



**BIOCHEM 918 Seminar in Single Molecule Approaches to Biology
crosslisted as CHEM 918**

Credits: 1

Canvas Course URL: <https://canvas.wisc.edu/>

Course Designations and Attributes: Graduate

Meeting Time and Location: Friday, 1:20pm, Virtual Location on Zoom (access via Canvas link)

Instructional Mode: Virtual, Synchronous

Specify how Credit Hours are met by the Course: Traditional Carnegie Definition – One hour (i.e. 50 minutes) of classroom or direct faculty/instructor instruction and two hours of out of class student work each week over approximately 15 weeks.

INSTRUCTORS AND TEACHING ASSISTANTS

Instructor Title and Name: Professor Aaron Hoskins and Professor CJ Lim

Instructor Availability: by appointment

Instructor Email/Preferred Contact: ahoskins@wisc.edu

Teaching Assistant (if applicable): N/A

TA Office Hours; N/A

TA Email/Preferred Contact: N/A

OFFICIAL COURSE DESCRIPTION

Course Description

As approved through governance, presented in [the Guide](#).

Participants will discuss recent literature in topics related to the use of single molecule techniques in biochemistry. These topics include but are not limited to fluorescence microscopy, tethered particle motion, patch-clamping, cryo-electron microscopy, optical trapping, magnetic tweezers, and super resolution microscopy. Each week, one student participant will lead a critical discussion on a recent publication in the field of single molecule biophysics. The discussion leader will explain the background materials, methodology, experimental results, and broader implications of the publication. **The discussion leader will also submit two questions related to the assigned reading 1 week prior to the presentation for students to answer before class. All participants will be expected to turn in answers to these questions at the start of class and play an active role in the discussion.** The discussion leader will answer these questions as part of the presentation and to foster discussion.

Requisites

Advanced coursework in biochemistry, biophysics, or chemical physics and permission of instructor.

LEARNING OUTCOMES

Course Learning Outcomes:

Students will become familiar with state-of-the-art research in the area of single molecule biophysics, students will gain communication skills by preparing a presentation, and students will gain experience in critically evaluating experimental results.

Texts: The texts of this course will be primary research literature selected by the professors and students. The literature is available from UW campus libraries.

Representative List of Readings: See below. Student choice papers are selected by the enrolled students.

GRADING

Attendance: 20%

Assignments: 20%

Participation: 20%

Presentation: 40%

DISCUSSION SESSIONS

Date		Topic/Paper	Speaker
01/29		Organizational Meeting	N/A
02/05	Paper 1	Newton, MD, et al. "DNA stretching induces Cas9 off-target activity", NSMB, v26, 185-192 (2019).	
02/12	Paper 2	Bradford, KC, et al. "Dynamic human MutSa-MutLa complexes compact mismatched DNA", PNAS, v117, 16302-16312 (2020).	
02/19	GL	Guest Lecture: CJ Lim	N/A
02/26	GL	Guest Lecture: Peter Favreau	N/A
03/05	SC1	Student Choice	
03/12	Paper 3	Desai, VP, et al., "Co-temporal Force and Fluorescence Measurements Reveal a Ribosomal Gear Shift Mechanism of Translation Regulation by Structured mRNAs", Mol Cell, v75, 1007-1019 (2019).	
03/19	SC2	Student Choice	
03/26	GL	Guest Lecture: Dan Stevens	N/A
04/02	****	No class	N/A
04/09	SC3	Student Choice	
04/16	GL	Guest Lecture: Tim Grant	N/A
04/23	Paper 4	Mateju, D., et al., "Single-molecule Imaging Reveals Translation of mRNAs Localized to Stress Granules", Cell, v183, 1801-1812 (2020).	
04/30	SC4	Student Choice	

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's to [Rules, Rights and Responsibilities](#)

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be

forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: “The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.” <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

DIVERSITY & INCLUSION

Institutional statement on diversity: “Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.” <https://diversity.wisc.edu/>

KEY POINTS

1. Presenters need to email 2 discussion questions to Prof. Hoskins/the class 1 week before their presentation.
2. Turn in your answers to the discussion questions on Canvas before class starts.
3. Bring up the discussion questions during your presentation to facilitate *discussion*