Biochemistry/Chemistry 945, Fall 2024

Seminar—Chemical Biology (Advanced)

1 Credit, Graduate

Course Description
Presentations and discussions of recently published research in chemical biology and related areas.

This course is intended for advanced graduate students, and is required of all NIH Chemistry–Biology Interface training program trainees.

Requisites
Graduate/professional standing

Meeting Time and Location
Thursdays, 1:20–2:10 pm, Biochemistry 1116

Instructional Modality
In-person, with remote meetings as needed.

How Credit Hours are Met by the Course
This class meets for one, 50-minute class period each week over the fall semester and carries the expectation that students will work on course learning activities (reading, writing, preparing presentations) for about 2 hours out of the classroom for every class period.

Regular and Substantive Student-Instructor Interaction
The US Department of Education requirement for substantive student–instructor interaction is fulfilled by class meetings occurring weekly during the Spring semester, in which instructors provide information about course content and facilitate discussion of the content.

Other Course Information

Instructor & Course Coordinator

Instructor Title and Name
Professor Helen Blackwell

Instructor Availability
By appointment

Instructor Email/Preferred Contact
blackwell@chem.wisc.edu

Course coordinator
Cara Jenkins

Coordinator Office Hours
By appointment

Coordinator Email/Preferred Contact
clbradfo@wisc.edu

Additional instruction will be provided by faculty facilitators as assigned.

Course Learning Outcomes

Students in Biochem/Chem 945 will:

- Recognize interesting and important research problems at the chemistry–biology interface
- Develop an understanding of the tools used in research at the chemistry–biology interface
- Demonstrate understanding of professional and ethical responsibility in research
- Evaluate published research reports in terms of importance, rigor, and further applicability
- Communicate effectively through oral presentations and leading discussions among scientists with diverse interests and backgrounds

Grading

Your grade will be based on your seminar presentation (if relevant), your participation during the class discussion, and your attendance (tracked by course instructors), according to the following guidelines:

For students assigned to give a presentation:
Seminar presentation—33%
Participation—33%
Attendance—34%

For students not assigned to give a presentation:
Participation—50%
Attendance—50%

Course Website, Learning Management System & Digital Instructional Tools

This course will use Canvas as our learning management system: https://canvas.wisc.edu/courses/376541. In addition, we will make use of the course email list: **chem945-1-f24@g-groups.wisc.edu**.

The Canvas site will also include links to tutorials on effective presentations, the class schedule, the course guidelines, and the link for the weekly class meetings via Zoom, if necessary. Please take some time to familiarize yourself with the materials on the Canvas site.

Required Software & Other Course Materials

All articles designated for discussion will be found on the Canvas site in the Files section of the site. Students will need access to a computer with Zoom installed in the event that they need to attend remotely.

Homework & Other Assignments

Students will be expected to read the assigned paper each week and spend some time preparing to discuss the questions sent out each week by the presenter. The presenter will also formulate 4 discussion questions and send them out to the class via email (see above for the email address) by **5 pm on Tuesday** before their Thursday seminar, so that everyone has time to think about them.

The following guidelines should be used to prepare presentations.

1. **Introduction (5–10 minutes).** Summarize briefly the important facts and history needed for an intelligent listener who is not an expert to place the paper in proper context. Typically, the introduction should outline what unsolved issue(s) are being addressed, why the particular approach is being used, and how this approach differs from previous work on the system.
2. **Critical commentary on methods and results (15–20 minutes).** Provide an overview of the methods so that listeners can follow the experiments. For example: "Proteins were separated by SDS-PAGE." Not: "Five micrograms of protein were dissolved in 0.1 mL of 1% (w/v) SDS, containing 1 mM β-mercaptoethanol..." Whenever possible use a figure to summarize the experimental protocol and/or results. Point out the critical steps and show the kind of data obtained. In discussing results, show the original data. This can be done from a scanned image of the original or by importing the figure directly from a PDF using Adobe Acrobat. It is helpful to put a title on each slide that summarizes the question being asked in the experiment or the experimental result. If the original data involves a complex figure with many curves, label the curves so that the audience need not read the legend to get the information. If specific comparisons within a Table are most important, facilitate those comparisons by color-coding the numbers that should be compared with each other. If a Figure or Table that you are focusing on leads to a clear conclusion, state it at the bottom of the slide. If you think of other interpretations of the data, you can raise these issues as well. The formal part of the seminar should be a critical discussion of no more than 20 minutes. Sometimes students discover that they are using much more time than they had anticipated. To avoid this problem, practice your talk. Be sure to allow the time for questions and discussion.
3. **Class discussion (15 minutes).** On a slide, the presenter should pose 4 questions to be answered by small groups of students working together in class. **One of the 4 questions must pertain to research rigor or ethics associated with the topic.** The question(s) should address the important issues in the article and provoke lively discussion within the groups.
4. **Recapitulation (10 minutes).** Call upon other students to present their answers to your questions. Use this time to provoke discussion between the small groups, which may have arrived at different answers to the same question.

Teaching & Learning Data Transparency Statement

UW-Madison's use of teaching and learning data is described broadly by the UW-Madison Privacy Notice, and all UW-Madison institutional data (including teaching and learning data) are protected by the Institutional Data Policy. When teaching and learning data are used for learning analytics, UW-Madison adheres to the Guiding Principles for Use of Learning Analytics that emphasizes the values of beneficence, transparency, privacy and confidentiality for the use of data. University records including teaching and learning data are retained and disposed in accordance with UW-Madison Record Retention Schedules and Disposition.

Privacy of Student Records & the Use of Audio Recorded Lectures Statement

View more information about FERPA.

Lecture materials and recordings for this course are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability who has an approved accommodation that includes recording. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities, with the exception of sharing copies of your personal notes as a notetaker through the McBurney Disability Resource Center. Students are otherwise prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

How to Succeed in This Course

Students will succeed in this course by carefully reading the assigned journal articles and formulating thoughtful responses to discussion questions. In addition, those who are assigned to present a paper will benefit from reviewing the articles provided on the Canvas site on how to prepare an effective scientific presentation.

From time to time you may experience illness or stress that interferes with completing the required course tasks. In this event, you may wish to consult the following resources:

- *University Health Services*
- *Undergraduate Academic Advising and Career Services*
- *Office of the Registrar*
- *Office of Student Financial Aid*
- *Dean of Students Office*
- *Graduate Student Services*

Course Evaluations

Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your confidential feedback is important to me. I strongly encourage you to participate in the course evaluation.

Students' Rules, Rights & Responsibilities

Every member of the University of Wisconsin–Madison community has the right to expect to conduct his or her academic and social life in an environment free from threats, danger, or harassment. Students also have the responsibility to conduct themselves in a manner compatible with membership in the university and local communities. UWS Chapters 17 and 18 of the Wisconsin Administrative Code list the university policies students are expected to uphold and describes the procedures used when students are accused of misconduct. Chapter 17 also lists the possible responses the university may apply when a student is found to violate policy. The process used to determine any violations and disciplinary actions is an important part of UWS 17. For the complete text of UWS Chapter 17, see this link, or contact the on-call dean in the Dean of Students Office, 608-263-5700, Room 70 Bascom Hall.

No student may be denied admission to, participation in or the benefits of, or discriminated against in any service, program, course or facility of the [UW] system or its institutions or centers because of the student's race, color, creed, religion, sex, national origin, disability, ancestry, age, sexual orientation, pregnancy, marital status or parental status.

Diversity & Inclusion Statement

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.

Academic Integrity Statement

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

Accommodations for Students with Disabilities 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 (UW-855) require the university to provide reasonable accommodations to students with disabilities to access and participate in its academic programs and educational services. Faculty and students share responsibility in the accommodation process. Students are expected to inform faculty [me] of their need for instructional accommodations during the beginning of the semester, or as soon as possible after being approved for accommodations. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to provide reasonable instructional and course-related accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center)

Academic Calendar & Religious Observances

See: https://secfac.wisc.edu/academic-calendar/#religious-observances

COVID-19-SPECIFIC POLICIES

Instructors and students will consult the university COVID response website (covidresponse.wisc.edu) and follow the guidelines found there.

COMMON MISTAKES IN THE 945 SEMINAR

1. **Inadequate introduction** —You must give enough background so that the intelligent listener will know why the work you describe was done, and how the problem was approached experimentally. Do not waste time in introducing too much background: tell your audience what they need to know to understand the paper you are presenting—no more, no less. Along with introducing the main authors of the paper, please include a slide introducing any specialized terms used in the paper.
2. **Failure to provide the rationale behind a specific experiment**—Before you plunge into a description of a specific experiment, tell the audience why it was done. An effective approach is to say: "the authors next asked, is ATP required for the phosphorylation of glucose? In this experiment, glucose was incubated with and without ATP, and the concentration of glucose-6-phosphate was measured..." This sounds obvious, but it is the most common mistake in seminars and one that is easy to correct. *State the question before describing the answer.*
3. **Poor description of experimental results**—When you show a figure or table, immediately point out what is being measured and state what each axis represents; say explicitly what each column in a table represents. Use the pointer to guide your audience.
4. **Too much information on your slides**—For written slides (as opposed to data slides or graphics slides) write no more than 5–7 lines per slide. You need not write complete sentences; key phrases are adequate. Remember, your slides are visual aids; you do not want your audience focusing its attention on the slides at the expense of listening to you.
5. **Incorrect pace**—Speakers often try to show their absolute mastery of the subject matter by discussing it at high speed. This approach is counter-productive; your listener will stop trying to understand and everyone's time is wasted. If you must err in pacing, err in the direction of going a little too slowly. Do not worry about pausing and not speaking for a few moments. Such pauses allow your audience to process the information and perhaps break in with discussion or questions. If some points are more important than others, it may be worth modulating your tone of voice and/or summarizing these key points during particular stages of the seminar.
6. **Advocacy of authors**—You are under no obligation to defend the authors' conclusions; you did not write the paper. Present the data as objectively as you can. State the authors' conclusions, and state your own reservations or conclusions. The idea is read the paper critically, and you should treat the paper as if you were a referee, not a member of the authors' laboratory. Although you should be critical when appropriate, you also should be mindful of the fact that the authors are not present to rebut your criticisms.
7. **Distracting mannerisms**—When you use a pointer, point at the information you want to highlight (you need not lasso it or emphatically underline it). Turn the pointer off when you are not using it to make a point, and please do not aim it at the audience. Speak to your audience, not the screen. Try to make eye contact with the audience. Speak LOUDLY.
8. **Vague discussion questions** —Make sure that your discussion questions address interesting and important issues that can be discussed. It is probably best if you do not have an "answer" in mind, but ask about an issue that is left unresolved or can be seen from different views. Make sure that your questions are worded clearly.

COURSE SCHEDULE: Biochemistry/Chemistry 945: Seminar—Chemical Biology (Advanced)

Blackwell — Fall 2024

Thursdays @ 1:20–2:10 pm, 1116 Biochemistry

Date	*Speaker*	*Discussion Facilitator*	*Paper*	*CBI-relevant Seminars*
Sep 5	(none)	Blackwell	Course Intro	
Sep 12	Irene Stoutland	Helen Blackwell	**Introducing Azomethine Imines to Chemical Biology: Bioorthogonal Reaction with Isonitriles** A. Markos, M. Biedermann, J. Heimgärtner, A. Schmitt, K. Lang,and H. Wennemers* *J. Am. Chem. Soc*. **2023**, *145*, 19513–19517	
Sep 19	Justin Suter, Jennifer Whetter	Sam Gellman Eszter Boros	**Affinity-Driven Aryl Diazonium Labeling of Peptide Receptors on Living Cells** S. Sharma, M. J. Naldrett, M. J. Gill, and J. W. Checco* *J. Am. Chem. Soc*. **2024**, *146*, 13676–13688	
Sep 26	Natalie Gonzalez-Velazquez	Cody Wenthur	**An antibiotic preorganized for ribosomal binding overcomes antimicrobial resistance** K. J. Y. Wu, B. I. C. Tresco, A. Ramkissoon, E. V. Aleksandrova, E. A. Syroegin, D. N. Y. See, P. Liow, G. A. Dittemore, M. Yu, G. Testolin, M. J. Mitcheltree, R. Y. Liu, M. S. Svetlov, Y. S. Polikanov*, A. G. Myers* *Science*, **2024**, *383*, 721–726	James Checco, University of Nebraska–Lincoln Sept 24, 3:30 pm, 1315 Chemistry
Oct 3	Isabel Cannell, Lauren Tran	Helen Blackwell, Sam Gellman	**Modular Development of Enzyme-Activatable Proteolysis Targeting Chimeras for Selective Protein Degradation and Cancer Targeting** Y. Chen, L. Zhang, L. Fang, C. Chen, D. Zhang, and T. Peng* *JACS Au*, **2024**, *4* , 2564–2577	
Oct 10	Jackie Spieles, La'Darious Quinn	Christina Hull, Dave Lynn	**Fluorogenic Probes of the Mycobacterial Membrane as Reporters of Antibiotic Action** M. G. Wuo, C. L. Dulberger, T. C. Warner, R. A. Brown, A. Sturm, E. Ultee, Z. Bloom-Ackermann, C. Choi, J. Zhu, E. C. Garner, A. Briegel, D. T. Hung, E. J. Rubin, and L. L. Kiessling* *J. Am. Chem. Soc*. **2024**, *146*, 17669–17678	Kevin Plaxco, University of California–Santa Barbara Oct 8, 3:30 pm, 1315 Chemistry
Oct 17	Alex Cruz Matthew Kim	Dan Weix Snehal Chaudhari	**Stereoselective amino acid synthesis by photobiocatalytic oxidative coupling** T.-C. Wang, B. K. Mai, Z. Zhang, Z. Bo, J.Li, P. Liu* and Y. Yang *Nature*, **2024**, *629*, 98–104	

Oct 24	Hana Hieshima, Will Leiter	Monica Neugebauer, Amy Weeks	**Leveraging a Phage-Encoded Noncanonical Amino Acid: A Novel Pathway to Potent and Selective Epigenetic Reader Protein Inhibitors** P.-H. C. Chen, X. S. Guo, H. E. Zhang, G. K. Dubey, Z. Z. Geng, C. A. Fierke, S. Xu, J. T/ Hampton,* and W. R. Liu* *ACS Cent. Sci*. **2024**, *10*, 782–792	
Oct 31	Tony Yao, Holly Weilbaker	Betül Kaçar, Andrew Buller	**Symmetry breaking and chiral amplification in prebiotic ligation reactions** M. Deng, J. Yum and D. G. Blackmond* *Nature*, **2024**, *626*, 1019–1024	
Nov 7	Carlos Huang-Zhu Juliet Chang	Reid Van Lehn	**Distinct chemical environments in biomolecular condensates** H. R. Kilgore* , P. G. Mikhael, K. J. Overholt, A. Boija, N. M. Hannett, C. Van Dongen, T. I. Lee, Y.-T. Chang, R. Barzilay, and R. A. Young* *Nat. Chem. Bio*. **2024**, *20*, 291–301	
Nov 14	Chris Roberts	Tim Bugni	**Establishing a synthetic orthogonal replication system enables accelerated evolution in E. coli** R. Tian*, F. B. H. Rehm, D. Czernecki, Y. Gu, J. F. Zürcher, K. C. Liu, J. W. Chin* *Science*, **2024**, *383*, 421–426	
Nov 21	Julia Hoffman, Ethan Aubuchon	Lingjun Li, Aaron Hoskins	**Domain-Selective BET Ligands Yield Next-Generation Synthetic Genome Readers/Regulators with Nonidentical Cellular Functions** A. Mohammed, M. B. Waddell, I. Sutkeviciute, A. Danda, S. J. Philips, W. Lang, P. J. Slavish, S. J. Kietlinska, M. Kaulage, D. Sourav, and A. Z. Ansari* *J. Am. Chem. Soc*. **2023**, *145*, 24568–24579	
Nov 28	None	None	Thanksgiving break	
Dec 5	Minhua Cao, Yareslie Cruz-Rivera	Eszter Boros, Song Jin	**On Demand Bioorthogonal Switching of an Antibody-Conjugated SPECT Probe to a Cytotoxic Payload: from Imaging to Therapy** P. Adhikari, G. Li, M. Go, D. Mandikian, H. Rafidi, C. Ng, S. Anifa, K. Johnson, L. Bao, H. Hernandez Barry, R. Rowntree, N. Agard, C. Wu, K.-J. Chou, D. Zhang, K. R. Kozak, T. H. Pillow, G. D. Lewis, S.-F. Yu, C. A. Boswell,* and J. D. Sadowsky* *J. Am. Chem. Soc*. **2024**, *146*, 19088−19100	Spring semester seminars of note: J.P. Gerdt, March 4, 2025