

DEPARTMENT OF BIOLOGY

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The mission of the Department of Biology at Converse College is to provide a broad course of study in basic biological science. The biology curriculum is designed to prepare biology majors for a wide spectrum of opportunities in graduate school, professional school, and employment. Courses for General Education students are designed to cultivate an understanding of the biosphere and the place of humans within it.

DEGREES AND PROGRAMS OFFERED

The Biology Department offers a Biology Major, with either a BA or BS degree, and a Biology Minor. Students with a Biology Major may receive Secondary Teaching Certification. The department also participates in the Biochemistry Major, described with the Chemistry program in this catalog. Students may not double-major in Biology and Biochemistry. Many biology students participate in pre-health professions programs, described elsewhere in this catalog. These are not part of the major, and the major is not required for them.

THE BIOLOGY MAJOR

Students majoring in biology may receive either a Bachelor of Arts (BA) or a Bachelor of Science (BS) degree. Both degrees require students to take 32 credit hours in Biology and to take the Assessment Exam, as outlined below. Additionally, students must complete Cognate Coursework (non-biology), which is slightly more rigorous for the BS degree, and the Research Requirement, which is also slightly different for BA and BS students. These are outlined below.

A student interested in biology should inform her adviser as early as possible. It is highly recommended, although not necessary, that she begin the chemistry sequence during her freshman year and that she begin the biology program by the first semester of her sophomore year. She should work closely with her adviser to plan her course of study.

At the time of graduation, each student with a biology major should be able to

1. research, write, and present a paper on a selected topic in biology.
2. apply scientific methodology in laboratory situations by designing and implementing experiments.
3. demonstrate knowledge of basic biological principles such as cellular structure and function, metabolism, diversity, ecology, evolution, reproduction, and development.
4. explain the place of humans in the biotic world.
5. compete successfully for professional opportunities following graduation.

Cognate Coursework

Bachelor of Arts

CHM 201-202 (General College Chemistry)	8 hours
CHM 303 (Organic Chemistry I)	4 hours
PHY 241 or 251 (Elements or Essentials of Physics I)	4 hours
MTH 110 (Elementary Functions) or placement in MTH 120*	0 or 3 hours
MTH 120 (Calculus and Analytical Geometry) or BAD 303, ECN 303, or PSY 303 (Social Science Statistics)	3 hours
One other non-biology science or math**	<u>3-4 hours</u>
TOTAL COGNATE CREDIT HOURS	22-26 hours

Bachelor of Science

CHM 201-202 (General College Chemistry)	8 hours
CHM 303-304 (Organic Chemistry)	8 hours
PHY 251-252 (Essentials of Physics)	8 hours
MTH 120 (Calculus and Analytical Geometry I)	3 hours
MTH 210 (Calculus and Analytical Geometry II) or MTH 323 (Probability and Statistics) or BAD 303, ECN 303, or PSY 303 (Social Science Statistics)	3 hours
One other non-biology science or math** ...	<u>3-4 hours</u>
TOTAL COGNATE CREDIT HOURS	33-34 hours

*BA students must be mathematically prepared for the first calculus course (MTH 120). Students who enter the college placed at that level or higher have fulfilled the requirement (with 0 hours). Students who enter the college placed at a lower level must pass MTH 110 (3 hours) to fulfill this requirement.

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**Non-biology science classes include chemistry or physics beyond the cognates required for the degree, computer science (CSC 201 or above), Geology (CHM 160), or Astronomy (PHY 143). Acceptable mathematics courses include any beyond the level demanded for the degree.

Biology Coursework for the Bachelor of Arts and the Bachelor of Science

The Biology major requires 32 credit hours in biology coursework. At least 18 of these 32 credit hours must be at the 300-level or higher. As part of the 32 hours, students must take Junior Seminar (1 hour) and Senior Seminar (2 hours). Students must also complete coursework in each of the sub-fields of biology listed below. The remainder of the 32 hours is elective coursework.

Cellular Biology (BIO 310 or BIO 312)	4 hours
Animal Diversity (BIO 202, BIO 308, or BIO 309)	4 hours
Plant Biology (BIO 203 or BIO 303) ...	4 hours
Genetics (BIO 301 or BIO 408)	4 hours
Evolution (BIO 302)	3 hours
Field Biology (BIO 303 or BIO 411)	4 hours

The following courses do not apply to the biology major: BIO 100, 105, 120, 199H, and 481. A maximum of 4 hours each of BIO 317 and 490 may apply to the biology major.

Research Requirement

All biology majors are required to gain research experience. Students may fulfill this requirement by performing a research project under the direction of biology faculty at Converse College, by performing a research project under another person, or as part of a summer program. All research performed away from Converse must be approved by the biology faculty at Converse College. BA students may also fulfill this requirement by successful completion of BIO 480. This option is not available to BS students, although they may take BIO 480 as part of their biology elective coursework.

Assessment Exam

In addition to the academic and research requirements, all biology majors must complete an assessment exam during the last semester of their senior year.

Secondary Teaching Certification

Majors who plan to be certified must consult with the Education Department for specific requirements. They must complete the following courses: BIO 202, 203, 312, 411, PHY 242 or 252, EDU 387, and ISC 303.

Minor in Biology

Students minoring in biology must complete 24 hours of biology credit above the level of BIO 100. The following courses may not count towards the minor: BIO 100, 105, 120, 199H, 391, 481, 491, and 497.

*100. CONCEPTS IN BIOLOGY/FOUR CREDITS

GEP or elective credit. Not accepted for major or minor credit. An introduction to the fundamental principles of biological activity and scientific methodology. *Lecture and laboratory.* A non-refundable laboratory fee of \$25.00 is required. Offered fall and spring semester.

*105. HUMAN BIOLOGY/FOUR CREDITS

GEP or elective credit. Not accepted for major or minor credit. A study of the principles of biology focusing on human issues, including diseases, impact of human population on ecosystems, physiological functions of the human body, and role of biotechnology in our society. The ethical aspects of various issues will be discussed. *Lecture and laboratory.*

*120. SPRING FLORA/FOUR CREDITS

GEP or elective credit. Not accepted for major or minor credit. This course introduces students to the variety of plants that live locally and form much of the spring bloom. Lectures will cover a broad range of general botany and ecology topics. Weekly laboratories will be held outdoors at a variety of plant habitats. Students will learn many of the local plants during laboratory, and they will perform field experiments and collect ecological data. A non-refundable laboratory fee of \$25.00 is required. Offered alternate springs.

*199H. FRESHMAN HONORS SEMINAR/ THREE OR FOUR CREDITS

GEP or elective credit. Not accepted for major or minor credit. A study of a selected subject within the discipline, which will vary from term to term. The course is designed to encourage student participation in the intellectual processes through class discussion, research and writing, special projects, problem solving and evaluation and defense of positions. When the subject matter duplicates that of another course, credit toward graduation will be granted for only one of the courses. Offered periodically in the fall or winter.

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*202. GENERAL ZOOLOGY/FOUR CREDITS

GEP, major, minor, or elective credit. Prerequisites: BIO 100 or adviser placement. A study of the morphology, taxonomy, and physiology of representative types from the Animal Kingdom. Lecture and laboratory. Lab fee of \$30.00. Offered fall semester.

*203. GENERAL BOTANY/FOUR CREDITS

GEP, major, minor, or elective credit. Prerequisites: BIO 100 or adviser placement. An introduction to plants, their activities, and their relationship to humans. Lecture, laboratory, and field trips. Lab fee of \$30.00. Offered spring semester.

211. HUMAN PHYSIOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: CHEM 202 and either BIO 100 or 202. A study of the functions of the basic human organ systems. Physiological processes will be related to organ structures and integrated with the functioning of the whole organism. Lecture and laboratory. A non-refundable laboratory fee of \$50.00 is required. Offered alternate years.

270. HUMAN SEXUALITY/THREE CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A study of the human reproductive system with primary emphasis on anatomy and physiology. Consideration also will be given the psychological, religious, and ethical aspects of human sexuality. Lecture. Offered alternate years.

299H. INTERDISCIPLINARY HONORS COURSE

This course is team taught by members in two departments and is open to Nisbet Honors Program members and to others who meet Honors Program guidelines. All students registering for these courses must register not only through the Honors Program but also with their adviser and the Registrar's Office.

301. GENETICS/FOUR CREDITS

*Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A study of the fundamental principles of heredity with emphasis on its molecular basis. Experimental work with *Drosophila melanogaster*, bacteria, and viruses will be included. Lecture and laboratory. A non-refundable laboratory fee of \$40.00 is required. Offered alternate years.*

302. EVOLUTIONARY BIOLOGY/THREE CREDITS

Major, minor, or elective credit. Prerequisites: BIO 301 or permission of the instructor. Junior or senior level is recommended. A survey of the theory, history, and principles of evolutionary biology. Both macroevolutionary and microevolutionary topics are covered and primary literature is discussed. Offered annually.

303. SYSTEMATIC BOTANY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A study of the taxonomy of the vascular plants with emphasis on the angiosperms. Laboratory will include work in the field. Lecture and laboratory. A non-refundable laboratory fee of \$30.00 is required. Offered alternate years.

304. COMPARATIVE VERTEBRATE EMBRYOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A comparative study of the development of selected vertebrates. Lecture and laboratory. A non-refundable laboratory fee of \$40.00 is required. Offered alternate years.

305. HUMAN AND COMPARATIVE ANATOMY/FIVE CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 202, or 203. A comparative study of the origin, structure, and function of organ systems of humans and other selected vertebrates. The gross anatomy of organ systems in relation to their functions are studied. Laboratory includes a hands-on approach to the identification of anatomical structures. Lecture and laboratory. A non-refundable laboratory fee of \$50.00 is required. Offered annually.

308. INVERTEBRATE ZOOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A study of the morphology and biology of invertebrates. Lecture, laboratory, and field trips. A non-refundable laboratory fee of \$30.00 is required. Offered alternate years.

309. PARASITOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A taxonomic approach to the ecology, physiology, and pathology of parasites, with emphasis on those of medical and veterinary importance. Lecture and laboratory. A non-refundable laboratory fee of \$30.00 is required. Offered alternate years.

310. CELL BIOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: BIO 100, 202, or 203. A study of cell structure, function, and reproduction. The course covers both prokaryotic and eukaryotic cells. Laboratories are designed to offer students a wide variety of both traditional and modern techniques. A non-refundable laboratory fee of \$40.00 is required. Offered annually.

312. MICROBIOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 202, or 203. Prerequisite or corequisite CHM 303. A study of the physiology and morphology of bacteria, algae, and fungi, and their roles in sanitation, agriculture, and medicine. Lecture and laboratory. A non-refundable laboratory fee of \$40.00 is required. Offered alternate years.

317. STUDY/TRAVEL PROGRAM/THREE CREDITS

Major, minor, or elective credit. Maximum of 4 hours allowed for major credit. Prerequisites: one of BIO 100, 201, 202, or 203 and consent of instructor. A special program offering the student the opportunity to learn about ecosystems in the United States and in foreign countries. The student will incur additional costs. Offered during winter or summer term.

330. INTRODUCTION TO IMMUNOLOGY/THREE CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203 (201 is recommended). Pre- or Co-requisite: Chemistry 304. A study of the cellular and molecular aspects of the immune response of the human body mounted against pathogens, Vaccination, grafting, tumor immunology, and autoimmune diseases are also discussed. Lecture. Offered alternate years.

350. SPECIAL TOPICS IN BIOLOGY/THREE CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203 and consent of the instructor. Selected topics in advanced biological study. Offered intermittently depending on student interest.

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391. JUNIOR SEMINAR/ONE CREDIT

Required of all junior majors. Major credit. Prerequisites: one of BIO 100, 201, 202, or 203. Directed reading, study, and discussion designed to reemphasize the fundamental principles of biology, to correlate and summarize the course work of the major program and related fields, to introduce new areas and ideas, and to provide experience in literature review and oral presentation. *Conferences as needed. Offered fall term.*

401. BIOLOGY FOR TEACHERS/THREE CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A special course covering the modern techniques for the teaching of biology on the secondary level. *Lecture, laboratory, and field trips. Offered Summer Session I.*

408. MOLECULAR BIOLOGY OF THE CELL/ FOUR CREDITS

Major, minor, or elective credit. Prerequisite: one of BIO 301, 310, and 312. The study of molecular mechanisms lying behind the workings of the cell, with emphasis on DNA, RNA, and proteins. Both lecture and laboratory will involve the study and use of modern biotechnological protocols and procedures. *Lecture and laboratory. A non-refundable laboratory fee of \$50.00 is required. Offered alternate years.*

411. ECOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203. A study of the principles governing the relationships between organisms and their environment. Laboratory will include extensive field work. *Lecture and laboratory. A non-refundable laboratory fee of \$30.00 is required. Offered alternate years.*

420. HISTOLOGY/FOUR CREDITS

Major, minor, or elective credit. Prerequisites: one of BIO 100, 201, 202, or 203 (201 is recommended). The study of animal tissues with emphasis on how structure and function interrelate. The laboratory emphasizes tissue recognition at the microscopic level. *Lecture and laboratory. A non-refundable laboratory fee of \$40.00 is required. Offered alternate years.*

480. RESEARCH METHODS IN BIOLOGY/ THREE CREDITS

Major, minor, or elective credit. Prerequisites: junior or senior class standing and completion of one biology course at the 300 or 400 level. This course fulfills the research requirement for the BA major in Biology. Students in this course are introduced to the diversity of thinking and practice in biological research. They will read literature from a variety of sources, ranging from philosophers to field and laboratory

researchers. As part of the course, each student will perform an experiment, analyze data using statistical methods, and prepare her own research proposal with a well-designed experiment. *Offered alternate years.*

481. INTERNSHIP IN BIOLOGY/THREE OR FOUR CREDITS

Elective credit. Not accepted for major or minor credit. Prerequisites: One of BIO 100, 201, or 203 and consent of instructor. A special course to afford the student practical work experience for academic credit. Open to juniors and seniors with an adequate background in biology. A journal and oral report of the internship are required. Graded on a pass/fail basis. Credit and work to be arranged according to the experience desired. *Offered as needed.*

485. RESEARCH/ONE TO FOUR CREDITS

Major, minor, or elective credit. Prerequisite: Permission of instructor. A special course to allow the student to pursue a research project. *May be repeated for a maximum of six credit hours. A non-refundable laboratory fee of \$25.00 is required.*

490. DIRECTED INDEPENDENT STUDY IN SPECIAL TOPICS/ONE TO FOUR CREDITS

Major, minor, or elective credit. Maximum of 4 hours allowed for major credit. A special course to allow the student to pursue independent study or research. *Credit and work to be arranged according to the problem, and topic must be approved by the instructor. May be repeated for credit.*

491. SENIOR SEMINAR/TWO CREDITS

Required of all senior majors. Major credit. Prerequisites: one of BIO 100, 201, 202, or 203. In addition to the requirements as listed under BIO 391, the senior biology major will conduct independent research on an assigned topic and submit a written report. *Conferences as needed. Offered fall term.*

497. HONORS/THREE CREDITS

Major credit. Prerequisite: senior class standing, approval by the department, and permission of the instructor. This course is for qualified students pursuing honors in biology. Students perform independent research and write a thesis under the direction of a Biology faculty member.