

BIOL 99: Senior Research and Senior Honors in Biology

Information and Petition

**This petition is being edited.
A new petition will become available during
the week of August 20, 2018.**

BIOL 99: Senior Research and Senior Honors in Biology

The Senior Research Program provides an opportunity for students concentrating in Biology to participate in a **two-semester** long independent research project during their senior year and to receive both course and elective credit for that research. Research must ask and attempt to answer a novel question in biology, with the goal of contributing to biological knowledge. Any senior concentrating in Biology regardless of GPA can participate in Senior Research (BIOL 99) and ask to be considered for Senior Honors (see BIOL 99 petition). Eligibility for honors is determined by the student's academic record and research performance.

1. BIOL 99 Senior Research.

There is no GPA requirement to enroll in BIOL 99. Students may select any Brandeis faculty member in the department of Biology as their research sponsor. If a student wishes to do research with a Brandeis faculty in another department (e. g., Biochemistry, Chemistry), or with a faculty member at another institution in the Boston area, the student **must receive permission** from the BIOL 99 Research Coordinator to do so, and, the **proposed research must have a biological basis and ask a biological question**. Also, if a student does BIOL 99 research with a non-Biology Dept. faculty member, the student must find a **co-sponsor** from the Biology faculty, and this person must be able to evaluate the proposed research.

BIOL Course Credit BIOL 99 is a **two-semester course restricted to seniors**. Each course is 4 credits, which requires a minimum time commitment of 12 hour per week. A single semester of BIOL 99 cannot be taken unless the student also has taken BIOL 93 (see below). Two semesters of BIOL 99 may be used as one elective toward the Biology major. To do so, the student completes the registrar's online major/minor substitution form, which will be reviewed by the Biology Undergraduate Advising Head. If the student is taking a *very light* course load and can spend significant extra time in the lab, and if the faculty sponsor confirms that this will occur, the student can request permission from the BIOL 99 Coordinator to enroll in BIOL 99e to obtain a third course credit. If permission is granted, the student would register for BIOL 99a in the Fall and for BIOL 99e in the Spring. A single semester of BIOL 99, even if BIOL 99e, cannot be used as an elective. A student **may not** receive more than three course credits and one elective for Senior Research (this includes combining BIOL 93 and BIOL 99, see below).

Combining BIOL 93 and BIOL 99 BIOL 93 is a **one-semester** long research internship (see BIOL 93 petition). Typically, students who take BIOL 93 intend to do only one semester of research. However, a student who really likes the BIOL 93 experience may want to continue doing research, and if this student is a *senior*, s/he can then take one semester of BIOL 99. The BIOL 99 research must be done with the **same research sponsor** as BIOL 93, **and** BIOL 99 must be taken the semester immediately after BIOL 93 was taken. This two-semester combination of BIOL 93 and BIOL 99 can be used as one Biology elective (and also as Senior Research) as long as the student (i) **fulfills the BIOL 93 requirements** (see BIOL 93 pdf for details), and (ii) **writes a senior research dissertation (see below) at the conclusion of BIOL 99**. The BIOL 99 senior dissertation may incorporate some of the BIOL 93 report but it must have a longer review and introduction, be more detailed, contain much more data, and a lengthier discussion. It is unlikely that the two-semester combination of BIOL 93 and BIOL 99 will provide research sufficient for senior honors. However, a three-semester combination of research courses may also be taken: BIOL 93 in *spring of junior year* or the *summer before senior year*, followed by two semesters of BIOL 99 in senior year. This three-course combination will yield one elective for the Biology major and there may be sufficient research accomplished for candidacy for senior honors.

How to Enroll in BIOL 99 The student meets with the BIOL 99 Coordinator and submits the completed BIOL 99 petition (pages 6-8), including signatures of the student and biology faculty sponsor (or co-sponsor if the student is doing BIOL 99 with a research sponsor not in the biology department and the research has been approved by the BIOL 99 Coordinator). The Biology department will then provide a consent code for the student to enroll in BIOL 99.

Course Requirements for 1st Semester of BIOL 99 (usually, BIOL 99a) At the completion of the first semester of BIOL 99, the student writes a paper that reviews the literature in the scientific field pertinent to his/her research and includes a bibliography of cited papers. A copy is given to the faculty sponsor and a pdf is submitted electronically to the Biology office. Some suggestions for the review paper:

In a minimum of 8 pages of double-spaced text, this review should describe and discuss the scientific literature that is important for the problem being investigated. If there are models or hypotheses, the review should describe what they are. What evidence supports or negates the models? What is the specific question or problem being explored and how will it be solved? The review should include references in the text and provide a bibliography containing those citations [the bibliography does not count toward the 8 pages of text]. This review will be useful when writing the introduction to the senior thesis.

This review is given to the research sponsor and a pdf copy is submitted to lwoolf@brandeis.edu in the Biology office by the designated deadline (see timetable).

Course Requirements for 2nd Semester of BIOL 99 (usually, BIOL 99b) At the completion of the 2nd semester of BIOL 99, students write a **Senior Research thesis** that contains the following sections:

Title Page: includes student's name, the title of senior research, and date.

Abstract (not more than 250 words): summarizes the nature of the research project, the results obtained, and the relevance of those results.

Introduction: poses the research question that was asked in the context of current knowledge in the relevant field.

Materials and Methods: provides in sufficient detail all aspects related to how the experiments were conducted.

Results: provides a written description along with figures and tables, of the experimental data obtained.

Discussion: evaluates the results obtained and their relevance and significance to current models and data in the field.

References: includes complete citations (authors' names, paper titles, journal, volume, page, year). See the journal *Cell* for examples.

The thesis is given to the research sponsor and a pdf copy is submitted to lwoolf@brandeis.edu in the Biology office by the designated deadline (see timetable).

2. Candidacy for Senior Honors.

To become a *candidate* for Senior Honors, the student enrolls in two semesters of BIOL 99 in senior year and completes the BIOL 99 petition *including the section asking to be considered a candidate* for Senior Honors. Senior Honors is the departmental award for Distinction in Biology and requires both excellence in laboratory research and a good academic record (GPA eligibility):

- ❖ Biology majors enrolled in BIOL 99 are eligible for honors if they have a **Biology FOC GPA of 3.0 or better and** if they have achieved a **B+ or better in both BIOL 99a and BIOL 99b**. Also, the student's faculty research mentor must support the student's honors candidacy.

Senior Honors Requirements All the 1st and 2nd semester BIOL 99 course requirements given above for Senior Research apply to *candidates* for Senior Honors. The Honors candidate must write an Honors thesis using the format of the Senior Research thesis (see above) and give a **public oral presentation and defense** of his/her work to a designated Faculty Research Committee, which is composed of the student's research sponsor and two faculty members in the Biology Department. The oral presentation and defense should last one hour. Typically, the candidate prepares a 30-35 minute talk that includes an introduction that shows why the work was undertaken, what goals were set, the results obtained and why they are significant. Throughout this presentation, the research committee members will ask questions. Presentations may include the use of a blackboard, handouts, slides, overhead transparencies, and/or Powerpoint presentations, etc. Each member of the research committee evaluates the written thesis and oral presentation/defense and makes a recommendation to the Biology concentration faculty that the candidate graduate with no Honors, Honors, High Honors, or Highest Honors. Assuming GPA eligibility has been met, these recommendations are considered by the Department of Biology faculty who make the final determination about the candidate's Honors status.

FALL SEMESTER 2017

(1) During the week of Aug. 29-Sept. 6: To enroll in BIOL 99a, meet with the BIOL 99 Coordinator and bring the completed BIOL 99 petition (pages 6-8). If you want to do BIOL 99 with someone who is not BIOL faculty, you need approval from the BIOL 99 Coordinator and signature of a Biology faculty co-sponsor.

(2) Deadlines for BIOL 99 Review or Senior Thesis:

(a) If you are a Senior Honors Candidate who is defending at the end of Fall Semester:

-by Dec. 4, 2017, 3:00 pm: Give one copy of your **Senior Honors Research thesis** to each member of your faculty research committee. You will be notified beforehand as to the faculty composition of your committee.

-on Dec. 11, 2017: Honors Oral Presentation and Defense [Dec. 12 is a backup date]

(b) If you are CONCLUDING Senior Research in the Fall (it is your second semester of BIOL 99) but are NOT an Honors Candidate:

-by Dec. 20, 2017, 3:00 pm: Your Senior Research thesis is due. Submit one copy to your faculty sponsor and send a pdf copy to Laura Woolf (lwoolf@brandeis.edu).

(c) If you are doing BIOL 99a in Fall and intend to do BIOL 99b in Spring (whether or not as Honors):

-by Dec. 20, 2017, 3:00 pm: The review paper on your field of research is due. Submit one copy to your faculty Sponsor (co-sponsor) and send a pdf copy to Laura Woolf (lwoolf@brandeis.edu).

SPRING SEMESTER 2018

(1) During the week of Jan. 8-11, 2018: If you took BIOL 99a in the Fall, email Laura Woolf (lwoolf@brandeis.edu) in the Biology Department to give you a consent code to enroll in BIOL 99b. If you are starting BIOL 99 this Spring semester and will conclude BIOL 99 in Fall 2018, or if you are a senior combining BIOL 93 (Fall) and BIOL 99b (Spring), complete the BIOL 99 petition, meet with the BIOL 99 Coordinator and bring pages 6-8 with you.

(2) Deadlines for BIOL 99 Senior Thesis:

(a) If you are a Senior Honors Candidate and are Defending in the Spring Semester:

-by April 19, 2018, 3:00 pm: Give a copy of your Senior Honors Research thesis to each member of your faculty research committee. You will be notified beforehand as to the faculty composition of your committee.

-on April 27, 2018: Honors Oral Presentation and Defense [April 30, May 1 are backup dates]

-by May 7, 2018, 3:00 pm: If *revisions* are required by your research committee, send a *final version* of your Senior Honors Research thesis to your faculty sponsor and a pdf copy to lwoolf@brandeis.edu

(b) If you are NOT doing Senior Honors but are concluding Senior Research in the Spring, or if you are combining BIOL 93a (Fall) and BIOL 99b (Spring):

-by May 7, 2018, 3:00 pm: Your Senior Research thesis is due. Submit one copy to your faculty sponsor and send a pdf copy to Laura Woolf (lwoolf@brandeis.edu).

THE NEXT 3 PAGES ARE THE BIOL 99 PETITION.

Detach and complete these 3 pages and bring them to your meeting with the BIOL 99 Coordinator.

PETITION FOR BIOL 99 SENIOR RESEARCH AND SENIOR HONORS IN BIOLOGY

Student's Name: _____
 (Print) First Last

Telephone #: _____ Student SAGE ID # _____

Email: _____ Please check box if you are a BS-MS candidate

A. Petition to Enroll in Senior Research (BIOL 99)

I will take BIOL 99 with _____
 (PRINT the Name of your BIOLOGY Dept. Research Sponsor)

Fill in the section below if your Sponsor is NOT a member of the Brandeis Biology Department:

Institution and Department affiliation of your **outside Sponsor**: _____

Telephone number and e-mail address of your **outside Sponsor**: _____

Biology Dept. Co-Sponsor: Print name: _____

Signature: _____

Permission is given for BIOL 99 to be taken with the above (non-Biology Dept.) Sponsor:

Signature of BIOL 99 Coordinator

Title of research project:

Brief synopsis of proposed research:

B. Student Signature

I understand that the course requirements to do Senior Research, whether as BIOL 99a + BIOL 99b, or as BIOL 93 + BIOL 99a (or 99b), include but are not limited to writing a senior thesis by the deadlines specified on the timetable for this academic year.

Student's Signature

C. Petition for Candidacy for Senior Honors in Biology

Eligibility for Honors will not be determined until the conclusion of the senior year. In addition to the requirements for BIOL 99a and b, *eligibility for honors* includes an oral presentation and defense, as well as a final GPA of *at least 3.00* in the science courses offered to fulfill the Biology concentration (major) **AND** a **B+ or better in both BIOL 99a and 99b.**

I understand the requirements and petition to be considered a *candidate* for Senior Honors.

Student's Signature

The next page is to be completed by your faculty research sponsor and should be included when you submit this petition (pages 6-8).

D. To be Completed by the Research Sponsor

I accept this student for BIOL 99 (Senior Research) and, if applicable, as a candidate for Honors in Biology. I will provide appropriate safety instructions as required for each hazard (checked off below) that may be encountered by this student while conducting research in my laboratory.

Sponsor's Signature

If the research to be conducted by this student involves any of the potential hazards listed below, please put a check next to that hazard:

____radiation or radioactivity

____chemical hazards, e. g., drugs, poisonous or explosive materials, carcinogens

____physical hazards, e. g., high voltages, pressure, or temperature; intense laser sources

____microbiological hazards, e. g., infectious or disease-producing bacteria, viruses, etc.

____recombinant DNA or genetic engineering

____use of or exposure to human tissues/cells/fluids/samples, etc.

____other (please specify)