Honors Research in Biology Program

Biology faculty are engaged in cutting-edge research that spans the full range of biological phenomena from molecules to ecosystems. We are also committed to helping the next generation of scientists become truly engaged in the scientific process, both by bringing current research into the classroom and by engaging undergraduates in research. Many Biology students become passionately committed to the discipline and undergraduates at all levels are encouraged to take advantage of the opportunities offered by a major research university. The Honors in Biology Program provides students with an opportunity to work closely with faculty who serve as intellectual and technical mentors in their exploration of biological research. Honors students also participate in a two-credit research seminar, providing exposure to a broad range of current science in the Biology research community.

Learning Goals:

The Honors in Biology Program provides an opportunity for students to translate formal coursework into research practice. Undergraduates fully engage in scientific inquiry and the process of doing science as independent researchers, and learn first-hand the dedication, commitment, perseverance, and technical skills required to see a project to fruition. They benefit from learning how to develop and test scientific hypotheses, as well as the inevitable setbacks that punctuate the scientific enterprise. The end result is one of learning the practice of science through questioning nature, mastering modern technologies, and collecting, analyzing, and interpreting data under the guidance of a faculty mentor. These experiences provide excellent preparation for graduate training and/or professional careers.

Eligibility Requirements/Application Process:

Admission to the Honors in Biology Program requires: 1) senior standing; 2) an overall minimum GPA of 3.5 at the time of application; and 3) approval of the Honors Program application by the Biology Department’s Research & Honors Committee. Prospective honors students must work with a faculty mentor to define a specific research project; a description of the project must be included in the Honors Program Application, which must be approved prior to registration in BI 401/402.

Program Requirements:

Successful completion of the Honors in Biology Program requires: 1) graduation with a GPA of 3.5 or higher; 2) participation in one semester of BI 497 (fall) or BI 498 (spring), a two-credit research seminar; 3) two semesters of mentored research, typically BI 401 (fall) or BI 402 (spring) during the senior year; see below for allowable alternatives; and 4) completion and defense of a written senior thesis.

Seminar:

All Honors in Biology students must complete two credits of either BI 497 or BI 498. The principal objective of this course is to provide a formal environment in which students are presented with research ideas, preliminary and published data, and research in progress. The intended functions of this course are: i) to have students think about how to present scientific ideas and data to a broader audience; ii) to have students think about and constructively critique ideas and data from all areas of
Biology; iii) to promote exchange of ideas among students enrolled in Honors Research; iv) to be presented with current research in the student’s field of interest.

During the semester they are registered for BI 497 or BI 498, students must attend one of these weekly research seminar series:

1. **Biology Department Seminar**
   LSE 103 Mon 12:00-1:00 [www.bu.edu/biology/calendar](http://www.bu.edu/biology/calendar)

2. **Neuroscience Seminar**
   LSE B01 Wed 12:00-1:00 [www.bu.edu/csn/events/seminar-series/](http://www.bu.edu/csn/events/seminar-series/)

3. **Progress in Cell and Molecular Biology Seminar**
   LSE B01 Fri 12:00-1:00pm (seminar details are on the Link under CAS BI 583/584)

4. **Progress in Ecology, Behavior, Evolution, and Marine Biology Seminar**
   BRB 113 Wed 12:00-1:30pm (seminar details are on the Link under CAS BI 579/580)

5. **Systems Biology (Bioinformatics) seminar**
   LSE 103 Thurs 12:45-1:45 [www.bu.edu/bioinformatics/seminars/sysbioseminars/](http://www.bu.edu/bioinformatics/seminars/sysbioseminars/)

Students must also complete five (5) two to three page writing assignments that review the research of the speakers during the semester. The writing assignments will be graded by the Chair of the Research and Honors Committee.

Students will additionally have an opportunity to engage with each other when all Honors Research in Biology students will meet as a group, at least once per semester, along with the Chair of the Research and Honors Committee, the Director of Undergraduate Studies, and/or the Chair of the Department.

A minimum grade of B+ in either BI 497 or BI 498 is required to graduate with Honors. The final course grade is determined by attendance at one of the weekly research seminar series and completion of the writing assignment. The writing assignment will be due by the last day of classes in the semester the student is taking BI 497 or BI 498.

**Research:**

Most Honors in Biology students will register for and complete two semesters of mentored Honors Research in Biology (BI 401 and BI 402) during their senior year. Honors students in BI 401/402 typically complete an original laboratory or field-based research project under the supervision of a faculty member in the Department of Biology. Projects involving theoretical and/or computational modeling, large-scale data analysis, meta-analysis, and/or extensive literature review and synthesis are also appropriate, contingent on approval by the faculty mentor and the Research & Honors Committee. All 8 credits count toward the Biology major; in the case of laboratory or field-based research projects, 4 of these credits also may be counted as one of the three upper-level laboratory courses required for Biology majors. Honors students are expected to spend a minimum of 12 hours per week engaged in their research project, including time spent analyzing data and preparing the senior research thesis. As noted above, students work with a faculty mentor to define a specific research project, which is included in their application to the Honors Program. In many cases, the senior research project is a continuation of work completed in previous years in the context of Undergraduate Research (e.g., BI 291/292 for sophomores, BI 391/392 for juniors), a summer or academic year UROP or REU experience, and/or volunteer or work-study experience in a laboratory. Students are strongly encouraged to take advantage of these research opportunities before senior year.
**Thesis:**

The Honors in Biology Program culminates in a written senior thesis successfully presented and defended before a faculty committee. In most cases, the senior thesis will be written in the general format of a standard MA/PhD research thesis. Thesis guidelines are on the Biology website at: [http://www.bu.edu/biology/undergrad/research/#thesis](http://www.bu.edu/biology/undergrad/research/#thesis)

A literature-based thesis is expected to be a comprehensive review and synthesis of a focused topic in modern biology. Although these are no formal page requirements for this document, such theses are likely to be 50-80 pages in length including figures and tables, plus 50-100 references. Most importantly, such documents should demonstrate the student’s comprehensive mastery of the current literature on a given topic, as well as the identification of research trends, inconsistencies, and unanswered questions. A general format for the literature-based thesis is as follows: Title page, Committee Signature page, 1-page Abstract, Introduction, Multiple Topic Sections (with Figures and Tables), Summary/Perspectives, and Future Directions.

The thesis committee will include the student’s research mentor and two additional faculty members. At least two members of the committee must be faculty from Biology. In certain cases, a student may elect to carry out his or her research in a laboratory outside the Department of Biology, such as the medical campus at Boston University. In such a case, the other two members of the thesis committee must be faculty from Biology. Grades in BI 401/402 are based on the student’s performance in laboratory or fieldwork, the written thesis, and the student’s defense. A minimum grade of a B+ in both BI 401 and BI 402 is required to graduate with Honors. The Biology Undergraduate Program Specialist will announce deadlines for Honors Program applications and for completion of the thesis.

**Alternative Research Pathways:**

To accommodate additional students in the Honors in Biology Program and allow some flexibility in course scheduling (e.g., participation in study abroad programs in fall semester of senior year), students who have already had significant research experience with their project mentor prior to senior year, may register for Honors Research in Biology for only one semester (BI 401 or 402), provided that all other requirements described above are met. Acceptable substitutes include: 1) a full-time summer research experience (e.g., REU/UROP); 2) one semester of directed research during junior year and/or senior year (BI 391/392; BI 491); or 3) a petition from the research mentor describing other significant research effort and accomplishments by the student in their laboratory (e.g., two semesters or more of paid REU or UROP experience). For credit toward the Honors Program, a minimum grade of a B+ is required in the alternative research courses listed above. For students graduating in January, these alternatives may be combined with BI 401 and thesis presentation and defense during the fall semester to complete the requirements of the Honors Program.

**Monitoring and Maintenance of the Program:**

The Director of Undergraduate Studies and the Biology Research & Honors Committee will monitor the progress of students enrolled in the Honors in Biology Program. This will include review and approval of applications to the Honors Program, review of petitions for allowable substitutes for BI 401, communication of program guidelines and requirements to students and faculty including off-campus faculty at the School of Medicine or elsewhere, and ensuring that deadlines are met.
Application for Honors in Biology
Due the first week of fall/spring classes

**Student Information**

First and Last Name: 

BU ID Number: 

Phone Number: 

E-mail Address: 

Major: 

Expected date of graduation (month/year): 

GPA: 

Indicate the semester(s) during which you will be conducting Honors Research:

☐ Fall  ☐ Spring

Indicate the semester during which you will attend the Honors Seminar:

☐ Fall  ☐ Spring

Project Title: 

**Faculty Mentor Information***

First and Last Name: 

School/Department Affiliation: 

E-mail Address: 

Office Phone Number: 

*Biology Faculty Sponsor (if primary research mentor is not in Biology): 

Sponsor Signature (if applicable): 

Sponsor E-mail Address (if applicable): 

*Students who are using their participation in UROP as part of their Honors in Biology work must have their UROP advisor sign the application in addition to the Biology Faculty member who will be sponsoring them for the 2-credit Honors Seminar.
Please respond to the following questions. Responses should be typed and attached to application.

**Honors in Biology**

1. Briefly describe your intended project, including the basic research question(s), methods of investigation, the data to be collected and how they will be analyzed, and the significance of the proposed work. *The proposal should be written in conjunction with the faculty mentor (or off-campus advisor).*

2. Explain how this project will contribute to your academic career goals.

3. Include a bibliography relevant to your work.

4. Attach an unofficial copy of your BU Transcript.

*Students who are using their participation in UROP as part of their Honors in Biology work must have their UROP advisor sign the application in addition to the Biology faculty member who will be sponsoring them for the 2-credit Honors Seminar.*

If you are not conducting both semesters of Senior Honors Research, CAS BI 401/402, please indicate your alternative research experience:

- [ ] Junior/Senior Research (BI 391/392; BI 491)
  
  Research Section: __________________________
  
  Grade: _____

- [ ] Full-time Summer Research Experience:
  
  *Summer Program/Year Participated (ex. UROP/YYYY):*
  
  ____________________________________________

- [ ] Research Mentor Petition
  
  *Please attach the petition to this application*

Student Signature: __________________________  Date: _______________
To be completed by the faculty mentor:

Student’s name: ____________________________

How long and in what capacity have you known the student?

________________________________________________________________________

Please evaluate the applicant’s aptitude for independent research according to the criteria listed below. Please add any applicable comments.

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Comments:

________________________________________________________________________

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I have read the student’s proposal and recommend that it be accepted as an Honors in Biology project.

Faculty Mentor (Print): ____________________________

Faculty Mentor (Signature): ____________________________

Director of Undergraduate Studies (Print): ____________________________

Director of Undergraduate Studies (Signature): ____________________________

Department Chair (Print): ____________________________

Department Chair (Signature): ____________________________

Undergraduate Program Specialist (Print): ____________________________  Date of Submission: __________