Integrated Biology, M.S.

The Department of Biology’s graduate programs in integrated biology (iBio) emphasize original research and developing the skills essential for publishing and communicating research findings to the scientific community. Research programs in the department cover many areas of the biological sciences: cell biology, developmental biology, ecology, evolution, genetics, and neurobiology. Graduate study in the department provides students with a broad understanding of these basic areas.

Newly admitted graduate students are assigned a temporary advisor and together they discuss the student’s educational background to formulate a first-semester study plan before registration. The programs allow each student to tailor coursework to their own research interests. Students may be advised to take specific coursework in order to enhance their background in certain areas.

During the first year, students whose preparation in chemistry, genetics, mathematics, or physics is insufficient may need to remedy deficiencies by taking appropriate coursework.

Entering students typically will have taken the following courses: organic chemistry, biochemistry, calculus or physics, and 20 s.h. of coursework in biology including a fundamental genetics course.

Students with bachelor’s degrees outside the biological sciences may request modification of certain area requirements. The Graduate Affairs Committee decides whether portions of the requirements may be waived.

Learning Outcomes

Graduates will:

- master the skill of reading, understanding, and summarizing primary literature across a variety of biology subdisciplines, demonstrating effective scholarly communication in the process;
- explain in writing the experimental rationale, articulate the central hypothesis, and outline the major investigative steps that will be undertaken in a student’s primary area of research;
- orally communicate established scientific concepts as well as ongoing research hypotheses, experimental design, and results to a wide array of audiences using established scientific communication norms;
- master in-depth pedagogical concepts through advanced lecture courses and engage in a vertically integrated critical analysis of a single topic over many levels of basic biology;
- learn and implement field-specific experimental processes, techniques, and data analyses in a responsible manner consistent with current bioethical protocols; and
- establish networking connections within the scientific profession, from peer level through established, independent researchers.

Requirements

The Master of Science program in integrated biology requires 30 s.h. of graduate credit with thesis or 34 s.h. of graduate credit without thesis. Students must maintain a cumulative g.p.a. of at least 3.00. Entering students are typically admitted only to the thesis program; however, students who decide not to continue their studies may opt for the nonthesis program.

Students must enroll in at least two advanced lecture courses (or courses approved by the Graduate Affairs Committee). In the first year, students enroll in BIOL:5512 Readings in Genetics in the fall semester and BIOL:6298 Concepts, Models, and Systems in Biology (COSMOS) Seminar in the fall and spring semesters. In subsequent years, students continue to enroll in BIOL:6298 for 1 s.h.

At the end of the first year, students take a qualifying exam that consists of essay questions based on major themes in biology. Students must perform satisfactorily on this exam in order to continue in the program. In the second year, students take one seminar course (2 s.h.) with significant writing and oral presentation components, as well as BIOL:6188 Seminar: Writing in Natural Sciences in the fall and spring semesters.

Thesis students may count a maximum of 9 s.h. of research credit toward the 30 s.h. required for the master’s degree with thesis. Remaining coursework is tailored to a student’s background and career goals and is selected in consultation with the student’s advisory committee. The thesis is based on original research. After the thesis is accepted by the student’s supervisor and advisory committee, the student must pass an oral examination based on the thesis research and on related subjects. Nonthesis students must write a library research report for a maximum of 4 s.h. of credit. They may apply up to 8 s.h. of research credit toward the 34 s.h. required for the master’s degree without thesis.

Visit the iBio Graduate Program website for more detailed information about the Master of Science program.

Admission

Individuals who wish to pursue graduate study in integrated biology may apply to the Master of Science with thesis program. The M.S. without thesis is an exit program and does not admit entering graduate students.

Application materials for the graduate program must be uploaded to the University’s Office of Admissions website. These are reviewed by the Department of Biology Graduate Recruitment and Admissions Committee. For detailed instructions, visit iBio Application on the integrated biology graduate program website.

Applicants must hold a valid B.A. or B.S. from an accredited institution. They must supply official transcripts from each undergraduate and graduate institution they have attended. The Graduate Record Examination (GRE) General Test is not required for admission, but if students wish to have their results considered they must include their verbal, quantitative, and analytical writing scores.

Applicants whose first language is not English must score at least 100 (internet-based) on the Test of English as a Foreign Language (TOEFL) and have their score sent to the Office of Admissions. International applicants who received their degrees (either bachelor’s or master’s) from a U.S. institution are exempt from this requirement. All international students whose first language is not English are required to take the on-campus English Proficiency Evaluation before they first enroll for classes.

Successful applicants for graduate admission typically have a g.p.a. of at least 3.00 (on a 4.00 scale) and a Graduate Record
Examination (GRE) General Test score above 308 (combined verbal and quantitative), although the GRE exam is not a requirement for admission. The admissions committee also considers letters of recommendation, the personal statement, and other appropriate criteria, especially prior research experience.

Although most applicants will have completed undergraduate programs in biology, the department also considers applicants with backgrounds in related sciences, providing they have taken the required coursework.

Students applying for admission to the M.S. with thesis program should have a bachelor's degree in one of the biological sciences. Students with bachelor's degrees in other areas may need to register as nondegree students and complete the equivalent of the department's bachelor's degree program prior to consideration for admission. Nondegree students must complete chemistry, physics, and calculus requirements in addition to the biology courses listed in the undergraduate program. Nondegree students should consult the department's graduate program administrator before applying for admission.

Applications are reviewed on a rolling basis prior to January 1; visit the Integrated Biology Graduate Program website for updated deadline information.

Applicants must meet the minimum admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

### Financial Support

Students generally are supported by available research or teaching assistantships. Offers of admission include information about offers of financial support.

### Career Advancement

The graduate program in integrated biology prepares students for careers in academic research, science education, industry, government, and a variety of other careers in which their scientific expertise can be used.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.