Biology

Biology is the study of life, its variety and processes. It emphasizes the relationship between structure and function in living systems and their interactions with the environment. The discipline is dynamic and rapidly advancing with the development of biotechnology and information technology. The major in biological sciences is designed for students who wish to enter graduate or health professional schools, the teacher credential program, or to seek careers in science education, business, industry or government. The minor will allow students in other majors to get a solid background in biology with further room to explore in-depth knowledge in a selected area. The Biology Program provides its students with a strong theoretical foundation in biology, combined with extensive, hands-on laboratory experiences using state-of-the-art technology. Students take a series of core courses augmented by upper-division electives selected from areas of special interest.

Programs offered:
Bachelor of Science in Biology
Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology
Minor in Biology
Certificate in Biotechnology

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Requirements for the Bachelor of Science Degree in Biology (120 units):

Lower Division Requirements (31 units):
(2 units of the following will be counted toward lower division GE credits, 4 units in each of three different disciplines)

1. Biology
   BIOL 200 Principles of Organismal and Population Biology ............... 4
   BIOL 201 Principles of Cell and Molecular Biology .................... 4
   BIOL 202 Biostatistics .................................................... 3

2. Mathematics
   MATH 150 Calculus I ....................................................... 4

3. Chemistry
   CHEM 121 General Chemistry I .......................................... 4
   CHEM 122 General Chemistry II ....................................... 4

4. Physics
   PHYS 200 General Physics I ............................................ 4
   PHYS 201 General Physics II ........................................... 4

For General Biology and Pre-Professional Students:
Upper Division Requirements (32 units):

1. Organic Chemistry
   CHEM 311 & 312 Organic Chemistry I .................................. 4
   CHEM 314 & 315 Organic Chemistry II ................................ 4
   (Organic Chemistry I & II taken at the 200 levels from community colleges are accepted as a year (8 units) of organic chemistry for the Biology major.)

2. Biology
   BIOL 300 Cell Physiology ............................................. 4
   BIOL 302 Genetics and Evolution ..................................... 4
   BIOL 330* Ecology and the Environment ............................. 4
   BIOL 346* Scientific and Professional Ethics ....................... 3
   BIOL 400 Molecular Biology and Molecular Genetics ................ 4

Electives in Biology (15 units): A minimum of 15 units chosen from 300 to 400 level upper division biology courses, with at least one lab-based course and only one course that can be taken at 300 level (as courses from BIOL 331 to 333 would be counted toward the major). CHEM 318 or CHEM 400 could also be taken to satisfy the electives.

Required Supporting and Other GE Courses (42 units):
ENGL 330 Writing in the Disciplines .................................... 3
American Institutions Requirement ...................................... 6
Other GE Courses in Categories A-E ...................................... 33

For Biology Students in Cell and Molecular Biology Emphasis:
Upper Division Requirements (40-41 units):

1. Organic Chemistry and Biochemistry (7 Units):
   CHEM 311 Organic Chemistry I ......................................... 3
   CHEM 312 Organic Chemistry I Laboratory ............................. 1
   CHEM 314 Organic Chemistry II ........................................ 3
   CHEM 315 Organic Chemistry II Laboratory ........................... 1
   CHEM 400 Biochemistry .................................................. 4
   Organic Chemistry I & II taken at the 200 levels from community colleges are accepted as a year (8 units) of organic chemistry for the Biology major.)

2. Biology (27 Units):
   BIOL 300 Cell Physiology ............................................. 4
   BIOL 301 Microbiology .................................................. 4
   BIOL 302 Genetics and Evolution ..................................... 3
   BIOL 330* Ecology and the Environment ............................. 4
   BIOL 346* Scientific and Professional Ethics ....................... 3
   BIOL 400 Molecular Biology and Molecular Genetics ................ 4
   BIOL 401 Biotechnology and Recombinant DNA Technologies ...... 5
3. Computing in Biology (3-4 units)
   BIOL 450* Research Design and Data Analysis ..........3
   BIOL 431* Bioinformatics ..................................4

4. Service Learning (2 units)
   BIOL 492 Biotech Internship ................................2-3
   BIOL 494 Independent Research ..............................2
   BIOL 497 Directed Study ......................................2

5. Capstone (1 Unit):
   BIOL 499 Senior Capstone Colloquium ...................1

(Courses with * are double-counted toward UD GE credits.)

ELECTIVES IN BIOLOGY (10 UNITS):
A minimum of 10 units chosen from 400 level courses, excluding BIOL 410.

REQUIRED SUPPORTING AND OTHER GE COURSES
(34-39 units):
   ENGL 330 Writing in the Disciplines .................3
   American Institutions Requirement ..................6
   Other GE Courses in Categories A-E ................29-30

REQUIREMENTS FOR THE CERTIFICATE IN
BIOTECHNOLOGY (24-25 units):
(For students with a B.S. degree in biology pursuing a certificate in
biotechnology)

1. B.S. degree in biology (may be concurrent);
2. Completion of the following courses with C or better grades:
   CHEM 318 or 400 Biological Chemistry or Biochemistry I....3-4
   BIOL 401 Biotechnology and Recombinant DNA Technology ....5
   BIOL 420 Cellular and Molecular Immunology .............3
   BIOL 431 Bioinformatics ..................................4
3. Complete another 6 units of UD biology courses in consultation
   with the program director;
4. Complete a Biotech Internship course;
5. Complete the Capstone course;
6. Approval by the program director.

Note: This program had not received final approval at the time this
catalog went to press. Please visit our Website at www.esc.edu for
confirmation of its approval.