

**BIOLOGY  
MAJOR'S  
HANDBOOK**



**VASSAR COLLEGE**

## TABLE OF CONTENTS

I.	Biology at Vassar College	3
II.	Requirements for a Biology Major	3
III.	Neuroscience and Behavior and Biochemistry	4
IV.	Procedures for Declaring a Major	5
	A. Declaring a Major	5
	B. Obtaining an Adviser	5
	C. Filling in the Forms for the Major	5
	D. Pre-Registration and the Drop-Add Period	6
	E. Special Permission and Limited Enrollment	6
	F. Waiting Lists	7
V.	Special Cases	7
	A. General Guidelines Regarding Work at Other Institutions	7
	1. Approval and Accreditation of Work Taken at Other Institutions	7
	2. Transfer Students	8
	3. Summer Work	8
	4. Leaves of Absence and Exchange Programs	8
	5. Junior Year Abroad	8
	B. Double Majors	9
	C. Education Certification	9
	D. Vassar Courses	10
	1. Field Work	10
	2. Retaking a Failed Course	10
	E. Exceptions in Biology	10
VI.	Student Research	11
	A. Independent Work	11
	B. Senior Independent Research – Biology 303	11
VII.	Other Opportunities for Involvement in the Major	12
VIII.	Department Honors and Prizes	12
	A. Criteria for Determining Departmental Honors	12
	B. Biology Department Prizes	12
IX.	Careers in Biology	13
	A. B.A. Degree Opportunities	13
	B. Masters Degree Opportunities	13
	C. Ph.D. Degree Opportunities	13
	D. Application to Graduate Programs	14

## I. BIOLOGY AT VASSAR COLLEGE

Biology is an exciting and dynamic field that has a major impact on society through its understanding of medicine, agriculture, genetics, ecology, evolution, and the environment. Biology is defined as the scientific study of life and its processes. The discipline is quite broad in scope and scale; it includes basic and applied research with humans, other animals, plants, fungi, bacteria, protists, and viruses and it spans levels of organization from molecules to global environments. The goal of the faculty is to introduce students to the areas in which biological research is conducted and to the methods by which it is carried out. The major is structured in such a way as to require students to become familiar with a variety of fields within the discipline while also allowing opportunities to achieve depth and to conduct research in particular areas.

## II. REQUIREMENTS FOR A BIOLOGY MAJOR

A total of thirteen (13) or fourteen (14) units, nine (9) of them graded, including:

- A. Biology 105\* Introduction to Biological Processes  
Biology 106 Introduction to Biological Investigation  
  
\*A student with a 4 or 5 in AP Biology may be exempted from this course
- B. Chemistry including 2 units (Chem 108 & 109) or 1 unit (Chem 125) *and* Chem 244 (Organic Chemistry)
- C. Four units of 200-level Biology with courses selected to meet the distribution requirements of at least one course in: 1) Ecology, Evolution and Diversity; 2) Biochemistry, Cellular and Molecular Biology; and 3) Developmental Biology and Physiology.
- D. Three units of 300-level biology, which may include Biol 303 (Senior Research)
- E. Two units to be chosen from among Chemistry 245 255; Physics 113, 114; Mathematics 101, 102, 121, 122, or 125; Geology 151; Psychology 200; Neuroscience and Behavior 201; Environmental Science 224; and other intermediate or advanced science courses subject to departmental approval. One of the two units may also be an additional graded 200-level or 300-level Biology course or ungraded independent research Biology 298 or 399.

**200-level Subject Areas:** Ecology, Evolution and Diversity; Biochemistry, Cellular and Molecular Biology; and Developmental Biology and Physiology. 200-level course descriptions indicate which subject area each course fulfills. Students may also consult the Biology Department web pages, Biology Advisers, or the Chair.

**Additional Courses:** For those students wanting to attend graduate school, you should be aware that most graduate schools require the second semester of Organic Chemistry (Chem 245), two semesters of calculus (Math 121/122), and two semesters of physics (Physics 113 and 114). Therefore, you should plan early in your academic planning to take these courses. As a general guideline it is often best to take Math early and wait to take Physics when you are a junior or a senior.

**NRO:** No course other than Biology 105 or 106 taken NRO may be counted towards the requirements of the biology major.

a **Senior-Year Requirement:** Two units at the 300-level taken for a letter grade. Biology 399 cannot be used to satisfy this requirement.

### III. NEUROSCIENCE AND BEHAVIOR AND BIOCHEMISTRY

Members of the Biology Department are intimately involved in two program majors in which biological sciences are taught at Vassar: Biochemistry and Neuroscience and Behavior. Neuroscience and Behavior is an inter-departmental major (with the Psychology Department), while Biochemistry is an inter-departmental major (with the Chemistry Department). Those who are interested in particular in the biological foundations of behavior and neuroscience or biochemistry are encouraged to examine the requirements for the Neuroscience and Behavior program or the Biochemistry program and to talk with a faculty member who is an adviser in that program (see the Vassar College catalogue for current listings).

#### A. Neuroscience and Behavior

The Neuroscience and Behavior major includes 8 required courses (Bio 105, 106, Psyc 105 or 106, 200, 241 or 243, 229 or 249, Neur 201, 301) and 5 other electives to be chosen from a master list in consultation with your adviser. Further information can be found at the Neuroscience and Behavior web site: <http://neuroscienceandbehavior.vassar.edu/>

#### B. Biochemistry

The Biochemistry major includes 18 required courses (Biol 105/106, Biol 238, Chem 108/109 or Chem 125, 244, 245, 323, and 350; Biol/Chem 272 and 324; Biochemistry 377, Math 121/122 or 125; Physics 113 and 114. Further information can be found at the Biochemistry web site: <http://biochemistry.vassar.edu/>

## **IV. PROCEDURES FOR DECLARING THE BIOLOGY MAJOR**

### **A. Declaring a Major**

Congratulations on your decision to declare a Biology major! A student who decides to declare a major in Biology needs to select a Faculty Biology Advisor, and then meet with the advisor to work through the process of declaring a Biology Major. The adviser will normally talk with the student in order to (a) determine the student's reasons for majoring in Biology and explore whether it is an appropriate field of study given the student's interests and goals; (b) evaluate the student's grades in both biology and other courses; and (c) make sure the student understands the Department's requirements for the major.

### **B. Obtaining an Advisor**

Any of the faculty members of the Biology Department can serve as Major Advisors. Students who have a preference for a particular faculty adviser may ask that individual whether s/he would be willing to serve as adviser. Students who have no preference should make an appointment to see the Chair of the Department to be assigned an adviser. It would be to the student's advantage to become acquainted with the Department's faculty members and their areas of interest prior to this time in order to make an intelligent choice of adviser. Research and teaching interests are also described on the Biology Department web site: <http://biology.vassar.edu/>.

### **C. Filling in the Forms for the Major**

The student should make an appointment with their adviser to discuss an overall program of study at Vassar. In preparation for the meeting, the student needs to obtain two forms from the Registrar's Office: 1) a "Declaration of Major" form and 2) three (or more) yellow "Field of Concentration" cards. Bring these to your meeting with your adviser. You will need to fill in all 3 of the yellow cards with a tentative program of study that includes all of the courses that you wish to take during your time at Vassar College. If you later decide to change your major, you will need to re-declare by filling out a new Major Declaration form.

The yellow cards have four columns; the first two are used to record courses in the major separately for fall and spring semesters. The third column is used to record courses taken outside of Biology but within the division of the natural sciences (the college requires that no more than 75% of your work be in this division). The final column is where you record all the courses outside of the natural sciences; the total number of courses in this column must equal at least 25% of the total units taken at the time of graduation (8.5, assuming 34 units).

In the left hand columns the student should enter all previous and all future Biology courses. The adviser will review these Field of Concentration cards to see that the program is an appropriate one for the student (given career or post graduate aspirations) and that, upon completion, there will be at least 8-9 units in Biology, that all Department requirements will have been met, and that necessary prerequisites are included.

It should be pointed out that the future courses listed on the Field of Concentration cards are not binding on the student; rather they are a means to assure the adviser that the student is knowledgeable about, and therefore responsible for, the satisfaction of all requirements for graduation from Vassar College with a major in Biology.

After the adviser signs all three Field of Concentration cards, the student turns in one card to the administrative assistant in Olmsted 302, one to the Dean of Studies' office, and retains one copy.

The student should also obtain the signature of the Chair of the Department on the Declaration of Major form that must be returned to the Office of the Registrar.

Students wishing to change advisers or to obtain a new adviser if his or her adviser leaves--or goes on leave--prior to the student's graduation must submit a new Declaration of Major form for the registrar, indicating that it involves a change in adviser only. The student must obtain the consent of the new adviser before submitting the form. A student who needs help finding a new adviser should consult with the Chair of the Department.

#### **D. Pre-registration and the Drop-Add Period**

Preregistration for each semester normally occurs three to four weeks before the end of classes in the preceding semester. Approximately two weeks prior to pre-registration, students should make appointments to meet with their advisers. Prior to this meeting, the students should plan their tentative schedules. The adviser will review this program with the student, suggest changes and offer advice as necessary, review the student's progress through the major, and make sure all prerequisites and appropriate sequences are considered. The adviser will then issue the student's PIN, which allows the student to register on line. Students should check their progress through the major before this meeting by referring to their Biology Majors Requirements form and updating it as necessary. The form should be sent by email to the adviser ahead of this meeting. It is to the student's advantage to see the adviser as early during this period as possible and to allow sufficient time for this meeting. If students wait until the last minute, and ask for an adviser's signature in a hurry, they are preventing advisers from fulfilling their intended function. Students thereby deprive themselves of valuable and necessary guidance. During the drop-add period, the student must obtain the adviser's signature for any course change.

#### **E. Special Permission and Limited Enrollment**

The student should obtain instructor's signatures for all special permission courses. Such signatures guarantee the student a place in that course. The student will not be enrolled for a special permission course at pre-registration unless both the instructor's signature and the adviser's signature appear on a form available from the registrar. In courses marked "limited enrollment", instructors' signatures are unnecessary, and registration will be on a first-come, first-served basis. An instructor's signature cannot be used to hold a place in a limited enrollment course.

#### **F. Waiting Lists**

Should a student not get into a course during pre-registration they may be placed on the waiting list for that course. However, it will be the student's responsibility to get in touch with the instructor for such courses at the start of the new semester. If a new section for a course becomes established, the student will be notified by e-mail prior to the start of the new semester, so that s/ he can register for that section during the drop-add period.

As openings become available, students will be admitted from waiting lists in order of class standing, and position on the list. Because professors cannot contact each student individually, it is up to the student to contact the professor; where schedules permit, the student should attend the first several classes as well.

## V. SPECIAL CASES

### A. General Guidelines Regarding Academic Work in Other Settings.

(Please also consult the current college catalog for additional information regarding each of these issues. The college catalog is the official and binding document for all college policies - <http://catalogue.vassar.edu/>.)

#### 1. Approval and Accreditation of Work Taken at Other Institutions.

If a student wishes to transfer work from other institutions for Vassar credit, the following procedures should be followed: Approval of the adviser should be sought prior to taking the courses. The student should bring catalogue descriptions to the adviser when seeking approval. If retroactive credit is sought, the student must bring to the adviser the course syllabus. Any work not taken at Vassar for credit is counted as ungraded work. Additional units taken at another institution may be counted toward the degree without being applied to satisfy the requirements of the major, following the same procedures outlined above. If a student wishes to use work taken at another institution as a prerequisite for Vassar courses without transferring the work for course credit, the Chair of the Department should be consulted.

**Note:** No more than 9 units of a student's work at Vassar may be ungraded work (including up to 4 possible NRO's), except for credits taken above the 34-course minimum. The College sets a limit on the total amount of work that may be taken away from Vassar. Nontransfer students may include no more than 9 units of work at another institution in the 34 units presented for the degree.

**Reminder:** All units completed under the NRO option are considered ungraded, whether or not grades are awarded at the end of the semester. See the College catalogue for details.

## 2. Transfer Students

Junior transfers are expected to take at least 7 graded units of Biology at Vassar, with the approval of the Chair of the Department. That is, no more than 7 units of Biology taken away from Vassar are accepted within the minimum 14 units required of Biology majors. The Chair of the Department grants credit for specific courses to be counted toward the major. If additional Biology courses are credited by the college toward the 34 units required for graduation, they must fall within the limit for courses in the major field. (Transfer students who enter with 17 units may not receive additional credit for summer work at another institution.)

## 3. Summer Work

The Biology Department encourages students to pursue summer work at other institutions since it may provide academic opportunities not available at Vassar College. This is especially true for biology field courses that are frequently taught at Biological field stations. See the list of Biological field stations on the Students & Advising web page to see the range of courses that are offered.

**Other institutions.** The student should bring the summer school catalogue to the adviser to obtain prior approval for any academic work the student intends to do over the summer. The student should also obtain prior approval for alternative courses. If retroactive credit is sought, the student must bring the course syllabus to the adviser. Note: Advanced placement in 200-level courses is available only to students who have completed a college-level introductory course in Biology. Such students should submit to the department chair the syllabus and description of the text used in the course, as well as an official transcript.

**Vassar Summer Work.** College regulations governing Vassar summer work can be found in the Vassar College Catalogue. Prior approval by the instructor is required for any Vassar summer work, such as Independent Work or Field Work. Students must confer with the faculty supervisor of the summer independent or field work before leaving campus in the spring. The due date for all summer work is October 1.

## 4. Leave of Absence and Exchange Program

Students should obtain the adviser's prior approval for all courses they plan to take, and also prior approval for alternative courses. The student should bring to the adviser a course catalogue when seeking approval for courses.

## 5. Junior Year Abroad

The Biology department encourages students to consider Junior Year Abroad as an option that may contribute to completing the Biology major. Many students have taken courses through the School for Field Studies in places such as Kenya, Mexico, and Australia. The Biology department is officially associated with the Semester in Environmental Science at the marine Biological laboratory at Woods Hole, MA. Students may obtain up to 5 units of graded credit toward the Biology major during this semester. For students contemplating Junior Year Abroad, it is important to plan ahead to discuss with your adviser how your program will mesh with the other courses and requirements for the major. Also, as early as possible the student should consult with the appropriate person in the office of the Dean of Studies to obtain information on possible programs and procedures. Students can find URLs to a number of JYA programs and the pre-approved biology credits from each program on the Students & Advising page.

**LEAVE NOTE:** PRE-REGISTRATION for the following year or semester for those who will be away from campus. Follow these guidelines.

1. Take a Vassar catalogue with you.
2. In April (November if away only first semester) e-mail, call, or write your adviser (or Department Chair) indicating which Biology courses you plan to take in the semester you return. Your adviser will make every effort to hold places in the courses for you.

## **B. Double Majors**

Students must apply to the College Committee on Leaves and Privileges to become double majors, and must file two complete sets of yellow cards.

Students should think carefully about their reasons for choosing two majors, because it is not always possible to take as many courses as they wish in a given department. All majors are urged to pursue work to the 300-level in at least one other department, whether or not they are double majors.

Students who can present a strong case to support a double major should be alert to the following hazards:

1. There is limited flexibility in planning programs, and the student may be locked into course sequences.
2. Fulfilling senior-year requirements for two majors may produce scheduling conflicts.
3. If the second major is also a natural science, there may be difficulty in taking the required 25% of work outside the major (Natural Science) division.
4. There is increased paperwork, such as the necessity of filing two sets of yellow cards, and obtaining advisers in both departments.
5. It sometimes becomes extremely difficult to arrange a program that allows double majors to spend a year away from Vassar, e.g., on an exchange program or on Junior Year Abroad.

## **C. Education Certification**

Biology majors can become certified for secondary school education certification should consult with the appropriate person in the Education Department (<http://education.vassar.edu/>) as soon as possible. Students should be alerted to the fact that there are often scheduling conflicts in the senior year, when practice teaching is required for certification and senior year requirements are required for completion of the major.

## **D. Vassar Courses**

### **1. Field Work (Biology 290)**

- a. Prerequisite: Biology 105 and 106.
- b. For one-half unit of credit, field work must entail at least four hours per week. For one unit of credit, field work must entail at least eight hours per week.
- c. Students should see the faculty adviser regularly during the first month of placement, especially if there are any placement problems.
- d. Requirements: The purpose of field work is to provide an opportunity for the student to integrate experiential learning with what has been learned in classes. Thus, the Department requires an academic paper, which must be submitted to the faculty adviser, along with the field work journal, before the study period begins. A copy of the paper must also be submitted to the Field Work Office.

- e. A list of some of the field work opportunities related to biology can be found on the Students & Advising web page.

## 2. **Retaking a Failed Course**

A student may retake a course that they have failed, but may not retake a course in which the grade was D or above. The original F remains on the student's record, and the student must fulfill all the requirements of the course when retaking it.

## E. **Exceptions in Biology**

After consultation with the adviser, a student may petition the Department to make an exception to one of the basic requirements if there are compelling reasons or extenuating circumstances. Petitions for exceptions should be submitted in writing to the Chair of the Department, explaining the nature of the exception desired, the special circumstances, and details of any courses taken in another department or institution that are related to the petition. Approval of the adviser must accompany such a request. In special cases, the Department has in the past approved petitions in the following areas:

1. To allow sophomore transfer students (and other special categories of students) to graduate with fewer than 7 graded units in Biology.
2. To count a 300-level course taken in the junior year as one of the two senior year required courses because of extenuating circumstances.
4. To approve one unit of related course work from another department as part of the 2 additional courses in the natural sciences.

## VI. STUDENT RESEARCH

Student research provides the opportunity for intensive study and research in an area of special interest. The Biology faculty welcomes student researchers in their laboratories. Faculty research interests are available on the Biology department website (<http://biology.vassar.edu/>). You should consult with faculty members about their interest in sponsoring a student independent research project in a particular semester. Due to other obligations and leaves some faculty members may not sponsor students some semesters.

Studies employing vertebrate animals, as subjects must be cleared through the faculty supervisor with respect to methodological and ethical concerns. The Institutional Animal Care and Use Committee must approve all studies using animal subjects.

### A. Independent Work

There are many opportunities for students to conduct Independent Research with Biology faculty. Independent research may be an empirical investigation or one based on library research and may begin as early as the freshman year. Independent work may be elected, with permission of a supervising faculty member, as Biology 178 (1/2 unit ungraded work open to freshman and sophomores only), Biology 298 (ungraded junior independent work), Biology 399 (ungraded senior independent work) or Biology 303 (graded senior research). (Bio 298 & 399 may be taken for one half or for a full unit of credit. A full unit's credit must involve student time and effort equivalent to a regular full-unit course at Vassar.) A final paper is usually required and the faculty adviser will determine its content and form.

### B. Senior Independent Research – Biology 303

Senior Research is available to students who have demonstrated their interest in research and who have made arrangements with a faculty member to work under their supervision. Students are expected to design a research project under the guidance of their faculty supervisor and submit it for approval from a second faculty member who will discuss the project and read the final paper. Under some circumstances students may work on biology projects at other institutions. This work may be considered for Biol 303 credit if: there is a Biology department supervisor who is intimately involved with the project, and if it receives approval from the biology department. Should this option be considered the student should submit a the project design along with a cover letter to the biology department requesting permission for this arrangement. Research with faculty conducted during the summer may comprise a portion of the Senior Research requirement provided that data analysis and paper writing are conducted during the fall or spring semester.

The presentation of Senior Research must be in both written and oral form. Written presentation must be in the form of a scientific paper whose form is determined by the faculty adviser. Both the primary adviser and the second reader will read the final paper. Students are also required to present the results of their research as part of the Biology 303 presentations that take place at the end of the semester. Faculty and students attend these presentations and it is an excellent forum for learning about the research conducted by our student colleagues.

## VII. OTHER OPPORTUNITIES FOR INVOLVEMENT IN THE MAJOR

**Biology Majors Committee** The Biology Majors Committee gives student majors the opportunity to plan both social and educational events for students, faculty, and staff. Members of the Biology Majors Committee also coordinate the distribution and tabulation of major's evaluations at the end of each semester. Students on the committee can also serve as a voice to raise concerns or suggest changes within the department.

**Sigma Xi** Vassar College hosts a chapter of Sigma Xi, the national honor society for sciences. Induction into Sigma Xi is based on academic merit.

## VIII. DEPARTMENT HONORS AND PRIZES

### A. Criteria for Determining Departmental Honors

1. A superior cumulative GPA (approximately 3.6) in all units in Biology and in Chem 108 & 109, or Chem 125; and Chem 244;
2. A good cumulative GPA (approximately 3.3) in other courses in the Natural Sciences division;
3. Evidence of outstanding initiative and integrative ability as demonstrated by performance in advanced Biology courses; and,
4. Demonstrated creativity and initiative through independent research conducted while a senior at Vassar College. A written report and an oral presentation are required. Please see your major adviser for more details.

### B. Biology Department Prizes

1. The Kate Roberts Prize for excellent work in biology
2. The Virginia Swinburne Brownell Prize for excellence in biology
3. Harriet Gurney Van Allen Prize for a promising sophomore

## **IX. CAREERS IN BIOLOGY**

Majors and prospective majors in biology frequently ask whether they will be able to obtain work relevant to their undergraduate course work in biology upon graduation. In general, employment opportunities can be divided into three categories: (1) those available upon completion of an undergraduate program in Biology, (2) those requiring a master's degree, and (3) those requiring a doctoral degree.

### **A. Employment Opportunities for Individuals with a B.A. Degree**

In a sense, careers for liberal arts graduates with a major in biology include those that are available to all liberal arts graduates as individuals having been educated in a broad sense. These include, for example, technical positions in private companies (e.g., environmental testing companies, pharmaceuticals, environmental engineering), and state and federal agencies. A list of kinds of employment secured by Vassar graduates in Biology can be obtained in the Office of Career Planning.

### **B. Employment Opportunities for Individuals with a Masters Degree**

Biologists with Masters degrees are found in many of the settings listed above as well as in two-year colleges, research institutions, private companies, and state and federal government. They frequently have more autonomy than employees who lack a graduate degree but they generally have a more limited range of employment opportunities than individuals who possess a Ph.D. degree.

Currently there is a large demand for biology teachers, so biologists with a Master of Arts in Teaching (MAT) are highly sought after. MAT programs are available for students who did not obtain undergraduate teaching certification. These are usually one-year programs available in graduate schools of Education at universities. Many students who did obtain teaching certification go on to Masters programs in Biology as a next step in formal training. These are typically two-year programs in graduate schools of Education. Students interested in careers in education should consult with members of the Department of Education for further details.

### **C. Ph.D. Degree in Biology**

The Ph.D. degree is offered in most of the major areas in Biology. These doctoral programs are research oriented, and commonly lead to positions in academic settings or industry. Most Ph.D. candidates aspire to academic positions that combine teaching and research. Other types of employment for holders of the PhD degree include research in fields of pharmaceuticals, agriculture, food science, and environmental companies, and positions in government or industry in areas related to Biology (e.g., National Institutes of Health, Department of Agriculture, Department of Commerce, etc.).

It is usually the case that students admitted to universities for a Ph.D. degree have a tuition waiver, a teaching or research assistantship stipend (around \$25,000), and adequate medical benefits. While not a high salary, it is usually enough to live on comfortably for the five years that it takes to complete a Ph.D. program.

### **D. Application to Graduate Programs**

Because the number of applicants for graduate education greatly exceeds the number of candidates admitted, students should be aware of factors that may increase their chances for admission to a graduate program. These factors include grades, letters of recommendation, standardized test scores, and research experience.

The importance of a good grade point average cannot be over estimated. Students with good grade point averages will be more likely to be admitted for advanced study in the best graduate schools. Other factors are important, however. During their junior year, students should re-evaluate their program of study to ensure that they will have close contact with at least one faculty member who will be able to write letters of recommendation with real knowledge of the student's abilities and potential. This contact may occur by simply taking several classes with a faculty member or by performing independent study or field work under the supervision of the faculty member. Since involvement in independent study or research may confer a selective advantage, students with these interests should begin independent work as early as their junior year. Information concerning ongoing or completed independent work can then be included in application materials and letters of recommendation. Finally, since admission committees consider applicants' scores on standardized tests such as the Graduate Record Examination; students may want to prepare for these exams by reviewing basic mathematics and vocabulary skills. Preparation for the specialty GRE in Biology can be accomplished by a thorough review of a good introductory biology text.

Information about specific graduate programs including degree requirements, tuition, financial assistance, and admissions requirements, is available at the web sites of all graduate schools.