

# *Biochemistry 495 Senior Seminar, Spring 2017*

## *Course Syllabus and Schedule*

**Tuesdays, 10:20am - 12:20pm. All class sessions will begin in room 101 Biochemistry.**

### **Course Instructors:**

Prof. Carol Wilkins (section 1, room 101)  
502B Biochemistry Building  
353-4927; mindockc@cns.msu.edu

Prof. Leslie Kuhn (section 2, room 111)  
502C Biochemistry Building  
353-8745; KuhnL@msu.edu

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

Peter Hsueh  
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### **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 clear and compelling scientific writing, public speaking, and informed discussion of current biochemical topics, as invaluable career and public relations skills.

### **Prerequisites:**

BMB462, or BMB462 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 net ID and select BMB495 to access the materials.

### **Course Summary:**

The course begins with workshops on biochemistry careers, identifying well-validated biochemical information online, and communicating effectively in reports and talks. The following weeks of the course will be 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, followed by a question and answer session with the class members. Students who choose to write a report on that topic may also ask questions about the report paper (provided under the professor's folder on the D2L website). Student presenters on the topic are welcome to ask questions about the papers they will present the following week. Each presenter will give a 15 minute talk on his topic, followed by five minutes of questions and discussion after each talk. Later in the semester, students will also have an opportunity to prepare and present a poster covering alternative sides to a controversial societal topic involving biochemistry.

### **Grade Components:**

- An oral presentation on a research topic each student selects during the first class session (which can be a talk 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); 16% of the grade
- A poster presentation by each student. working with another student to cover both sides of a controversial topic in biochemistry; 16% of grade
- Resume/cover letter peer-review assignment; 8% of grade
- 6 written reports on professors' topics other than the topic of your oral presentation (8% of grade for each report; 48% of course grade altogether). There are 10 topics from which to choose; reports may be on any topic other than the topic of your oral presentation.
- Class participation (12% of grade)
  - 6% of grade for turning in 11 evaluations of student oral presentations (one/week)
  - 6% of grade for asking at least 6 questions following professor and student talks throughout the semester
- Pre-review and report improvement bonus: up to 1 pt bonus per report for having up to 5 of your reports peer-reviewed or critically reviewed by Writing Center personnel and using that feedback to

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>

- The course grading at the end of the semester will be roughly: **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 talk and poster scores between the two sections of the class if needed to ensure that the grading scales are consistent. But the highlighted ranges above are a good guide to what you can expect.

### **Reports and oral presentations on research topics**

Each professor leading a research topic has chosen a *particular style* for your presentation (which should be 15 minutes long with PowerPoint slides, plus 5 minutes for questions) *or report writing* (no more than 3 pages in length, typed in double spacing). The professor will provide literature for you to review in his folder on D2L, with one document designated as the basis for report writing (for debate format, this will involve several documents covering the pro/con sides), and three documents designated for coverage by different students giving oral presentations. Carefully follow each professor's instructions in his/her folder. Students giving oral presentations on the same professor's topic in a given class section (Dr. Kuhn's or Dr. Wilkins') should coordinate with one another on which student will cover each paper, so that no paper is presented twice in the same classroom. Your presentation grade from Dr. Wilkins or Dr. Kuhn 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.

**The style to use for each professor for his reports and presentations is defined in the professor's folder** on D2L. Which paper to use for reports 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.

**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 beta(2) 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 it at the end of your talk. This helps the audience make use of those references.

**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. **Direct language of the author of a paper or other work should not be used in reports or presentations.** Direct quotes lacking quote marks or attribution of the source are considered plagiarism. Our goal is for you to understand and explain the work clearly in your own words. Quotes are frowned upon in scientific writing in general, even direct quotes that attribute the person who made the statement. For both reasons, including quotes, even within quote marks and defining who made the statement, is discouraged and will be penalized in your reports. For instance, instead of saying " 'Obese mice ate, on average, 43.2% more calories than normal mice', as stated by Dr. Jones", describe this in your own words.

**Debate**, focusing 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 the *pro* or *con* side of the debate, based on peer-reviewed or scientifically validated technical reading provided in the professor's folder. For oral presentations in debate style, one speaker will present each side of the issue. An additional student will present the background context at the beginning of the session if there are three speakers. 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 reference 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 preceding paragraph.

**Your debate-style report should be 2-3 pages long, and include the following *labeled* sections:**

**Introduction and Background:** Introduce the topic that is being debated, document how it came to be an important issue, and state the two main opposing sides. For talks, provide the full reference for the primary paper(s) you are presenting as part of your title slide.

**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 upon which side you choose. Nor do you have to choose a side of the debate with which you personally agree. It can be challenging and interesting to try and defend the other side. You may end up changing your own opinion on the matter, or strengthening your original position.

**Main Points and Scientific Validation:** These are the key points that will sway the reader to believe your position. You should support your arguments with scientific examples, including references to 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.

**Conclusions:** Summarize your views and the arguments used to validate your position on the debated topic. If you are successful, the reader has now been convinced that your position is the correct one to take on this issue.

- **Layperson**, where you explain scientific information in terms that are interesting and clear for a non-scientist. **Layperson style may be designated for reports and talks.**

Layperson reports should be 2-3 pages long, in the style of a *Science News* article and summarize the assigned peer-reviewed paper. See <http://www.sciencenews.org/> or access its articles through MSU's subscription at [er.lib.msu.edu](http://er.lib.msu.edu). A sample Science News layperson article is provided in the Writing Pointers folder on D2L. See another article in the same folder on why writing for the layperson is so important for scientists to make a difference in society! In your report, include complete references for all the literature you cover, using footnotes or lists in a format such as that shown in the middle of the previous page.

- **Technical** format, the standard style for formally presenting a study to other scientists. Here, consider the audience of your talk or report to be senior undergraduate biochemistry students. The talk or report should be clear to students with no specialized background in the topic you are presenting and presented 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 are 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 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. **For original research papers presenting new results**, discuss each of the following in a labeled section of your report or talk:
  1. **Title and full journal reference** for the paper, including authors' names (see format, middle of pg. 2). Include the main, complete reference on your title slide.
  2. **Hypothesis** (being tested by the research) or **Question addressed**
  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 hypothesis)
  7. **Your perspective** on particular weaknesses or strengths of the paper

**If, alternatively, 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. 2) Include the main, complete reference on your title slide.
2. **Topic** being reviewed
3. **Background and significance**
4. **Summary of 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

**Late work.** The TA is not required to grade late reports. If accepted, 30% of the points will be deducted. This is because students turning in reports after hearing the 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 by students cannot be made up, including the peer-review of mock job applications during the second class period, or points in subsequent class periods for asking questions of other students and professors, or evaluation of other students' talks.

**Poster presentation.** During the third week of class, you will sign up with a partner of your choice to present two sides of a current controversial topic in biochemistry later in the course. The details of this assignment will be handed out in class and follow the debate format listed above. The information should be presented in debate style while being formatted as an up to 36" tall X 48" wide conference poster using PowerPoint or a similar tool, with the presenters' names listed on the poster according to the side of the question each 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 will be provided. The poster should be printed on paper the week before it is due to be shown in class, by several days' advance arrangement with Computer Specialist Pappan in room 202 Biochemistry (Dr. Kaillathe Padmanabhan; padmanab@msu.edu; 353-0814). Posters *cannot* be printed by Pappan the day before (or of) class. Bring the poster to class the day you are scheduled to present.

**Point scale for written reports** (same grading scale, but double the points, for poster or oral presentations), with roughly equal weight given to logical presentation of scientific content and quality of writing (grammar, clarity, and format):

- 8 excellent
- 7 very good
- 6 good
- 5 reasonable
- 4 some effort
- 3 poor
- 0=nothing submitted or evidence of plagiarism

**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, it constitutes an intellectual property crime. Short quotes (within quotation marks and a full citation of the source) are not illegal. However, our course policy is for you to not include any quotes. This is because it is highly unusual/frowned upon in scientific writing to quote others. The goal is for you to explain the work in your own words, which is important to convey that you understand and can explain the material to others. Please consult Dr. Wilkins' presentation in the third class session to understand what constitutes plagiarism and how to avoid it. Health Sciences Librarian Susan Kendall will also discuss how to correctly cite others' work during the second week of class.

**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; 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 with a computer are the standard for professional presentations in all fields.

High quality writing and presentations are important in most scientific careers. For help with writing, avail yourself of the resources on our D2L website, the MSU Writing Center, 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 presentation, we recommend that you bring your talk on your own laptop to use with the classroom video projector, so you won't have to worry about the formatting in your presentation appearing differently on the classroom computer due to PowerPoint version differences. If you have an Apple computer, you will need to bring an Apple video adaptor plug to connect to the video projector. In any case, it is recommended to bring a USB flash drive that also contains your talk, which can be loaded onto the classroom computer if necessary. Load and test your talk with the video projector at least 10 minutes before class. Better yet, check your talk with the classroom projector during your practice talk the preceding week. Rooms 101 and 111 are often available late in the day. You are strongly encouraged to do several practice runs of your talk 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. Working with the professor to review and practice your talk will 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.

**Student and professor evaluation of presentations.** All students, including the speakers, will provide anonymous written feedback to 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, for consistency. Each speaker will receive an email from his instructor with feedback on strong points and areas that would benefit from improvement, typically within a week of his presentation.

**Credit for class discussion.** Students are encouraged to ask questions after the 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:

- 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 is much more interesting than being passive and encourages your neurons to keep up the good battle. Discussion also improves your professional network and provides the speaker with thoughtful feedback and ideas.

## *BMB495 Session Schedule for 2017*

### **1/10 Orientation and Career Workshop** in 101 Biochemistry

**(A) Course organization and how it relates to career preparation** (10 min, Prof. Kuhn)

**(B) Biochemistry career workshop**, led by **Brian Telfor, Career Services Coordinator** (telfor@csp.msu.edu), in 101 Biochemistry (40 min) – Career options for Biochemistry graduates  
(5 minute break)

**(C) Resources for finding appropriate positions, and science resume and cover letter preparation**, led by **Brian Telfor** (35 minutes)

**(D) First assignment** handed out by Prof. Kuhn: select a job ad and prepare a resume and cover letter, to be turned in at the beginning of class next Tuesday for peer review

**(E) Sign up for oral presentation topic and date** (Profs. Carol Wilkins and Leslie Kuhn)

### **1/17 Writing workshop** in 101 Biochemistry

**(A) Effective use of online scientific resources**, to advance your ability to discern well-validated information on the web and do literature/web research on biochemical topics to enhance your understanding and presentations (50 min, Health Sciences Librarian **Susan Kendall** (skendall@msu.edu))

(5 minute break)

**(B) Peer review workshop on student resumes and cover letters** by **Prof. Carol Wilkins** (mindockc@msu.edu) - Students will turn in their resume/cover letter assignments at the beginning of class and then learn how to peer review each other's work (50 min). For peer review throughout the course, we will only give you credit if the review includes several specific comments on how to improve the paper (cajole or change your reviewer, as necessary!) You will then use comments from the peer review to create an improved version of your writing to turn in. Every piece of writing can be improved, and becoming an effective communicator is a continuing process!

### **1/24 Biochemistry communication and research** in 101 Biochemistry

**(A) Overview on writing good reports, giving good presentations, and avoiding plagiarism** (30 min, Prof. Carol Wilkins); **How to Engage your Audience** (10-15 min + questions, Dr. Frank (Yongliang) Yang)

(5 minute break)

**(B) 11:00am** in 101 Biochemistry. **Prof. Michael Feig** (feig@msu.edu)

**Drug Design in Test Tubes and Computers Instead of Cells. An effective approach to new therapies?**

Student reports on this topic are to be in layperson style and student talks in debate format.

**(C) 12:00pm** in 101 Biochemistry. **Poster assignment sheet** will be handed out (Prof. Kuhn), and you'll **sign up with a poster partner**. For this, be sure to know the section of the course in which you are registered, since poster partners must be in the same section.

### **1/31 10:20am** in 101 Biochemistry. **Prof. Erik Martinez-Hackert** (emh@msu.edu)

**Transforming Growth Factor Beta (TGF-beta) Signaling**

Student reports on this topic are to be in layperson format, and presentations in technical format.

At 11am, class sections will divide between rooms 101 and 111 for student presentations on the topic of **Drug Design in Test Tubes and Computers Instead of Cells. An effective approach to new therapies?**

- 2/7** 10:20am in 101 Biochemistry. **Prof. Michaela TerAvest** (teraves2@msu.edu)  
**Extracellular Electron Transfer in Bacteria**  
 Student reports/presentations on this topic are to be in layperson format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on  
**TGF-beta Signaling**
- 2/14** 10:20am in 101 Biochemistry. **Prof. Susanne Hoffmann-Benning** (hoffma16@cns.msu.edu)  
**The Good, the Bad, and the Evil: Are GMOs our Friend or Foe?**  
 Student reports on this topic are to be in layperson format and presentations are to be in technical format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on  
**Extracellular Electron Transfer in Bacteria**
- 2/21** 10:20am in 101 Biochemistry: **Dr. Tom Deits** (deitst@gmail.com)  
**CRISPR Technology: What is it, why should we care, and who should own it?**  
 Student reports and presentations on this topic are to be in debate format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on  
**The Good, the Bad, and the Evil: Are GMOs our Friend or Foe?**
- 2/28** 10:20am in 101 Biochemistry: **Prof. Monique Floer** (floer@msu.edu)  
**Chromatin and Gene Expression**  
 Student reports/presentations on this topic are to be in technical format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on **CRISPR Technology: What is it, why should we care, and who should own it?**
- 3/7** Spring break – no class
- 3/14** 10:20am in 101 Biochemistry. **Prof. Jin He** (hejin1@msu.edu)  
**Targeting Stem Cells for Cancer Treatment**  
 Student reports/presentations on this topic are to be in layperson format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on the topic  
**Chromatin and Gene Expression**
- 3/21** 10:20am in 101 Biochemistry. **Prof. Brian Haab** (brian.haab@vai.org)  
**The Role of the Tumor Microenvironment in the Progression of Pancreatic Cancer**  
 Student reports on this topic are to be in layperson format, and presentations in technical format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on the topic  
**Targeting Stem Cells for Cancer Treatment**
- 3/28** 10:20am, 101 Biochem.: **Prof. John LaPres** (lapres@msu.edu)  
**Hypoxia, Metabolism, and Cancer**  
 Student reports/presentations on this topic are to be in debate format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on the topic  
**The Role of the Tumor Microenvironment in the Progression of Pancreatic Cancer**
- 4/4** 10:20am, 101 Biochemistry: **Prof. Justin McCormick** (mccormi1@msu.edu)  
**Chronic Myelogenous Leukemia, a Cancer One Can Live With**  
 Student reports/presentations on this topic are to be in technical format.  
 At 11am, class sections will divide between rooms 101 and 111 for student presentations on **Hypoxia, Metabolism, and Cancer**
- 4/11** 10:20am, 101 Biochemistry: Student presentations on **Chronic Myelogenous Leukemia, a Cancer One Can Live With**

- 4/18** 10:20am **Section 1** (Prof. Wilkins) **Poster Session 1**, inside room 101  
10:20am **Section 2** (Prof. Kuhn) **Poster Session 1**, in hallway near 111 Biochemistry  
All students participate in the poster session discussions.
- 4/25** 10:20am **Section 1** (Prof. Wilkins) **Poster Session 2**, inside 101 Biochemistry  
10:20am **Section 2** (Prof. Kuhn) **Poster Session 2**, outside 111 Biochemistry  
All students will participate in the poster session discussions.
- 5/4** **7:45-9:45am** (Special day and time due to final exam week; both sections will meet in room 101)  
**Student presentations on their undergraduate research**, following the same format as other technical talks in the course.