

PROPOSED CHANGES TO THE __BS BIOLOGY__ DEGREE PROGRAM IN THE COLLEGE/SCHOOL OF __NATURAL SCIENCES_ SECTION IN THE UNDERGRADUATE CATALOG 2014-2016 or LAW SCHOOL CATALOG 2014-2016

Type of Change

X Academic Change

Degree Program Change (THECB² form required)

1. IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST CONSULT NEAL ARMSTRONG TO DETERMINE IF SACS-COC APPROVAL IS REQUIRED.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Is this a new degree program?</td>
<td></td>
<td>X</td>
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<td>Does the program offer courses that will be taught off campus?</td>
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<td>Will courses in this program be delivered electronically?</td>
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2. EXPLAIN CHANGE TO DEGREE PROGRAM AND GIVE A DETAILED RATIONALE FOR EACH INDIVIDUAL CHANGE (include page numbers in the catalog where changes will be made):

1. Option VIII: Teaching.
   a. Req #6 and 13.a.: Add SCI 360 (Topic 4: Physics by Inquiry) and PHY 108 (Introduction to Research) as an alternative to second half of physics sequence.
   b. Req #13 a: Add CH 369 to be counted as upper-division Biology hours.

Rationale:

a. Composite certification in Texas means that students who major in biology, take two physics courses, and become teachers both legally and practically can find themselves assigned to teach physics at some point in their careers. Thus we have to ask how best to prepare them. The American Physical Society is finalizing recommendations on the preparation of physics teachers, and the recommendation for exemplary preparation is that future physics teachers have the opportunity to study physics with a master physics teacher who models for them the best pedagogical strategies they would need in a high school setting. SCI 360 (Topic 4: Physics by Inquiry), is the best course at the university for this purpose. At the same time, biology majors also need fluency in standard numerical problems, if only because they may wish to keep career options open by taking the MCAT. The PHY 108 course accompanying SCI 360 addresses this need. While we do not want to forbid biology majors from satisfying their physics requirement with conventional physics courses, we do wish to ensure that the SCI 360/PHY 108 combination which is probably preferable preparation, will be allowed.

b. In the Biology teaching option there are two tracks, one for students seeking Composite Science certification and one for students seeking Life Science certification. The current requirements for upper-division biology for Composite Science certification add up to a minimum of 21 upper-division hours beyond BIO 325, instead of the required 24 upper-division hours. Allowing 3 hours of Biochemistry to count towards upper-division biology hours will help students meet the 24 upper-division hours requirement.

2. Option III: Marine and Freshwater Biology
   a. Change the name of Option III to Marine and Freshwater Science
   b. Replace MNS307 Introduction to Oceanography with MNS310 Fundamentals of Marine Science

Rationale:

a. The current title, *Marine and Freshwater Biology*, does not accurately reflect the content of the degree. Marine Science is inherently interdisciplinary, requiring knowledge of not only biology but also chemistry, physics, etc. for understanding complex problems. Changing the title to *Marine and Freshwater Science* would more accurately reflect the content of the degree and the variety of instruction that students experience in the program.

b. Currently, students in the Option III degree plan are required to take MNS307, Introduction to Oceanography, a course that is targeted to students outside of the College of Natural Sciences.
Students in the degree plan, who need to complete upper-division coursework in marine science, would benefit from a more rigorous and in-depth introduction to marine science. The course MNS310 Fundamentals of Marine Science has been designed to provide a greater depth and rigor of instruction, and it will better prepare students for their upper-division coursework.

3. **SCOPE OF PROPOSED CHANGE**
   a. Does this proposal impact other colleges/schools? Yes___ X No___
      If yes, then how?
      UTeach students currently take this class, which is designed for pre-service science teachers who might teach physics at the middle and/or high school level. Other interested UTeach students will be accommodated.
      The proposed change to Option III does not impact other programs or schools.

   b. Will students in other degree programs be impacted (are the proposed changes to courses commonly taken by students in other colleges)? Yes___ No___
      If yes, then how?
      The proposed change to Option III does not impact students in other degree programs.

   c. Will students from your college take courses in other colleges?
      If 3 a, b, or c was answered with yes:
      How many students do you expect to be impacted?
      Impacted schools must be contacted and their response(s) included:
      Person communicated with:
      Date of communication:
      Response:

   d. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? No
      If yes, explain:
      If yes, undergraduate studies must be informed of the proposed changes and their response included:
      Person communicated with:
      Date of communication:
      Response:

   e. Will this proposal change the number of hours required for degree completion? If yes, explain:

4. **COLLEGE/SCHOOL APPROVAL PROCESS**
   Department approval date:
   College approval date:
   Dean approval date:

**PROPOSED NEW CATALOG TEXT:**
Bachelor of Science in Biology

The Bachelor of Science in Biology degree program offers ten options. The options have certain prescribed work in common, and each option has additional requirements. Many fields in the study of biological systems require broadly based training that transcends the classical boundaries of biology. In planning a program of work to meet his or her degree requirements, a student interested in specializing in these interdisciplinary areas should choose courses both in biology and in sciences that complement biology. Students who plan to complete the program within four years will have little flexibility in course selection unless they plan a schedule in advance. More information is given in Order and Choice of Work below. Students who plan to follow option IX, biology honors, must be admitted to the Dean’s Scholars Honors Program.

Prescribed Work Common to All Options

All students pursuing an undergraduate degree must complete the University’s Core Curriculum. The core includes courses in language, literature, social sciences, natural sciences, and fine arts. In addition, students seeking the Bachelor of Science in Biology must complete the following degree-level requirements. In some cases, courses that fulfill degree-level requirements also meet the requirements of the core.

1. Two courses with a writing flag. One of these courses must be upper-division. Courses with a writing flag are identified in the Course Schedule. They may be used simultaneously to fulfill other requirements, unless otherwise specified.
2. Options I–VII and X: One of the following foreign language/culture choices. Students in options VIII and IX are exempt from this requirement.
   a. Second-semester-level proficiency, or the equivalent, in a foreign language.
   b. First-semester-level proficiency, or the equivalent, in a foreign language and a three-semester-hour course in the culture of the same language area.
   c. Two three-semester-hour courses in one foreign culture area. The courses must be chosen from an approved list available in the dean’s office and the college advising centers.
3. At least twenty-four semester hours of upper-division coursework beyond Biology 325 in biology and approved related fields, including at least one course from each of the following areas. In most options, the student must use specific courses to meet this requirement; these courses are listed in Additional Prescribed Work for Each Option.
   b. Physiology and neurobiology: Biology 328, 361T, 365R, 365S.
4. At least twenty-one semester hours of upper-division coursework in biology must be completed in residence at the University. All students must complete at least thirty-six semester hours of upper-division coursework.
Additional Prescribed Work for Each Option

Option I: Ecology, Evolution, and Behavior

5. **Mathematics 408C** and **408D**, or **408N** and **408S**.
7. **Chemistry 301 or 301H, 302 or 302H, and 204**.
8. Either **Biology 311C, 311D, and 325** or **Biology 315H and 325H**. These courses must be completed before the student progresses to other upper-division biology courses.
9. At least four laboratory courses in biology. Three of these courses must be upper-division. One of the four courses must have a field component; the following courses may be used to meet this requirement: **Biology 321L, 340L, 453L, 354L, 455L, 369L, 373L, Marine Science 352D, 354, 354C**.
10. **Biology 328M** and three hours of coursework chosen from the following: **Chemistry 320M**, computer science courses at the level of **Computer Science 303E or 313E**, **Geological Sciences 401 or 303**, and upper-division mathematics courses.
11. In fulfilling requirement 3 above, the student must complete the following courses. No single course may be used to meet more than one of these requirements.
   a. Ecology: **Biology 357, 373**, or **Marine Science 320**.
   b. Evolution: **Biology 370**.
   c. Behavior and comparative physiology: **Biology 322 and 122L, 359K**, or **361T**.
   e. Six additional hours chosen from the following:
      iv. Conservation biology: **Biology 359, 375, Marine Science 354Q**.
12. Enough additional coursework to make a total of 126 semester hours.

Option II: Human Biology

5. **Mathematics 408C** and **408D**, or **408N** and **408S**.
7. **Chemistry 301 or 301H, 302 or 302H, and 204**.
8. Either **Biology 311C, 311D, and 325** or **Biology 315H and 325H**. These courses must be completed before the student progresses to other upper-division biology courses.
9. At least four laboratory courses in biology and related fields. Three of these courses must be upper-division. The student must complete **Biology 206L** or **208L**, **Anthropology 432L**, **Kinesiology 324K** and **Marine Science 120L** may be counted toward this...
requirement, but the student must complete at least one upper-division laboratory course in biology.

10. **Biology 328M** and **Chemistry 220C, 320M, and 320N**.

11. In fulfilling requirement 3 above, the student must complete **Biology 346**, at least six semester hours in area a below, and at least three hours each in areas b through e.
   b. Anatomy: **Anthropology 432L, Biology 446L, 478L, Kinesiology 324K**.
   c. Physiology: **Biology 361T, 365R, 365S**.
   d. Behavior and psychology: **Biology 359K, 359R, Psychology 332**.
   e. Evolution and ecology: **Biology 357, 364, 370, 373**.

12. In fulfilling requirement 3 above, the student must complete at least fifteen semester hours of coursework, including at least nine hours of upper-division work, in one of the following concentrations. A course counted toward requirement 11 may not also be counted toward requirement 12.
   b. Genetics and biotechnology: **Chemistry 369** and twelve hours chosen from the following courses: **Biology 325L, 325T, 226L, 326R, 335, 337 (Topic: Genomics), 337 (Topic: Emerging Infectious Disease), 337 (Topic: Epigenetics), 347, 366, 366R, Philosophy 325M**.
   d. Social aspects of health and disease: **Chemistry 369, Geography 357, Pharmacy 350K, Philosophy 325M, Sociology 319, 330C, 336C, 336D, 354K, 358D, 369K (Sociology 319 and 369K may not both be counted in the concentration)**.
   e. Problems of developing countries: **Biology 351, Geography 340D, 342C, 346, 356, 356T (Topic: Global Societies), 357, 358, Sociology 319, 324K, 340C, 346, 369K, 369L. (Sociology 319 and 369K may not both be counted in the concentration)**.

13. **Biology 137** (Topic 1: *Senior Seminar in Human Biology*), completed on the pass/fail basis in the student’s senior year.

14. Enough additional coursework to make a total of 126 semester hours.

**Option III: Marine and Freshwater Biology Sciences**

5. **Mathematics 408C** and **408D**, or **408N** and **408S**.
6. An eight-semester-hour sequence of coursework in physics chosen from the following: Physics 301, 101L, 316, and 116L; 317K, 117M, 317L, and 117N; 303K, 103M, 303L, and 103N; 302K, 102M, 302L, and 102N.

7. Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, and 320N.

8. Either Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.

9. At least four laboratory courses in biology. Three of these courses must be upper-division. The student must complete Biology 206L or 208L.

10. Biology 328M.

11. Geological Sciences 307 or Marine Science 307-Marine Science 310; Biology 101C (Topic: Marine Science Seminar); and three semester hours in geological sciences, chosen from courses that may be counted toward the requirements for a major in geological sciences.

12. In fulfilling requirement 3 above, the student must complete the following courses.
   a. Biology 226L and 326R.
   b. Marine Science 320 and 120L.

13. Enough additional coursework to make a total of 126 semester hours.

**Option IV: Microbiology and Infectious Diseases**

5. Mathematics 408C and 408D, or 408N and 408S.

6. An eight-semester-hour sequence of coursework in physics chosen from the following: Physics 301, 101L, 316, and 116L; 317K, 117M, 317L, and 117N; 303K, 103M, 303L, and 103N; 302K, 102M, 302L, and 102N.

7. Chemistry 301 or 301H, 302 or 302H, 204, and an organic chemistry/biochemistry series chosen from the following: Chemistry 220C, 320M, 320N, and 369; or 320M, 320N, 339K, and 339L.

8. Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.

9. Biology 206L.

10. Two upper division biology laboratory courses, one of which must be chosen from Biology 230L, 160L, and 361L. Biology 377/379H may be used for the second course if approved in advance by the microbiology faculty adviser. Biology 226L may not be counted toward requirement 10.

11. In fulfilling requirement 3 above, the student must complete the following courses: Biology 226L, 326R or 326M, 328M, 330, 339, 360K, 366, 370, and 320 or 332 or 344.

12. Enough additional coursework to make a total of 126 semester hours.
Option V: Cell and Molecular Biology

5. Mathematics 408C and 408D, or 408N and 408S.
6. An eight-semester-hour sequence of coursework in physics chosen from the following: Physics 301, 101L, 316, and 116L, 317K, 117M, 317L, and 117N; 303K, 103M, 303L, and 103N.
7. Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, 320N, and either 339K and 339L or 369 and 353M.
8. Either Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.
9. At least four laboratory courses in biology. Three of these courses must be upper-division.
10. In fulfilling requirement 3 above, the student must complete the following courses.
   a. Biology 320 and 344.
   b. Biology 226L, 326R, 349, 370, and one of the following: 320L, 331L, 349L.
   c. Biology 328, 365R, or 365S.
11. Enough additional coursework to make a total of 126 semester hours.

Option VI: Neurobiology

5. Mathematics 408C and 408D, or 408N and 408S.
7. Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, and 320N.
8. Either Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.
10. In fulfilling requirement 3 above, the student must complete the following courses.
   a. Biology 320, 344, 349, 370, and 365R.
d. Three additional semester hours chosen from the following courses: Computer Science 303E, Psychology 308, 332, 353K.
11. Enough additional coursework to make a total of 126 semester hours.

Option VII: Plant Biology

5. Mathematics 408C and 408D, or 408N and 408S.
6. An eight-semester-hour sequence of coursework in physics chosen from the following: Physics 301, 101L, 316, and 116L; 317K, 117M, 317L, and 117N; 303K, 103M, 303L, and 103N; Physics 302K, 102M, 302L, and 102N.
7. Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, and 320N.
8. Either Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.
9. At least four laboratory courses in biology. Three of these courses must be upper-division. The student must complete Biology 206L or 208L, Biology 177, 277, or 377 may be counted only once toward the laboratory requirement.
10. In fulfilling requirement 3 above, the student must complete at least twenty-four hours of coursework chosen from the following: Biology 320, 320L, 322 and 122L, 323L, 324 and 124L, 327 and 127L, 328, 128L, 331L, 343M, 350M, 351, 262 and 262L, 363, 370, 472L, 373, 373L, 374 and 174L, 375.
11. Eleven additional semester hours of upper-division coursework in the College of Natural Sciences or the Jackson School of Geosciences. A course may not be counted toward this requirement if it does not fulfill major requirements in the department that offers it.
12. Enough additional coursework to make a total of 126 semester hours.

Option VIII: Teaching

This option is designed to fulfill the course requirements for certification as a middle grades or secondary school science teacher in Texas; the student chooses either composite science certification with biology as the primary teaching field or life science certification. However, completion of the course requirements does not guarantee the student’s certification. Information about additional certification requirements is available from the UTeach-Natural Sciences academic adviser.

5. Mathematics 408C and 408D, or 408N and 408S.
7. Chemistry 301 or 301H, 302 or 302H, 204, and either Chemistry 320M, 320N, and 220C or 320M and 369.
8. Either Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.

9. At least four laboratory courses in biology. Three of these courses must be upper-division. The student must complete Biology 206L or 208L.

10. In fulfilling requirement 3 above, the student must complete the following courses:
    a. Biology 320, 226L, 326R, 370, and either 324 and 124L or 322 and 122L.

11. One of the following research methods courses: Biology 328D, 337 (Topic 2: Research Methods: UTeach), Chemistry 368 (Topic 1: Research Methods: UTeach), Physics 341 (Topic 7: Research Methods: UTeach).

12. History 329U or Philosophy 329U.

13. One of the following:
    a. For composite science certification: CH 369 (to be counted as upper-division biology hours) and six semester hours of coursework in geological sciences. Courses intended for nonscience majors may not be counted toward this requirement. The remaining composite certification content requirements are met by the chemistry, and physics, and science courses used to fulfill requirements 6 and 7.
    b. For life science certification: Biology 373, and three additional semester hours of biology chosen from the courses listed in requirement 10b.

14. Eighteen semester hours of professional development coursework consisting of:

    1. Curriculum and Instruction 650S.
    2. Curriculum and Instruction 365C or UTeach-Natural Sciences 350.
    3. Curriculum and Instruction 365D or UTeach-Natural Sciences 355.
    4. Curriculum and Instruction 365E or UTeach-Natural Sciences 360.
    5. UTeach-Natural Sciences 101, 110, and 170.

15. Students seeking middle grades certification must complete the following courses: Educational Psychology 363M (Topic 3: Adolescent Development), or Psychology 301 and 304; and Curriculum and Instruction 339E.

16. Enough additional coursework to make a total of 126 semester hours.

Option IX: Biology Honors

5. Breadth requirement: An honors mathematics course; Biology 315H and 325H; Chemistry 301H and 302H; and one of the following: a three-hour honors-designated computer science course; a three-hour honors-designated statistics course; Physics 301 and 101L; Physics 315 and 115L; or Physics 316 and 116L. Credit earned by examination may not be counted toward this requirement.
6. An eight-semester-hour sequence of coursework in physics chosen from the following: Physics 301, 101L, 316, and 116L; 317K, 117M, 317L, and 117N; 303K, 103M, 303L, and 103N. Courses used to satisfy this requirement may also be counted toward requirement 5.

7. Chemistry 204, 128K, 128L, 328M, and 328N.

8. In fulfilling requirement 3 above, the student must complete Biology 320 or 344, 349, 365R, 370, and at least twelve additional semester hours of upper-division coursework in biology chosen from a list available in the student’s advising office. Six semester hours of thesis coursework may be counted toward the twelve semester hours of upper-division biology.

9. Three upper-division laboratory courses in biology. Biology 377 or 379H may be used as only one of the three required upper-division laboratory courses. Courses used to fulfill this requirement may also be counted toward requirement 8.

10. A section of Undergraduate Studies 302 or 303 that is approved by the departmental honors adviser.

11. A section of Rhetoric and Writing 309S that is restricted to Dean’s Scholars.

12. Two semesters of Biology 379H.

13. At least four laboratory courses in biology. Three of these courses must be upper-division. Biology 321G fulfills one of these upper-division requirements.

14. Enough additional coursework to make a total of 120 semester hours.

Option X: Computational Biology

5. Mathematics 408C and 408D, or 408N, 408S, and 408M; Statistics and Scientific Computation 329C or Mathematics 340L or 341; Mathematics 362K; and Mathematics 358K or 378K or Statistics and Scientific Computation 321 or 325H or 328M, or Biology 328M.

6. Computer Science 303E; Computer Science 313E or Statistics and Scientific Computation 222; and one of the following courses: Computer Science 323E, 323H, 324E, 327E, 329E, 337, 367, Statistics and Scientific Computation 329D, 335, 374D, 374E, Mathematics 348, 372K, 376C.

7. An eight-semester-hour sequence of coursework in physics chosen from the following: Physics 301, 101L, 316, and 116L; 317K, 117M, 317L, and 117N; 303K, 103M, 303L, and 103N.

8. Chemistry 301 or 301H, 302 or 302H, and 204.

9. Either Biology 311C, 311D, and 325 or Biology 315H and 325H. These courses must be completed before the student progresses to other upper-division biology courses.

10. In fulfilling requirement 3 above, the student must complete Biology 321G, 370, and six additional hours of upper-division coursework in biology.

11. At least four laboratory courses in biology. Three of these courses must be upper-division. Biology 321G fulfills one of these upper-division requirements.

12. Enough additional coursework to make a total of 126 semester hours.
Special Requirements

Students in all options must fulfill both the University's General Requirements for graduation and the college requirements. They must also earn a grade of at least C- in each mathematics and science course required for the degree, and a grade point average in these courses of at least 2.00. More information about grades and the grade point average is given in General Information.
To graduate and be recommended for certification, students who follow the teaching option must have a University grade point average of at least 2.50. They must earn a grade of at least C- in the supporting course in requirement 12, and in each of the professional development courses listed in requirement 14 and must pass the final teaching portfolio review; those seeking middle grades certification must also earn a grade of at least C- in each of the courses listed in requirement 15. For information about the portfolio review and additional teacher certification requirements, students should consult the UTeach-Natural Sciences academic adviser.
To graduate under the honors option, students must remain in good standing in the Dean’s Scholars Honors Program, must submit an honors thesis approved by the departmental honors adviser, and must present their research in an approved public forum, such as the college’s annual Undergraduate Research Forum.

Order and Choice of Work

Students begin the Bachelor of Science in Biology degree program with six hours of introductory biology for science majors (Biology 311C and 311D), as well as Chemistry 301 or 301H and 302 or 302H and Mathematics 408C and 408D or 408N and 408S. The genetics course, Biology 325, is prerequisite to other upper-division biology courses. Students should consult with academic advisers about specific concentrations within biology, about appropriate courses in mathematics and physical sciences, and about course load and the balance between laboratory and nonlaboratory work. Most students select an option by the end of the second year and take at least twenty-one hours of upper-division coursework in the major in the third and fourth years.

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1 See http://www.utexas.edu/provost/planning/cat_change/UnderGrad.html for detailed explanations.
2 Texas Higher Education Coordinating Board.
3 The proposed text should be based on the text of the current catalog available at http://www.utexas.edu/faculty/council/pages/catalog_chgs/catcopy.html. Strike through and replace (with underlines) only the specific language to be changed. Do NOT use “track changes”! For questions on completing this section, please contact Anita Ahmadi, fc@austin.utexas.edu, 471-5936 or Brenda Schumann, brenda.schumann@austin.utexas.edu, 475-7654.