

Junior Honors Seminar in Biological Sciences
Spring, 2016, Fridays, 1:20 – 3:15, Galvin 298
1 credit, letter grade

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GOALS: Students will be able to:

1. Critically evaluate research data
2. Design scientifically defensible experiments and projects
3. Create and present a professional research talk or poster
4. Ask and answer scientific questions regularly
5. Explore your own ethical boundaries and apply to research ethics
6. Write a research proposal/report supported by primary literature

Course Overview:

The purpose of the Junior Honors Seminar is to create a small learning community where students and practicing scientists can connect. The seminar learning goals are to support and develop each student's independence, scientific communication skills, critical review skills, and understanding of their research in the context of the larger field.

For all assignments in this course, the highest level of academic rigor and your best work is always expected. All work should be reviewed by your mentor so you will need to complete writing and presentations with enough time (several days) to get feedback from the mentor to revise. Talk to your mentor about the deadlines in the program ahead of time and make a plan.

Active participation is a must – 20% of your grade depends on this and speaking at every session is required. Drs. Whaley or Stark can work individually with any student who wants to improve this skill. A good way to start is to write questions down during class and then ask them out loud.

Attendance:

You are expected to attend every class session. Failure to do so will result in participation penalties.

Assignments and Grading:

20% Journal Club Talk (45 minutes each)

20% Class Participation

10% One page paper

25% Research Talk presentation and defense (15 min talks, 15 Min Q&A)

25% Research Proposal, Research Design and Methods section (2 drafts)

Grade Cut Offs

94 A

90 A-

87 B+

84 B

80 B-

77 C+

On all assignments, your **intellectual contribution** to your work is extremely important. To be at the level of excellent, you will have to understand your work at an intellectually deep and sophisticated level (masters student level by the time you finish the honors program). This means you read literature regularly and you understand a larger context than just your project, or even your lab. You need to understand your field and sometimes draw information from other fields.

Your work ethic is also very important, this is one of the most valued attributes of a research student. This means you work harder and longer than the typical UR student in Biology. Always remember the Honors motto: **DO YOUR BEST WORK** even though a grade or course is not demanding that from you. This comes from your own internal drive and commitment to excellence.

SCHEDULE:

Session 1: Jan. 15. Course overview and expectations (with examples on what to do and not to do in Honors assignments), COS SURF applications (Dr. Chaloner, 2 pm), class participation grade. Also generate list of faculty speakers to invite. Start discussion on what is good research (work in groups of 2).

Students form pairs for journal club presentation. CHOOSE PRESENTATION DATES. One student will present alone due to an odd number in the seminar. This person can ask another undergraduate researcher to do this with you. Pick a paper in the next few days that interests both presenters, but do not pick a paper that one of you already presented in some other group.

Session 2: Jan 22. Two discussion topics:

1:30 What is Good Research (Dr. Vaughan)

- Read the two papers assigned by Dr. Vaughan that come up with different conclusions. Be ready to discuss the merits of each paper and what they concluded. Make sure you understand the figures/data from each paper.
- Take this opportunity to ask about the attributes the speaker sees in an excellent student researcher, and what he considers good versus average/sloppy work in his lab.
- Make sure you get to see how he thinks about the work in his lab including the Knowledge Gap, Intellectual Novelty, and Far Reaching Impact of his current projects.

2:30 One Page Paper: Understand the Knowledge Gap, Intellectual Novelty, Far Reaching Impact of your research. (Dr. Zhang).

By the end of the session, make sure you know:

- The definition of the Knowledge Gap, Intellectual Novelty, and Far Reaching Impact
- Examples from the speaker of the Knowledge Gap, Intellectual Novelty, and Far Reaching Impact in his lab.
- Tips on how to think about these aspects in your own work.
- After this session: read, think, and talk to your mentors about this to refine your ideas.

Session 3: Jan 29: 1:30 – 3 pm. Discussion topic: Critical review of experimental design and data analysis (Drs. Stark and Gorsuch). Student select journal club paper after consultation with mentor or lab members. This workshop will deliver information through examples. Although the examples will not be in your field, draw out the critical thought process that the speaker uses to analyze experiment design and data. After this session, you will present a paper in our journal club. You will need to know how to critically read a paper and how to interpret design/figures/data/conclusions in a paper. With this experience, we hope you will look at your own research in a more critical way.

Session 4: Feb 5

Student Journal Club Presentations (2, 45 min each)

Session 5: Feb 12

Student Journal Club Presentations (2, 45 min each)

Session 6: Feb 19

Student Journal Club Presentations (2, 45 min each)

Session 7: Feb 26. Two discussion topics:

1:30 Discussion topic 1: Research Proposal, Scientific Writing and Literature Review (Dr. Chaloner)

The speaker will cover very important general and specific topics on excellent scientific writing. You would be expected to take notes and use this information

in all writing in the Honors program, allowing for style differences between fields and labs. This speaker is the advisor for the Scientia Journal, the coordinator of COS-SURF applications, and an Honors writing mentor. Make sure you ask him many questions and understand what he thinks is excellent writing, and how he approaches grading honors writing. This will help you know what the program expects, although each writing mentor has their own style.

Also, make sure you ask about the writing assignments coming up during this session:

a. one page paper (background, hypothesis/question, knowledge gap, intellectual novelty, far reaching impact)

b. two drafts of research design and methods proposal in prep for summer

2:30 Discussion topic 2: Research Talk Prep: timeline, organization, slide construction, examples. (Drs. Whaley and Stark)

Session 8: March 4

No class due to break, email one page paper due before you leave for break to Drs. Stark and Whaley.

SPRING BREAK

Session 9: March 18

CANCELLED, Guest Speaker

Make Up Session, March 23, 5:00 – 6:30 pm, Dr. Amy Stark

Discussion topic: The Science of Personalized Medicine/Research Talk prep (Dr. Stark)

The topic covered will be on the science of personalized medicine and biomedical research, but will also include tips on how to put together a research talk.

Session 10: March 25

no class, EASTER BREAK

Session 11: April 1

(CANCELLED, Dr. Stark, MOVED TO March 23)

Make Up Session for April 6: 5:00 -6:30 pm

Guest Speaker, Dr. Monroe: *Biological and Psychological factors of Depression and Stress.*

Session 12: April 8

Research talk and defense, 30 minutes per student (15 min talk/15 min Q&A) - Matt, Kevin, Justin
First draft Research Design and Methods section due, email to Dr. Whaley

Extra Session: Wednesday, April 13, 6:30 – 7:30 pm

Keon and Nicole presentations

Session 13: April 15

Research talk and defense, 30 minutes per student (15 min talk/15 min Q&A) Sarah, Lan, Abbey

Session 14: April 22

Research talk and defense. Ryan, Clay, Bradley.

April 29:

Final draft Research Design and Methods section due for grading.

Please remember to put your best effort into your talks and papers and make sure your research mentor reviews your work before you hand it in. This will enhance the research you conduct this summer!

ASSIGNMENT INSTRUCTIONS:

Dr. Vaughan's two papers: (CLIP-170 and Restin)

For each paper: What is the research question? List their approach and finding for each figure. What did each conclude? Which will stand the test of time (in other words, their research was accurate).

Journal Club Instructions:

Speaker Responsibilities: (for J. Club)

- Pick an appropriate paper (not too short, not too long) for a 45 min. J. club that will engage the audience. It is best to pick a paper that is not in your immediate field, and please do not pick a paper that you already know well or was covered in your lab. Use your time very wisely during the presentation and promote discussion in the group.

- Paper(s) should be a research article, not a review, published within the last 2-3 years. Typically journal clubs focus on papers that have very recently been published to keep all attendees up to date on the field.

-Email the paper ahead of time to the class.

-Audience understanding should be your primary concern, in addition to knowing the paper well yourself. So teach, don't just speak. Since the audience is not in your immediate research area, you will have to explain more in the introduction.

-Give a solid introduction by reading other papers. Use figures and explanations from outside sources in your background as needed. You should have several intro slides.

-Can give an outline of the paper figures and conclusion – giving the punchline first usually helps.

-if it's a complicated paper, having a pathway, etc. on the board that is always up may help.

-Cover all of the following for each figure:

1. Purpose of experiment
2. How the experiment was done
3. Explain the figure parameters
4. Explain the data in the figures
5. State the conclusion
6. Ask for questions (or at least read the audience to see if there are puzzled looks)

-its important to add helpful text to the figure if needed, see journal club examples that will be presented in class.

-Summarize findings and critique the paper in a slide

-Ask for questions, read additional papers so you can answer questions.

Important aspects of presentations for grading: clarity, accuracy, thorough explanations, slide construction, sophisticated level, able to answer questions.

Audience Responsibilities

-Read the paper ahead of time.

-Be attentive and alert, be intellectually engaged in the presentation even if it is not in your direct field.

Grad students and faculty have to go to talks all the time that are outside of their immediate discipline. In this research climate, the more you know about other fields, the better.

-Ask questions during the talk. Realize that your career success depends on your practical thinking skills, and your ability to articulate questions/comments. Work diligently on this.

-Critique/scrutinize data and conclusions

-Give thoughtful feedback on evaluation form to help the speakers improve

One Page Paper (single spaced):

One-page paper framework, please use the following headings: background, hypothesis/question, knowledge gap, intellectual novelty, far reaching impact (implication for future research).

Address each in a well-crafted, intellectually deep paragraph. If you need slightly more than one page, take it, but make sure your writing is concise. This will be covered in a class session(s) with examples, make sure you take notes from these sessions and use that info to write you paper.

Research Talk and Defense:

Talk: ~ 14 minutes, combination of results you already have and proposed work until you graduate, with a focus on the proposed work you will do this summer.

Q&A: ~15 minutes

Slide construction tips

- Title “Western Blot Analysis” is not a good title – not descriptive or informative
- Cancer speaker who was here previously– title was conclusion of that figure, at bottom of the slide was meaning/significance of that result - this was great because it was impossible to get lost during talk
- Good labels are needed (example red and green fluorescence)
- Not too text heavy, but not too minimalistic either in terms of labels that can help audience follow you.
- Have organizational figures if helpful – a flow of experimental work, a pathway that keeps building as you go through the talk
- Construct your own figures if needed, versus using something from your lab that isn’t an exact fit.
- Clearly state your hypothesis/research question on the slide – don't just say it.
- Be predictive to help us understand what kind of data you may produce if you don't have it yet
- Include extra slides after your talk that anticipate questions or provide additional information

Talks tips

- Give a solid introduction since audience is not in your immediate field, but carefully consider what is necessary and what can be cut.
- Make us care about your research by setting up why your study is important in the context of the field (explicitly state the knowledge gap).
- Be concerned with logic and flow in what you are saying, connect parts to make a whole, tell a cohesive “story”
- Choose words and explanations carefully, this means you have to get feedback from mentors. Scientific precision in language is needed, for example –do not over or under state results/conclusions.
- Use figures effectively, point, don't skip parts of your slide, help us understand each slide well. An alternative to a pointer is slide design – highlight/box subsections of slide as you go over it.
- Practice until your talk is very polished, but not overly memorized
- Keep a good pace that is not too fast, if you just said something important written on your slide, don't immediately change the slide, wait a second to let the audience absorb what you said.
- Need to know everything that you present well, any question is fair game.

Q&A: this is a defense

Know material beyond the scope of your work – other research (not just their conclusions, but their approaches also), alternative methods, why did you choose your cell lines, methods, approach. Answer shouldn't be my lab had this already without a biological reason, or nothing is known since this is a new area. Know why you are doing everything you do. This means you have to prep for questions, read more and ask questions of your mentors. When you are asked a question during the Q&A, answer directly, not in a round about way, try to nail answer on the head.

Research Proposal Instructions:

Rationale: This assignment will deepen your experimental knowledge about your project, while setting you up for a productive summer. In general, the assignment is asking you to articulate, ‘*What experiments do I have to do and how do I design them.*’

Length and Content: The length should be ~5-6 pages, single-spaced, and follow the style of Research Design and Methods section of NIH proposal. This can be an expansion of your COS-SURF 1 page research description for the summer but must also include your research plan for the senior year. Write in a style that someone in your immediate field could understand with more experimental detail. For example, the controls that you would include, why those controls, or why this approach. Your focus when writing should be to critically think about your experiments and present them in detail.

You should start with one paragraph that states necessary background and your overarching research question and justifies your research contribution given your field. This will require to you state the knowledge gap in your area of study and why your project will make an impact. Then move on to the Research Design and Methods section. If you have preliminary data that is necessary to understand your proposal, create a supplemental document and submit at the same time.

Required sections for each research question:

- Specific aim (or objective)
- Hypothesis
- Rationale
- Experimental strategy (or design) with methods
- Interpretation and significance

Sections not needed for this assignment include the Background and Significance, Prior results/preliminary studies, time table, and budget

Second Draft Instructions:

All second drafts need to include a statement to your reader call "Response to Comments" about what you changed, point by point. This would be a separate document. This is what you do to respond to an editor for a publication.

You would:

1. List the comment and location/section of the comment in the document.
2. State your response including what you did to address the comment. Often times you agree and make the change, sometimes you disagree but have to state why.
3. Be very polite and respectful in your responses

Below are examples:

Comment 2, pg 4, second paragraph: “These meaning congenital, acute, and chronic?”

Response: On page 4 near the beginning of section 1.2, the phrase “making *these diseases* a global public health issue,” refers to kidney disease in general, as referenced multiple times above.

Comment 3, pg. 6, fourth paragraph : “Any number? How much more susceptible?”

Response: More specific numbers were added to enhance this information.

Comment 4, Pg. 7, first paragraph : “Rewording of the phrase *and even death.*”

Response: In the last sentence of section 1.2, the phrase “and even death” was reworded so as to come across more smoothly, with the use of the phrase “mortality rates,” instead of simply “death.”

Planning Ahead, the Thesis Introduction:

Keep in mind that your Thesis Introduction should have a very strong underpinning in primary literature. This section will be due the first two weeks of the fall semester. Therefore, the Honors Committee expects you to work on this over the summer. The Introduction should be at least 4 pages long single-spaced (8 pages double spaced), not including figures. The average length last year was 6 - 8 pages single-spaced, not including references. References listed were numerous, over 20 papers.

Writing Mentors:

Haley Barlow (Prof. Wingert) – abroad in Spring, 2016. Will do junior seminar as a senior.

Clay Becker (Prof. Wingert)

Bradley Bowles (Prof. Zhang)

Justin Brill (Prof. Belovsky)

Matt Cervantes (Prof. Morales)

Sarah Fracci (Prof. Stark)

Nicole Handa (Prof. Hyde)

Lan Jiang (Prof. Lee)

Keon Schmidt (Prof. Prospero)

Ryan Sweeney (Prof. Zhang)

Abigail Tirrell (Prof. Robichaud)

Kevin Wilkins (Prof. O'Tousa)

J. Club Presentation Evaluation

Presenter Names: _____

1. Clarity and comprehension of background information, research question, context, significance of paper:

Excellent v. good good fair poor

2. Clarity and comprehension of experimental design and results in paper:

Excellent v. good good fair poor

3. Quality and usefulness of the visual aides/figures used: (slide construction)

Excellent v. good good fair poor

4. Quality of presentation itself (tone, pace, effective use of time, etc.):

Excellent v. good good fair poor

5. General level of speaker's knowledge, understanding (Q&A)

Excellent v. good good fair poor

Additional comments:

Research Presentation Evaluation**Presenter Name:** _____

1. Quality and Interpretation of Data

Excellent (5) v. good (4) good (3) fair (2) poor (1)

2. Clarity and comprehension of background information, research question or hypothesis, context, and significance. (Introduction):

Excellent (5) v. good (4) good (3) fair (2) poor (1)

3. Clarity and comprehension of experimental design and results presented (Main body of the presentation):

Excellent (5) v. good (4) good (3) fair (2) poor (1)

4. Clarity and comprehension of the meaning, impact and future directions of the work (End of the presentation):

Excellent (5) v. good (4) good (3) fair (2) poor (1)

5. Quality and usefulness of the visual aides/figures used: (Slide construction)

Excellent (5) v. good (4) good (3) fair (2) poor (1)

6. Quality of presentation itself (tone, pace, effective use of time, engagement of the audience etc.):

Excellent (5) v. good (4) good (3) fair (2) poor (1)

7. General level of speaker's knowledge, understanding (Q&A)

Excellent (5) v. good (4) good (3) fair (2) poor (1)

Additional comments:

Quality of Scientific Work

9. The proposal sets out a plan for sound significant scientific research and is appropriate for the length of time to be spent (one summer and senior year).

Strongly agree agree slightly agree slightly disagree disagree strongly disagree

Strengths:

Weaknesses:

Letter Grade (A, A-, B+, B, B-, C+, C, C-): _____