

SENIOR RESEARCH and SENIOR HONORS IN BIOLOGY

Fall 2008 - Spring 2009

THE SENIOR RESEARCH PROGRAM AND SENIOR HONORS IN BIOLOGY

The Senior Research Program is designed to provide an opportunity for undergraduate students concentrating in Biology to participate during their **senior year in a two-semester long**, independent research project, and to receive both course and elective credit for that research. **Any senior concentrating in Biology can participate in Senior Research.** Also, seniors conducting Senior Research may petition for candidacy for Senior Honors; eligibility is determined by the student's academic record and research performance (see below).

Students should think early-before they begin their junior year- about whether they want to do Senior Research: many students find it beneficial to spend their junior year, and the summer before their senior year, working in the lab. Students who contemplate entering the Senior Research Program should first familiarize themselves with the research activities of the Biology and other life science faculty by visiting the web page <http://www.bio.brandeis.edu>.

BIOL 99 SENIOR RESEARCH

1. Selecting the Research Sponsor for Senior Research

Students may select any faculty member in the Department of Biology at Brandeis University as their research Sponsor. Alternatively, students may choose faculty members in the Departments of Biochemistry or Chemistry at Brandeis University, or faculty members in similar departments at other institutions in the Boston area, as their research Sponsor. However, in these latter cases, students *must receive permission* from the Senior Honors Coordinator; and the student's research *must be co-sponsored by a faculty member in the Department of Biology at Brandeis*; and the *research should have a biological foundation or pose a biological question*. The student should provide the Biology faculty co-sponsor a description of the proposed research, and meet with his/her co-sponsor on a regular basis to discuss how the research is progressing.

Some students begin working in the laboratory of their research Sponsor as early as their first or second year at Brandeis. It is strongly recommended that students select their research Sponsor no later than the beginning of Fall semester, junior year. Most research Sponsors expect students to work in the lab during the junior year, and Sponsors may also expect that students will work in their lab the summer before their senior year. Many research Sponsors will expect their students to work on their research projects during winter intercession and vacations. These and other issues such as rate of work per week should be discussed in advance with the prospective Sponsor, so that the expectations are clear to everyone involved.

2. How to enroll in Senior Research

- ❖ The student must get the agreement of a faculty member in the Department of Biology to act as research Sponsor (or co-sponsor).

- ❖ During the first week of Fall semester, the student must **complete a petition**, available in the Biology office, for enrollment in the Senior Research Program. The petition must be signed by the research Sponsor [and co-sponsor, if applicable] and **returned to the Biology office** by the specified deadline (see timetable below).
- ❖ The student must **enroll** in BIOL 99a in the Fall and BIOL 99b in the Spring using a course enrollment form obtained from the Registrar: <http://www.brandeis.edu/registrar/forms.html>
The enrollment form requires two signatures: the research Sponsor [Biology co-sponsor if applicable], and the Senior Research/Honors Coordinator for Biology. The student then submits the signed form directly to the Registrar.

3. Credit for Senior Research

BIOL 99 is a *year-long, two credit course*. If unusually intensive work by the student and his/her research Sponsor is anticipated, and if the student is taking a light course load enabling extra time to be spent in the lab doing research, the student may *request permission* from the Senior Honors Coordinator to enroll in BIOL 99e, to obtain a third credit. If permission is granted, the student would register for BIOL 99a in the Fall and for BIOL 99e in the Spring (or, BIOL 99e followed by BIOL 99a). A student may **not** receive more than three credits for Senior Research.

4. Requirements for Senior Research, 1st (Fall) semester

At the completion of the first (Fall) semester, *all students enrolled in BIOL 99* will write a paper which reviews the literature in the scientific field pertinent to their research and includes a bibliography of cited papers.

In a minimum of 5 pages of text, your paper should **review** the scientific literature that is important for the problem you are investigating. If there are models or hypotheses, your paper should describe what they are. What evidence supports/negates the models. What is the specific question/problem you are working on, and how do you propose to solve it. You must include (a) references in your text description and (b) a bibliography containing those citations [the bibliography does not count toward the 5 pages of text]. This review paper should resemble a long version of the introduction to a scientific paper published in a journal in your field. You will be able to use all or some of this material when you write your senior research thesis. As part of the BIOL 99 course requirement, give a copy of this review paper to your faculty sponsor and a copy to the Senior Research/Honors Coordinator.

5. Requirements for Senior Research, 2nd (Spring) semester

At the completion of the second (Spring) semester of BIOL 99, students who are **NOT** candidates for Senior Honors will write a Senior Research thesis. The timetable included with the BIOL 99 petition (see below) gives the **submission deadline**, and thesis copies are to be given to the research sponsor (and Co-sponsor) and to the Senior Research/Honors Coordinator.

The Senior Research thesis consists of the following sections:

Title Page, which includes your name, the title of your Senior Research, and date.

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

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

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

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

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

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

6. Evaluation of Senior Research, Spring semester

The research Sponsor will evaluate the student's laboratory performance and Senior Research thesis, then assign him/her a grade for BIOL 99. During the Biology, Biochemistry, and Neuroscience mini-commencement proceedings, it will be announced that the student participated in the Senior Research Program.

SENIOR RESEARCH WITH HONORS

1. Senior Honors Eligibility and Requirements

Senior Honors is the Departmental award for Distinction in Biology. It is earned by students who have a good academic record and who have excelled in laboratory research. The levels of Distinction in Biology are Honors, High Honors, and Highest Honors.

In order to become a candidate for Senior Honors, students must **enroll in BIOL 99 and complete the petition for the Senior Research Program, including the section about candidacy for Senior Honors.** All the Fall and Spring semester requirements given above for Senior Research (BIOL 99) apply to candidates for Senior Honors.

Eligibility for Honors is decided at the conclusion of Spring semester, senior year:

- ❖ Senior Biology majors enrolled in BIOL 99 who have a FOC grade point average of **3.30 or better** in **all courses required for the Biology concentration** are automatically eligible for Honors. *FOC: all courses needed to fulfill the Biology major requirements.*
- ❖ Senior Biology majors enrolled in BIOL 99 who have a FOC grade point average between 3.0 and 3.3 **and** who have achieved an **average of B+ or better in THREE electives** taken to fulfill the Biology concentration requirement for either the B. A. or the B. S. degree in Biology, are also eligible. BIOL 99 does not count as one of the 3 required electives.

2. Honors Thesis and Defense

The Honors candidate writes a Senior Honors thesis using the format of the Senior Research Honors thesis (see above). A copy of the Honors thesis is submitted to each member of the student's Faculty Research Committee by the designated deadline (see timetable, below).

The Honors candidate gives a public oral presentation and defense of his/her research before his/her Faculty Research Committee [see timetable, below]. The Faculty Research Committee consists of the faculty research Sponsor [and co-sponsor, if applicable] and two faculty members of the Department of Biology.

The oral defense is 60 minutes long. Students typically plan a talk of ~30 min that: introduces the topic; indicates why the work was undertaken and what the goals were; provides a summary of the experiments done and results obtained; and gives a succinct discussion of the significance of the findings. The Faculty Research committee members will have read the thesis in advance and will interrupt throughout the presentation to ask the Honors candidate questions. Presentations may include the use of the blackboard, handouts, slides, overhead transparencies and/or Power Point presentation. The student should make arrangements in advance with the Biology office for the appropriate equipment.

3. How is Senior Honors determined

The Faculty Research Committee members read and evaluate the Senior Honors Research thesis, and attend and evaluate the oral presentation; each member makes one of the following recommendations to the Department of Biology: no honors, Honors, High Honors, or Highest Honors. The candidate's final FOC GPA and laboratory performance, and the Faculty Research Committee recommendations, are all considered by the Department of Biology faculty, who make the final determination of the candidate's status.

If the Biology faculty determine that the candidate is deserving of Honors (or High or Highest Honors) in Biology, this is announced during the joint Biology, Biochemistry, and Neuroscience commencement proceedings. If the faculty determine that the candidate is not deserving of Honors in Biology, then it will be stated during the commencement proceedings only that the student conducted Senior Research in Biology.

The research Sponsor will assign a grade for BIOL 99 based upon the student's laboratory performance and Senior Honors Research thesis.

**SENIOR RESEARCH PROGRAM AND SENIOR HONORS COORDINATOR:
Dr. Joan Press, Rosenstiel Center room 511; x62450; press@brandeis.edu**

SENIOR RESEARCH AND SENIOR HONORS IN BIOLOGY

TIMETABLE FOR 2008-2009 ACADEMIC YEAR

FALL SEMESTER, 2008

BEFORE September 11th, 2008 [Sept. 11 is last day to enroll in classes]:

- 1. Enroll in BIOL 99:** turn in to the Registrar's office a BIOL 99 course enrollment form (obtained from Registrar's office) signed by both Dr. Press **and** your Sponsor (or Biology faculty co-sponsor if your Sponsor is not Biology faculty).
- 2. Return completed Senior Research/Senior Honors petition** to Biology Office.

BY December 15th, 2008:

All BIOL 99 students: review paper on your field of research **is due**. Submit one copy to your faculty Sponsor and one copy to Dr. Press.

SPRING SEMESTER, 2009

BEFORE Jan. 27th, 2009 [last day to enroll]:

Enroll in BIOL 99 as above (two signatures are required).

April 24th, 2009: THESIS IS DUE

Students NOT doing honors: Write a Senior Research thesis (see guidelines above). *There is no oral presentation or defense of the thesis.* Give copies to your Research Sponsor (and co-sponsor) and to Dr. Press by the deadline specified.

Honors candidates: Write a Senior Honors Research thesis (see guidelines above). Give one copy to each member of your Faculty Research committee by the deadline specified. You will be notified as to the faculty composition of your committee as well as the date, time, and room assignment for your oral presentation. Email the title of your research thesis to Dr. Press.

April 30th, May 1st, and May 4th, 2009: Oral defenses for Honors candidates

Public oral presentation and defense of your research and thesis before assigned Faculty Research committee.

May 8th, 2009: Honors candidates: final version of Honors thesis is due

A copy of the *final version* of your Senior Honors Research thesis, including any revisions required by your Faculty Research committee, is due in the Biology Dept. office by 4:00 pm.

KEEP THESE PAGES (1-5). THE NEXT 3 PAGES ARE THE PETITION TO BE COMPLETED AND RETURNED TO THE BIOLOGY OFFICE.

PETITION FOR SENIOR RESEARCH AND SENIOR HONORS IN BIOLOGY

Complete, detach and return pages 6-8 to the Biology Office by Sept. 11, 2008

Student's Name: _____
(Print) First Last

Telephone #: _____ Mailbox #: _____

Email: _____

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

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

Title of research project:

Brief resumé of proposed research:

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

Institution and Department affiliation of your Sponsor: _____

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

Name of Brandeis Biology Co-sponsor: _____

I understand that taking Senior Research (BIOL 99) **requires that I submit a written review and a senior thesis** to my Research Sponsor (and Co-Sponsor, if applicable) by the deadlines specified on the timetable for this academic year:

_____ (student signature)

Signatures of your Research Sponsor (and co-sponsor, if applicable): I/we accept this student for BIOL 99 (Senior Research) and, if applicable, as a candidate for Honors in Biology.

Research Sponsor's signature

Co-Sponsor's signature

REMINDER: BIOL 99 REQUIRES TWO SIGNATURES TO ENROLL

Senior Research/Honors Coordinator
Your Biology Department Research Sponsor (or co-sponsor)

B. Petition for candidacy for Senior Honors in Biology.

Provide in Section A above your proposed sponsor, title of your research, and a research abstract.

Eligibility for Honors will not be determined until the conclusion of the senior year. In addition to laboratory performance, requirements include a written thesis, an oral presentation and defense, and a specific GPA:

You are eligible to be a candidate for Senior Honors if the final GPA of science courses offered to fulfill the Biology concentration is **3.30** or higher, **or**, if the final GPA of science courses offered to fulfill the Biology concentration is at least **3.0** **and** you have an **average of B+ or better** in **three** Biology electives, **not including BIOL99**, taken to fulfill the Biology concentration requirement for either the B.A. or B.S. degree. [Although five electives are required for the B.S. degree, the best three "grades" will be chosen to calculate the average.]

Please list the BIOL electives (and grades received, if already taken) you have taken or plan to take:

Your present total GPA is _____.

Your present science GPA is _____
(only count the courses that apply to the Biology major)

I have read the Senior Honors section of the Senior Research Program booklet, I understand the eligibility requirements, and I petition to be considered a candidate for Senior Honors.

_____ (Student's signature)

C. TO BE COMPLETED BY RESEARCH SPONSOR

You are the research sponsor for an undergraduate student conducting BIOL 99 research. 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 or viruses

_____recombinant DNA or genetic engineering

_____other (please specify)_____

I, the research sponsor, will provide appropriate safety instructions as required for each of the hazards that may be encountered by this student while conducting research in my laboratory.

Signature of Research Sponsor

Date