BIOC 4050 **Fall 2022**

Guidelines for Senior Biochemistry Majors intending to pursue Honors Research

Course Description: Welcome to Advanced Independent Study in Biochemistry**!** This experience is designed to provide a **capstone experience** that will integrate your scientific background, develop your ability to explore scientific questions independently, and present scientific information through a complete research experience. In this research experience you will learn alongside your advisors and your peers. An additional goal of this experience is to strengthen the peer group that exists among seniors conducting research.

Course Philosophy: We believe that all students can grow through their research experiences. We encourage students to be active researchers, have a growth mindset. and support their peers to create an inclusive research community.

Objectives: In the course of your research experience this semester you will:

1. **develop** research goals and objectives
2. **perform** a comprehensive literature review of your research area
3. **design** appropriate experiments to reach your goals and objectives
4. **conduct** well-planned experiments
5. **analyze** your data to understand and interpret your results
6. **present** your findings in poster, oral and written formats
7. **thoughtfully critique** the work of your peers
8. **stay current** with developments in the field by attending weekly seminars featuring invited speakers who will present current and on-going research

Time commitment: Advanced independent study requires a strong commitment to your scholarship and the conscientiousness necessary to participate in an "unstructured" course. Bear in mind that your time commitment is expected to exceed that of a standard Bowdoin course – you will be spending an average of **12-15 hours a week** on your research.

Mentor/Mentee Roles: Given the limited number of research opportunities in biochemistry laboratories, we are fortunate to welcome faculty from outside the biochemistry program who are willing to mentor biochemistry honors students. If you are working with such a mentor, please remember that your project needs to be grounded in biochemistry, and also needs prior approval from the biochemistry committee, so plan ahead. We look forward to exploring how biochemistry connects to many other disciplines. Additional specific roles and expectations are below.

<u>Mentor Expectations</u>

- Only the supervising faculty member or appropriately trained staff may train biochemistry honors students in general lab safety and lab-specific techniques, supervise lab activities, and report on the activities of students.
- In-person assistance in the lab from the advisor or trained staff should be provided upon request or soon thereafter.
- Advisors are expected to meet with each of their students individually a minimum of once per week.
- Individual expectations for a student's contributions to a group project should be clearly delineated at the outset of the student's project, and an individual student's contributions to a group project should also be clear in all of the student's presentations and written work.

<u>Mentee Expectations</u>

- Reach out to your mentor when you are in need, and respond in a timely fashion to communications from your mentor, the program director, the program coordinator and the College.
- Be responsible for adhering to the guidelines and due dates within this syllabus, as well as those communicated to you from your mentor, the program director, the

program coordinator, and the College. Do not expect reminders from any of these sources, so be sure to manage your time and commitments independently!
- Conduct your research in a safe and ethical manner, as dictated by the College, the program, and your mentor.
- Enjoy your research experience! As you may know, opportunities to conduct cutting-edge, "real world" research are relatively rare, so do all that you can to make it a positive experience!

Safety training: To perform laboratory-based advanced independent study, you will need to take the lab safety training and hazardous waste training prior to starting experiments. Ensure that your training is up-to-date if you were trained in the past. See the Office of Laboratory Safety for information on training: https://bowdoin.instructure.com/enroll/RATJ7F. Your safety is more important than any experiment, so take the time to plan accordingly and ensure that you have a safety buddy (someone in the building who knows what you're doing and checks in on you) during non-standard work hours.

Seminars: There are a series of biochemistry-relevant seminars noted at the end of this document that will be held on **Fridays from 2:30-3:30pm** in either Druckenmiller 020 or Druckenmiller 004. These seminars are excellent opportunities for you to see the breadth of active research in biochemistry. Please consult with your advisor about additional seminars that you should attend.

We will also hold a special paper discussion this semester on **Thursday 9/15 at 7:30pm in Druckenmiller 26** to delve into a recent publication by Prof. Giddings, who is that week's seminar speaker. Your attendance at the paper discussions and seminars is expected. If you have a compelling reason to be absent, please seek permission from your research advisor and the Biochemistry Program Director.

Assignments: A list of assignments for all students pursuing Honors in Biochemistry is listed below.

Date	Assignment
Sept. 13th	Project title due to Sylvia Bosco & Ben Gorske
Early October	If you are participating in the President's Research Symposium (check with your advisor), schedule your poster printing appointment.
Oct. 21st	If you are participating in the President's Research Symposium (check with your advisor), present a well-prepared, advisor-reviewed poster at the symposium.
Nov. 18th	Fall paper draft due to your advisor
Dec. 5th	Midyear report due to your advisor & readers, including: • ~10 page introduction • Data you generated this semester • An in-depth analysis of that data.
Dec. 12th	Oral presentation (10-12 minutes) to the biochemistry program

Plan Ahead: You will iterate several drafts of your oral and written presentations with your advisors. Expect more than 24 hours or at most a week's wait for feedback. **Plan ahead** and collaborate with your advisors to develop timelines that are workable for both of you.

Evaluation: The biochemistry faculty has high expectations of the quality of work produced by all senior research students, and these expectations are elevated for those working toward Honors. Your grade on your independent study project will reflect your efforts in all

elements of the research experience documented above and your active participation in the biochemistry research community. Your progress toward achieving the stated objectives of the research experience will be formally evaluated by the biochemistry faculty at the mid-year point to ensure that you may continue in your pursuit of honors, and then again at the end of the year to determine if honors will be awarded. At these points, the biochemistry faculty will identify strengths and limitations in your progress and performance and either your advisor or a representative biochemistry faculty member will provide recommendations for addressing any concerns in progress. The following criteria will be used to evaluate your performance and progress: (i) your engagement in the project; (ii) independence in laboratory and analysis (which we expect will be enhanced over the two semesters); (iii) your ability to incorporate feedback from your advisor in written and oral assignments; (iv) the final quality of your written and oral assignments. *See mid-year feedback form at the end of this document.*

Grades: Grades for BIOC 4050 are awarded by your faculty advisor. For students undertaking a yearlong project, faculty members often submit a grade of "S" (satisfactory) for the first semester grade. This grade is then replaced by a final grade at the completion of the year. The convention for grading should be discussed with your advisor.

Honors: ***Honors is a distinction awarded at the end of the year to advanced independent study students whose projects merit this recognition, as determined by the Biochemistry Committee***. Students who receive this distinction for their work must (i) meet eligibility standards (such as grade requirements), (ii) must participate in required honors activities (such as attending and engaging in seminars), (iii) must present their project in the required oral and written formats (as noted above), (iv) must demonstrate, through their independent engagement in the project, their ability to plan and execute experiments, and their ownership of the project and relevant literature, and (v) must demonstrate, through the quality of their final thesis, that their project has risen to a level worthy of receiving the award of Honors.

For students pursuing Honors in biochemistry, you will receive a written response from the Biochemistry Program with feedback regarding your project with information about areas where you are or are not meeting the expectations for an Honors project at the midyear point. Following your successful completion of two semesters of independent study (BIOC 400X), the department will assess whether your final thesis can be recommended for Honors.

List of key seminars and assignments

Schedule of biochemistry-relevant seminars

Note that these are biochemistry seminars offered as part of the weekly biology and chemistry seminar series. Meet with your advisor to identify additional biology or chemistry seminars that they expect you to attend.

Date	Location	Seminar
Sep. 15th, 7:30 pm	Druck 026	Lesley-Ann Giddings Paper Discussion
Sept. 16th	Druck 004	Lesley-Ann Giddings, Smith College
Oct. 14th	Druck 020	Amy Spens, Fred Hutchison Cancer Center
Nov. 11th	Druck 020	Jess Floro, ROME Therapeutics

Biochemistry honors assignments and due dates

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Mid-Year Feedback on Work Toward Honors

Honors Candidate_____

Faculty Advisor or Representative Biochemistry Faculty Member:_____

The areas listed below, in combination with a written thesis and poster presentation, will be considered when the Biochemistry Committee meets at the end of the year to determine if an Honors project/thesis are worthy of receiving Honors. The assessment provided below should be taken as an indicator of areas where the expectations of Honors are being met, as well as areas where the work to date only partially meets or does not currently meet the expectations for Honors. You should discuss this information with your research advisor.

Area	**Does Not Meet**	**Partially Meets**	**Meets**	**Exceeds**
The candidate has devoted sufficient time and effort on the project.				
The candidate understands the goals, experimental details, and concepts/theories relevant to the project.				
The candidate demonstrates engagement and the ability to work and propose experiments independently.				
The candidate demonstrates effective record-keeping skills with respect to their lab notebook and electronic records.				
The candidate has regularly attended departmental seminars.				
The candidate has submitted a mid-year report that demonstrates their potential to produce an Honors thesis characterized by quality writing and correct formatting.				
The candidate has presented their project in an oral format that demonstrates their ability to present scientific information with clarity.				