What is biophysics?/how to do lit reviews	Group work quiz
3-Apr	Protein/nucleic acid refresher	
5-Apr	Protein/nucleic acid refresher	Engagement quiz
8-Apr	Crystallography	
10-Apr	Crystallography	Background Questionnaire due
12-Apr	Crystallography and SAXS	Lit review deconstruction, engagement quiz
15-Apr	Crystallography assignment start	CLASS IN STURM 354
17-Apr	Crystallography paper discussion	Individual synthesis table, Read crystallography.pdf
19-Apr	UV-Vis, CD	Engagement quiz
22-Apr	CD paper discussion	Read CD.pdf
24-Apr	Simulation day 1	Group synthesis table draft 1, engagement quiz
26-Apr	Simulation day 2	“Solve the structure” assignment due; engagement quiz
29-Apr	Simulation day 3	Finish simulation; UV-Vis, CD quiz
1-May	Simulation presentations/ lit search update	Simulation presentation; Group synthesis table draft 2
3-May	EM and Cryo-EM	Post-simulation questionnaire due, engagement quiz
6-May	Cryo-EM and lit review group work	
8-May	Cryo-EM paper discussion	Read cryoem.pdf;
10-May	NMR	engagement quiz; Group synthesis table draft 3
13-May	NMR	
15-May	NMR paper discussion	Read NMR.pdf
17-May	Fluorescence (lecture pre-recorded)	Engagement quiz; Final group synthesis table
20-May	Fluorescence paper discussion	Read Fluorescence.pdf
22-May	ITC, DSC, MST, Stopped flow, SPR	NMR figure quiz
24-May	ITC paper discussion	Read itc.pdf, engagement quiz; Group first draft
29-May	SPR paper discussion	Read SPR.pdf;
31-May	All-atom MD	Engagement quiz; Group peer revisions
3-Jun	All-atom MD paper discussion	Read allatommd.pdf; MST, ITC, DSC, Stopped flow, SPR, Fluorescence, CD, UV-Vis quiz;
5-Jun	QM, Coarse-grained MD, and protein folding prediction	Group final draft
7-Jun	Coarse-grained MD discussion	Read coarsegrainMD.pdf, engagement quiz
11-Jun	A sprint to the finish of the paper!	Class final draft, quarter-long reflection

Lit Review Project Overview

Introduction group: find your own papers.

Structure group:

High-resolution DNA quadruplex structure containing all the A-, G-, C-, T-tetrads

A Minimal Sequence for Left-Handed G-Quadruplex Formation

Crystal Structure of a Tetrameric DNA Fold-Back Quadruplex

Recognition group:

Several structural motifs cooperate in determining the highly effective anti-thrombin activity of NU172 aptamer

Structural basis of G-quadruplex unfolding by the DEAH/RHA helicase DHX36

Every Friday: Engagement quiz on canvas quiz with 4 questions, graded for participation only.

Also every week have to turn in current document.

Week 1-2: Confidential individual canvas quiz about whether there are people you specifically want to work with or specifically not want to work with. Divide into groups and individual literature search. Start individual guiding tables/synthesis table. Lit review deconstruction example in groups. Group meeting with research librarian.

Weeks 3-5: Groups share what they found and expand guiding tables based on feedback. Dig deeper with searching, now coordinating efforts as a group.

Weeks 6: Groups assemble detailed synthesis tables and create figures.

Week 7: Groups draft sections. Meet with writing center.

Week 8: Groups give each other feedback

Week 9-10: Groups revise. Meet with writing center.

Week 10-Final exam period: Class revisions, and quarter-long reflection, hopefully submission.