

BMB 495: Senior Seminar, Spring 2023

Course Syllabus

Class Times and Locations

Tuesdays, 10:20am - 12:20pm.

Class sessions will be in-person. For the first 3 sessions, both sections meet in BCH Room 101 for the whole class. Starting with the fourth session, both sections meet for the first hour in BCH Room 101; sections will then split for the oral presentations. Section 1 remains in BCH Room 101; Section 2 will move to Biochemistry Room 208 (BCH 208).

Course Instructors and Teaching Assistant

Prof. Carol Wilkins
Section 1
502B Biochemistry Building
353-4927; mindockc@msu.edu

Prof. Kaillathe (Pappan) Padmanabhan
Section 2
202A Biochemistry Building
353-0814; padmanab@msu.edu

Teaching Assistant (for writing assignments and questions on D2L content):

Hannah Decot: decothan@msu.edu

Objectives

This 2-credit seminar course is designed to acquaint senior biochemistry majors with a range of current topics in biochemistry research. Students will become familiar with the scientific method: posing a hypothesis, developing methods or experiments to test the hypothesis, interpreting the results of the experiments, and placing those results in context of current knowledge in the field. Students will also gain experience in invaluable career and public relation skills such as clear and compelling scientific writing, public speaking, career preparation and interviewing.

Prerequisites

BMB462 taken previously or concurrently with BMB495. Open only to biochemistry majors.

Required Text

None. Materials for the course will be posted on <http://d2l.msu.edu>
Log in using your MSU netID and select BMB495 to access the materials.

Course Summary

The course begins with workshops on biochemistry career development, identifying well-validated biochemical information online, and communicating effectively in reports and talks. The following weeks of the course are organized as mini symposia on current research topics spanning the breadth of biochemistry. The first week on each research topic will feature a short (~20 minute) introductory talk by a professor who is an expert in that research field, placing the topic into context. Students who choose to write a report on that topic may email the professor to ask further questions about the report paper (provided under the professor's folder on the D2L website). Students who will present talks on the professor's topic the next week are also encouraged to email the professor to ask further questions about the papers they will present the following week and/or request a time to practice their talk with the professor. Each student will partner with another student and present a 15-minute talk on their topic, followed by five minutes of questions and discussion. Later in the semester, students will have an opportunity to prepare and present a poster covering alternative sides to a controversial societal topic involving biochemistry.

Grade Components

1. **An oral presentation** (20% of grade)
As a team of 2 students on a research topic each student selects during the first class; or as a single presenter prepared on the student's own research for the undergraduate research forum, UURAF; if so, sign up to present during the last week of class.
2. **A poster presentation** (20% of grade)
In which each student works with another student to cover both sides of a controversial topic in biochemistry
3. **Resume/cover letter** (8% of grade)
4. **4 written reports** (10% of grade for each report; 40% total to course grade)
On professors' topics *other than the topic of your oral presentation*. There are 9 topics from which to choose.
5. **Class participation** 12% of grade
 - a. 6% of grade: Turning in 10 evaluations of student oral presentations (one per week) and evaluating 2 posters during the poster session other than the one in which you are presenting for a total of 12 evaluations.
 - b. 6% of grade: Ask at least 6 questions following professor talks and following student talks throughout the semester.
6. **Peer-review and report improvement bonus:** up to 1 point bonus (4 points maximum) per report for having up to 4 of your reports pre-reviewed by peers or Writing Center personnel, **and** followed by your using that feedback to revise and improve your report **prior to** submitting it in class. Prof. Wilkins will cover the details in class. Learn how to benefit from the Writing Center at <http://writing.msu.edu>.

Course Grading Scale

The course grading at the end of the semester will be roughly as follows: **90% or better, 4.0; 85-89%, 3.5; 80-84% 3.0; 75-79%, 2.5;** etc. We may do some curving to make grade divisions at natural points in the grade distribution and to reflect that the material varies slightly in difficulty from year to year. We will also normalize scores between the two sections of the class, if needed, to ensure that the grading scales are consistent. The highlighted ranges above are a good guide on what you can expect.

Reports and Oral Presentations on Research Topics

Each research topic led by a professor will have a *particular style* specified for your presentation (**which should be 15 minutes long with PowerPoint slides plus 5 minutes for questions**) and report writing (no more than 3 pages in length and typed with double spacing). The professor will provide literature for you to review in his or her folder on D2L, with one document designated as the basis for report writing (for debate-style reports, this will involve several documents covering the pro/con sides) and will also be used for one of the oral presentations, along with three additional documents designated for further coverage by different student teams giving oral presentations. Carefully follow each professor's instructions in his or her folder. Students giving oral presentations on the same professor's topic in a given class section (Dr. Padmanabhan's or Dr. Wilkins') should coordinate with one another on which student team will cover each paper so that no paper is presented twice in the same classroom. Your presentation grade from Dr. Wilkins or Dr. Padmanabhan will reflect your ability to convey the scientific information accurately and clearly, as well as the logical flow, grammar, formatting, and correct citation of the images/data shown in your slides. When formatting your slides, please include the slide number on the bottom or lower-right corner of each slide after your title slide.

The style to use for each professor for his or her reports and the (possibly different) style to use for presentations is defined in the professor's folder on D2L. Which paper to use for reports as well as presentations is also noted in the folder. Reports are due at the beginning of class one week after the professor's introductory talk on that subject.

Citing Your Sources

Whether you are submitting a report or presenting a talk, your primary reference should be cited in full detail, including the title, at the beginning of your report/talk, using a format such as:

Rasmussen, S.G., Devree, B.T., Zou, Y., Kruse, A.C., Chung, K.Y., Kobilka, T.S., Thian, F.S., Chae, P.S., Pardon, E., Calinski, D., Mathiesen, J.M., Shah, S.T., Lyons, J.A., Caffrey, M., Gellman, S.H., Steyaert, J., Skiniotis, G., Weis, W.I., Sunahara, R.K., and Kobilka, B.K., Crystal structure of the beta2 adrenergic receptor-Gs protein complex. *Nature* 477, 549-555 (2011).

When you cite any other references in your talk (for a figure or data), include the full reference on the slide where you show the figure or data (e.g., as a footnote at the bottom of the slide) rather than putting all the references at the end of your talk. This helps the audience understand who made those contributions.

Overview of Styles for Reports and Presentations

The three report styles are Debate, Layperson, and Technical, as described below. Talks will either be in Debate or Technical style. For technical talks and papers, keep in mind that your audience consists of your peers, and what you say should be fully

comprehensible to them. Unfamiliar terms (jargon and abbreviations) should be kept to a minimum and fully explained. **Copying the wording of the author of a paper or other work should never be done in reports or presentations;** that is plagiarism (making it seem like someone else's work or writing is your own). Our goal is for you to understand and be able to explain the work clearly in your own words. Quotes are also frowned upon in scientific writing, even direct quotes that mention the person who made the statement. For both reasons, including quotes will be penalized in your reports. For instance, instead of saying " 'Obese mice consumed, on average, 43.2% more calories than normal mice,' stated by Dr. Jones [reference]," describe this finding in your own words.

Debate Style (reports and presentations)

Debate format focuses on controversial issues. Example: "Is it in the public's best interest for a diagnostic test to be patented?" If writing a debate style report, you will primarily address either the *pro* or *con* side of the debate, while mentioning briefly and countering the arguments presented for the other side of the debate. Peer-reviewed or scientifically validated technical reading on both sides of the issue will be provided in the professor's folder on that topic. For oral presentations in debate style, one speaker team will present each side of the issue. When there are three speaker teams, one student team will present the background context of the issue at the beginning of the session. As with the other talk formats, PowerPoint slides with graphics should be designed to accompany your debate. On the title slide, cite the complete primary peer-reviewed reference you are covering. On the other slides, cite the references for all data and figures you include from other sources, using footnotes to give the *complete* literature reference in a consistent format, such as shown in the middle of page 3, above.

Your debate-style report should be 2-3 pages long typewritten and double-spaced. Include the following sections in your report or talk, with the following section headings:

1. **Title.** Clearly define the debate topic and your position on the debate with an interesting title.
2. **Introduction and Background:** Introduce the topic that is being debated, document how it came to be an important issue, and state the two opposing positions. For talks, provide the full reference for the primary paper(s) you are presenting as part of your title slide.
3. **Pro or Con:** Clearly state which side of the debate you are defending and summarize the key points supporting your position. (Your detailed arguments will be presented in the next section.) Your grade will *not* depend on which side you choose, nor do you have to choose the side of the debate with which you personally agree. It is challenging and interesting to defend the other side just as strongly. You may end up changing your own opinion on the matter or strengthening your ability to defend your position.
4. **Main Points and Scientific Validation:** These are the key points that will sway your audience to believe your position. You should support your arguments with scientific examples and data from peer-reviewed/high-quality scientific literature. Also address and try to discredit the opposing view of the debated issue. Your position should be clearly documented by data and figures.
5. **Conclusions:** Summarize the arguments used to validate your position on the debated topic. If you are successful, the reader will now be convinced that your position is the correct one to take.

Technical Style (reports and presentations)

Technical format is the standard style for formally presenting a study to other scientists. Here, consider the audience to be senior undergraduate biochemistry students. Your talk or report should be clear to students with no specialized background in the topic you are presenting and explained in your own words. Therefore, avoid unfamiliar technical terminology and minimize the use of abbreviations. Instead, focus on the clarity of your explanation as though you were teaching about the subject, and back up your statements with appropriate data and figures from the paper. Cite peer-reviewed references for the literature you cover and the figures you include. You only need to cite the paper you are summarizing once, at the beginning of the report or talk. Any material (including figures) from other sources should be fully cited where used.

Your technical-style report should be 2-3 pages long typewritten and double-spaced. For *original research* papers, which present new data and results, include the following, each as a labeled section of your report/talk:

1. **Title and full journal reference** for the paper you are covering, including the authors' names (following the format in the "citing your sources" section, above), on your title slide
2. **Hypothesis or Scientific question** being addressed by the research
3. **Background and significance**
4. **Methods**
5. **Experimental results** (summary of the objective data, and observed trends)
6. **Conclusions** (based on interpretation of the results, and relating results back to the original question being addressed, and the prior state of understanding of this question in the literature)
7. **Your perspective** on particular weaknesses or strengths of the paper

Layperson Style (reports only)

Layperson, where you explain scientific information in terms that are interesting and clear for a non-scientist. **Layperson style will be designated for reports only (not talks).**

Layperson reports should be 2-3 pages long, follow the style of a *Science News* article, and summarize the assigned research paper. **Include an original, topic-relevant, appealing title for your report.** See <http://www.sciencenews.org/> or access its articles through MSU's subscription at er.lib.msu.edu. A sample *Science News* layperson article is also provided in the Writing Pointers folder on D2L. See another article in the same folder about why writing for the layperson is so important for scientists to make a difference in society! Currently, there is a great divide between scientists' ability to make thoughtful, objective decisions on societal issues, and the public's ability to do the same. This is largely due to our use of highly technical terminology, which hinders non-scientists' understanding of advances or concerns (think climate change!). We have a responsibility to bridge that gap by explaining things clearly and objectively to those with different backgrounds, resulting in better decision-making for all. Using familiar examples can be a very effective approach. In your report, include complete references for the literature you cover in a format such as that shown on the previous page.

Review Papers

Alternatively, if the paper you are reporting on is a *review paper* summarizing several recent advances in the area rather than a paper that is the first publication of new (original) results, cover the following points in separate, labeled sections:

1. **Title and full journal reference** for the paper, including authors' names (see format, mid-pg. 3). Include the main, complete reference for this paper on your title slide.
2. **Topic** being reviewed
3. **Background and significance**
4. **Summary of different groups' methods and results** discussed in the paper
5. **Conclusions** (what these approaches and results tell us about the state of the art, and the remaining challenges to be solved)
6. **Your perspective** on particular weaknesses or strengths of the paper

Poster Presentation

During the third week of class, you will sign up with a partner of your choice to present a poster on two sides of a current controversial topic in biochemistry later in the course. The details of this assignment will be discussed further in class and will follow the debate format listed above. The information should be presented in debate style while being formatted as a 36" tall X 48" wide conference poster using PowerPoint or a similar tool, with the presenters' names listed on the poster along with the side of the debate each student presents (pro or con). Use large fonts so the poster will be easy to read from a few feet away when printed in full size. An example template with good font sizes is provided online. *The poster should be printed on paper the week before it is due* to be shown in class by making arrangements several days in advance with computer specialist Dr. Padmanabhan (Pappan) in room 202 Biochemistry (Dr. Kaillathe Padmanabhan; padmanab@msu.edu, 353-0814). Posters cannot be printed by Pappan on the Monday or Tuesday of your poster session week. Bring your poster to class the day you are scheduled to present. ***Please also email your poster PowerPoint presentation to Dr. Wilkins (for section 1) or Dr. Padmanabhan (for section 2) by 5 PM the afternoon BEFORE you are to present.*** This serves as a back-up and is helpful for the faculty in grading the poster.

Point Scales for Reports and Presentations

The point scale for written reports is below. For poster and oral presentations, the scale is approximately doubled, with 20 reflecting excellent work, 18 very good work, etc. Roughly equal weight is given for logical, clear presentation of the scientific content and for quality of writing (grammar, organization, and format):

- 10 excellent
- 8-9 very good
- 6-7 good
- 5 acceptable
- 3-4 needs a lot of work
- 1-2 poor
- 0 = nothing submitted or evidence of plagiarism

Late Work and Plagiarism

Late work is not accepted. Reports are due at the beginning of class one week after the professor's overview presentation on this topic (please print your report and turn it in as you come into class). The TA will not accept or grade late reports. Students turning in reports after hearing the student presentations would have an unfair advantage over students who turned in their reports on time. Oral presentations will not be rescheduled unless an MSU physician-signed medical excuse has been provided *before* class. **Points for class participation cannot be made up** since they require interaction with other students, so plan to come to class each week and participate. This includes points received in class for asking questions after students' talks and posters, and your written evaluation of other students' talks. **Attendance at each class will be taken.**

Plagiarism. Copying sentences from a paper, website, or other source, or using another's writing as part of your report or presentation is considered plagiarism and will result in a grade of zero for that assignment. In the real world, plagiarism is a crime, considered to be stealing another's writing/intellectual property. Short phrases (a few words) or quotes (within quotation marks and a full citation of the source) are not illegal; however, our course policy is for you to not include quotes. This is because it is highly unusual in scientific writing to quote others. **The goal is for you to explain others' work in your own words, which is important to convey that you understand and can explain the material.** Please consult Dr. Wilkins' presentation to understand what constitutes plagiarism and how to avoid it. Health Sciences Librarian Jodi Coalter will discuss how to correctly cite others' work during the second class session, as well.

Student and Professor Evaluations of Presentations

All students, including the speakers, will provide anonymous written feedback for one of the student speakers each week, using an evaluation form provided in class. This counts towards the participation part of the course grade. Talks will be graded by the section instructors, to ensure grading consistency. Each speaker will receive an email from his or her instructor with feedback on strong points and areas that would benefit from improvement, typically a week after the presentation.

Credit for Class Discussion

Students are encouraged to ask questions after the professor and student presentations, as part of their participation points (6 pts for 6 questions). Much of what makes the class successful, and fun is active participation by the audience through discussion. As we discuss each topic, consider the following implications:

What is the importance of this topic in biochemistry and technology? What are the ethical or political issues in this area? Are there parts that are confusing, contradictory, error-prone, or incomplete?

Participate vigorously! This makes the class experience much more interesting than being passive and encourages your neurons to keep up the good battle. Discussion strengthens your professional network and provides the speaker with thoughtful feedback and ideas. It is how scientists learn from each other!

Ensuring Effective Talks and Posters

Successful presentations emphasize data and figures from the paper (and other peer-reviewed/validated scientific sources), accompanied by clear explanations of how they address the research question. Minimize the number of words and the complexity of your panels/slides; one-line bullet points work well. Presenting the ramifications of those results for science, technology, health, or the environment will make your talk more interesting. Visual aids (images, data, schematic diagrams) are essential. PowerPoint slides shown by a video projector are the standard for professional presentations in all fields.

High quality writing and presentations are important in most scientific careers. For help with writing, make use of the resources on our D2L website, the MSU Writing Center (which will also help with PowerPoint presentations) and:

- Purdue OWL: an online writing resource helpful for all students: <https://owl.english.purdue.edu/owl/>
OWL also has a specific ESL menu for students for whom English is a second language
- Another writing resource particularly useful for ESL students: <http://www.eslcafe.com/>

For your oral presentation, please email your presentation to Dr. Wilkins (for section 1) or Dr. Padmanabhan (for section 2) by 5 PM the afternoon BEFORE you are to present. While you will be presenting in-person as a team of two, reviewing the PowerPoint helps the faculty in grading the presentation. You are strongly encouraged to do several practice talks with your fellow presenter, including once with the session professor (schedule this in advance), and to time your talk to ensure it is 15 minutes in length without rushing and that it flows well between the two presenters. Working with the professor to review and practice your talk will significantly enhance its quality! This is a great opportunity to practice speaking to others about science, which will help with job or graduate school interviews, too.