BIOL 99: Senior Research and Senior Honors in Biology
Information 2018-2019

To enroll in BIOL 99a for Fall semester: complete the Biology 99 Petition online no later than Sept 10, 2018. The biology department will send you the consent code so you can register in BIOL 99 if the petition is complete, your faculty research sponsor fills their (separate) form, and project requirements have been met (and notify you if not).

To enroll in BIOL 99b for Spring semester: if you enrolled in BIOL 99a in the previous Fall, you do not need to submit the petition again but you must email the Biology Department lwoolf@brandeis.edu by no later than Jan. 18, 2019 that you wish to enroll in BIOL 99b. The biology department will send you a consent code for the class and you will use it to register. If you are enrolling in BIOL 99 for the first time (e.g., you did BIOL 93 in the Fall), you must complete the online Biology 99 Petition no later than Jan 18, 2019. The biology department will send you the consent code so you can register in BIOL 99 if the petition is complete, your faculty research sponsor fills their (separate) form, and project requirements have been met (and notify you if not).

BIOL 99: Senior Research and Senior Honors in Biology

The Senior Research Program provides an opportunity for students concentrating in Biology to do 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 research performance and final academic record.

1. BIOL 99 Senior Research.
There is no GPA requirement to enroll in BIOL 99. Students may seek the agreement of any member of the faculty in the Brandeis department of Biology as their research sponsor. If a student wishes to do research with a Brandeis professor 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. If a student does BIOL 99 research with a non-Biology department faculty member (including non-Brandeis), the student must find a co-sponsor from the Brandeis Biology faculty, and this person must be able to evaluate the proposed research. In all cases, the proposed research must have a biological basis and ask a biological question.

BIOL Course Credit BIOL 99 is a two-semester course sequence restricted to seniors. Each of BIOL 99a and b is worth 4 credits, and requires a minimum time commitment of 12 hours per week. A student should not take BIOL 99 as a one-semester course unless they have taken BIOL 93 (see below). Two semesters of BIOL 99 may be used as one elective toward the Biology major. To claim the elective credit, the student must complete the Registrar’s online major/minor substitution form, which will be reviewed by the Biology Undergraduate Advising Head. (Note that the credit will not appear in a student’s SAGE audit until the successful completion of the second semester of BIOL 99.)
If the student is taking a **demonstrably 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 (but no additional elective credit). If permission is granted, the student registers for BIOL 99a in the Fall and BIOL 99e in the Spring. A single semester of BIOL 99, even if BIOL 99e, **cannot** be used as a Biology elective. A student **may not receive more than three course credits and one elective credit** 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**, they 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) so long as the student (i) **fulfills the BIOL 93 requirements** (see BIOL 93 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 have 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 should meet with their faculty research sponsor (and co-sponsor, when appropriate). The student then submits the completed BIOL 99 Petition online. The Biology department will then email the research sponsor (and co-sponsor, when appropriate) a Sponsor’s Agreement form to complete. The enrollment application will be complete only when the student and research sponsor (and co-sponsor, when appropriate) have submitted their forms. The Biology department will then send a consent code to the student so they can 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 their research and includes a bibliography of cited papers. Requirements for the review paper:

In a **minimum** of 8 pages of double-spaced text, the student 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.

The student must give their review to the **Brandeis research sponsor or co-sponsor and** send a PDF copy to lwoolf@brandeis.edu in the Biology office by the 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 student must give the thesis to the Brandeis research sponsor or co-sponsor and send a PDF copy to lwoolf@brandeis.edu in the Biology office by the 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 strong academic record (GPA eligibility): Biology majors enrolled in BIOL 99 are eligible for honors if they have a final GPA of at least 3.00 in the science courses offered to fulfill the Biology concentration (major) and if they obtain a B+ or higher 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 co-sponsor, when appropriate) and two additional 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, 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.

BIOL 99 TIMETABLE FOR 2018-2019 ACADEMIC YEAR

FALL SEMESTER 2018
(1) No later than Sept 10: To request enrollment in BIOL 99a, complete and submit the online BIOL 99 petition. If you want to do BIOL 99 with someone who is not a member of the Brandeis Biology faculty, you will need a Brandeis Biology faculty co-sponsor and approval from the BIOL 99 Coordinator.

(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 Nov. 20, 2018, 3:00 pm: Send a PDF of your Senior Honors Research thesis to your Brandeis research sponsor or co-sponsor and to the other two members of your faculty research committee (and give paper copies, if asked). You will be told beforehand who the committee members are.
- on Dec. 10-14: Honors Oral Presentation and Defense
(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. 21, 2018, 3:00 pm: Send a PDF of your Senior Honors Research thesis to your Brandeis research sponsor or co-sponsor and to 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. 21, 2018, 3:00 pm: The review paper on your field of research is due. Send it as a PDF to your Brandeis research sponsor or co-sponsor and to lwoolf@brandeis.edu.

SPRING SEMESTER 2018

(1) During the week of Jan. 8-18, 2019: If you took BIOL 99a in the Fall, email lwoolf@brandeis.edu in the Biology Department to enroll you in BIOL 99b. If you are starting BIOL 99 this Spring semester and will conclude BIOL 99 in Fall 2019, or if you are a senior wanting to combine BIOL 93 (Fall) and BIOL 99b (Spring), complete and submit the online BIOL 99 petition. If you want to do BIOL 99 with someone who is not a member of the Brandeis Biology faculty, you will need a Brandeis Biology faculty co-sponsor and approval from the BIOL 99 Coordinator.

(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, 2019, 3:00 pm: Send a PDF of your Senior Honors Research thesis to your Brandeis research sponsor or co-sponsor and to the other two members of your faculty research committee (and give paper copies, if asked). You will be told beforehand who the committee members are.
- on May 3, 2019: Honors Oral Presentation and Defense [May 6, May 7 are backup dates]
- by May 8, 2019, 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:
- by April 29, 2019, 3:00 pm: Send a PDF of your Senior Honors Research thesis to your Brandeis research sponsor or co-sponsor and to lwoolf@brandeis.edu.

BIOL 99 Senior Research /Honors Coordinators
Prof. Neil Simister  Prof. Rachel Woodruff
Bassine 201  Bassine 202
simister@brandeis.edu  woodruff@brandeis.edu