

Biol 385 Senior Seminar in Biochemistry, 2024

Thursday, 12:30 -1:20 ISC 137

Instructor Lewis ISC

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Office Hrs. Tuesday, 9 – 11:00 am, Thursday, 2 – 4 pm and by appointment.

Course Description and Objectives:

Reading a topic review is often a helpful start to understanding a particular area of science however, reviews can be very passive since someone else is summarizing the work for the reader. True understanding of a topic in science comes from working first hand in that area. For this course this is not an option. Therefore, the next best thing to doing experiments is reading, and understanding a topic well enough to recognize where there are areas yet to explore within a particular topic.

A second important part of science is learning how to synthesize the literature in an area and formulate your own hypothesis from what is understood, what is known and what is not known in that area. This part takes you beyond the "facts" and forces you to grasp where a particular topic is and where it may be going. Along the way you become familiar with some of the methods used in exploring this area of science, which brings you to a greater understanding of the topic.

A third important set of skills in science is writing and presenting your thoughts and ideas surrounding a topic. By now you have probably written summaries of topics in the form of a general review of sorts. Scientific writing often entails more than simply reviewing what is known. It involves understanding and writing about what is *not* known. It involves formulating educated opinions about topics in the form of hypotheses and designing experiments to test these hypotheses. Finally, it also involves presenting these ideas to others so that you can get feedback about them. Scientists, you may not realize, **live** to discuss their ideas, and hear about others' ideas. It's really the only way they get out of the lab!

The purpose of this seminar is three-fold. First, you will further develop your abilities to read and critique primary literature in different areas of Biochemistry. Second, you will learn how to synthesize a hypothesis based on a review of the primary literature in a particular area of biochemistry. Thirdly, you will write and orally present your hypothesis along with a means for testing the hypothesis in the form of a research proposal. Along the way you will also be expected to critique proposals of your colleagues which is something a scientist must learn to endure, and even seek out, to be successful.

General class policies

Grades will follow the following point distribution:

>93% A	90 - 92.9 % A
87-89.9% B+	83 – 86.9% B
80 – 82.9% B-	77 – 79.9% C+
73 – 76.9% C	70 – 72.9% C
60 – 69.6% D	< 60% E

Under most circumstances, there will be no adjustment to your grades. There is no quota for particular letter grades.

Grade Appeals on assignments and presentations:

Requests for recalculation of an assignment or presentation evaluation must be submitted to me within 1 week of receiving the graded evaluation. Please have something in writing that you can submit to me by email or in person and we will arrange to sit down and discuss your appeal.

Class etiquette and excuse policies:

You get out of a course what you put into it and attending class can only add to that fact. You must also be present to get credit for any assignments that have an in-class discussion component. If there is a submission due with the in class discussion component you will only receive partial credit for the assignment if you do not come for the submission component. There will be few exceptions to this requirement. If you find that you cannot make the class you must contact me prior to the discussion date. If this is not possible (as in the case of severe illness or unexpected family affairs) proper documentation must be provided. This should be done as soon as is possible.

DATE		TOPIC	Assignment
January	25	Introduction to course and how to read a paper	read over course materials and look over a paper
Feb.	01	Work on choosing proposal topic	Bring Biochem. text and computer.
	08	Sherry Larson-Rhodes Research Instruction Librarian	Will address different types of scientific articles and how to do a literature search in various databases.
	15	Paper #1 (20 pts)	Questions for paper #1 handed in during class typed
	22	Sherry Larson-Rhodes Research Instruction Librarian	What is an annotated bibliography and how to make one.
		Topics for proposals due (20 pts)	Students must present and hand in a one-page paper typed describing the topic for their proposal.
March	07	Critique of Dr. Lewis' proposal (20 points)	Critique should be typed and cover the aspects as put forth in the proposal evaluation guidelines. Handed in during class.
	14	Spring Break	No class

	21	Annotated Bibliography for proposals due. (30 points)	An annotated Bibliography has all the information about citation plus a short description of its significance to your proposal. Students will present a summary of their idea to the class. Order chosen at random.
	28	Continued presentation of topics	Order chosen at random.
April	04	Discussion of a figure (10)	Each person brings a figure to class, which they will discuss in detail.
	11	Draft of Proposals Due (50 pts) Discussion of figures continued.	Proposal draft due, <u>bring 4 copies of your proposal draft to</u> class.
	18	In class reviews.	in groups of two you will review each other's proposal.
	25	Presentation of proposal. (60 pts)	
May	2	Presentation of proposal.	
	10 at 8:00 am	Presentation of proposal.	Final proposal due-to me via Brightspace on May 14 th by 11:59 pm. (100 pts)

THERE ARE SEVERAL DUE DATES FOR PARTS OF THIS PROJECT:

15 February Paper #1 Questions and Discussion (20 pts)

Answers to Questions submitted in class – must be typed.

Paper #1: Meng et al., (2019) Substitutions in the β subunits of sickle-cell hemoglobin improve oxidative stability and increase the delay time of sickle-fiber formation. J. Biol. Chem. <http://www.jbc.org/cgi/doi/10.1074/jbc.RA118.006452>.

29 February Topics for Proposals Due (25 pts)

Students must hand in a typed paper describing in 3-4 paragraphs the topic for their proposal no later than this date along with the sheet that Sherry Larson-Rhodes gave to you during her presentation on February 8.

7 March Critique of Dr. Lewis' proposal (20 pts)

Critique should be typed and cover the aspects as put forth in the proposal evaluation guidelines. Handed in during class.

21 March Annotated Bibliography for Proposals Due (30 pts)

The proposal requires a minimum of 6 sources (at least 4 of which should be peer reviewed journal articles). You can only use 3 web pages as sources and these must be properly cited. An annotated bibliography of these sources, along with an outline (noting where the articles apply) is due no later than this date. You will give a brief overview (15- 20 minutes) to the class of your topic using only the white board.

4 April Discussion of figures (10 pts)

We will discuss 1 – 2 figures provided by Dr. Lewis in class. Bring your computers to look up information about the methods used to generate the figures.

11 April Proposal Drafts Due and review by peers (50 pts)

All students must bring 4 copies of a draft of their proposal to class. Students will then be placed in review groups. Each group (of 2 – 3 students) will critique their group members' proposals after carefully reading each proposal. Students will also be required to turn in an electronic copy of their draft to the professor for review.

25 April Presentation of proposals begins. (60 pts)

Volunteers welcome followed by random selection of presenters.

02, 10 May Presentations continue.

14 May Completed proposal due (100 pts)

Proposals must be submitted on Brightspace as a pdf by 11:59 pm.

Biochem. Sem. 2024 Proposal Writing Assignment

A **10 - 10 page paper** is required from each student in the class. The paper will be based on the student's reading and analysis of the primary literature (preferably research articles although a certain number of review articles is expected) and subsequent development of a research proposal. Dr. Lewis has provided a list of topics from which you can choose one on the next page. See the tentative schedule below for dates when things are due.

When choosing your topic, keep in mind that you will be formulating an **original** hypothesis pertaining to that topic.

This assignment is not a term paper, or just an exercise in reviewing and summarizing existing literature in biochemistry. Developing a research proposal allows you to (1) critically review the current state of a subdiscipline of biochemistry or the state of a biochemical problem, (2) identify an area where understanding is unclear or not well tested (3) design a study to test hypotheses in biochemistry.

IMPORTANT THINGS TO KEEP IN MIND:

Originality- In your proposal, you should not just plan to replicate what other researchers have done. You will build your work on the research results of others, but you should plan to extend previous work, apply methods to a new problem, to test previously untested hypotheses, address interesting questions that have received little attention.

Feasibility-Because of the nature of this exercise, your financial and logistical concerns should be minimal. However, your methodologies should be based on realistic possibilities.

Length and content - The proposal should be > 15 printed pages. The format presented

below is based on the format used for research proposals submitted to the National Institutes of Health. You can follow this format exactly or you can modify it. However, your modifications must make sense and include all the elements described for each of the sections listed below.

A. Title - The effect of a good title is often underestimated and even overlooked. When you are deciding on your research problem, think about what you will have as a title. The title should be direct and descriptive. While a catchy title may be fun, if it does not reflect your proposal directly it can mislead and even hurt your argument. Keep it simple and straightforward.

B. Public Summary- one page summary of your project that is understandable to the layperson. You should include a brief outline of your specific aim(s) (ie., Mom, Dad, Uncle Bernie, Aunt Bev, etc.)

C. Specific Aims- This is a bit more detailed than your public summary and is meant as a general overview of what will be presented in the rest of your proposal. It begins with an introductory paragraph explaining the problem. Then you should outline your specific aim(s) and then present a brief explanation of the overall significance.

D. Introduction & Background - introduction to your proposed study and the relevant published literature. This section will place your project in context and make clear the originality of your proposal.

E. Objective and Methods - clearly describe your objectives/goals (specific aim(s)) and the methods that will allow you to achieve them.

F. Expected results and possible problems - How will the data you collect, and the results of your analyses help you test your hypotheses. What results are you expecting to get. If you don't get these results what would this mean and what would be your next step.

G. Literature Cited - A list of all published work in your proposal. The proposal requires a minimum of 8 sources (at least 6 of which should be peer-reviewed journal articles). You can only use 3 web pages as sources and these must be properly cited. Remember to cite your literature within your text as well as providing the list of references at the end of your proposal.

**LIST OF TOPICS (YOU MAY CHOOSE A TOPIC NOT ON THIS LIST
HOWEVER IT MUST BE APPROVED BY DR. LEWIS)**

- CRISPR-Cas9 research in mechanisms of disease.
- Epigenetics in cancer development and progression
- Protein misfolding and neurodegenerative diseases
- Biochemical pathways in ageing and longevity
- Environmental pollutants and human metabolism
- Stem cells in regenerative medicine
- Signaling in plants and "immune" response
- Plant responses to environmental stress and climate change
- Mitochondrial bioenergetics and metabolic diseases
- Apoptotic mechanisms
- The glucocorticoid pathway in cell survival and death
- Heat shock proteins in disease
- Free radicals in disease

reactive oxygen species

reactive nitrogen species

- Antioxidants in disease
- The role of ubiquitin in gene expression
- Nitric oxide signaling
- Morpheins and allosteric regulation
- Biochemistry of psychedelics and brain effects