EXECUTIVE VICE PRESIDENT AND PROVOST
THE UNIVERSITY OF TEXAS AT AUSTIN

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March 7, 2016

Dr. Steven Leslie
Executive Vice Chancellor for Academic Affairs
The University of Texas System
OHH 304 (P4300)

Dear Dr. Leslie:

Enclosed for your approval are the following proposed changes to the College of Natural Sciences chapter of the *Undergraduate Catalog 2016-2018* (D 14355-14377). The proposals were approved by the Faculty Council on February 24, 2016.

- Proposed Changes to the Bachelor of Science in Biology (D 14355-14359)
- Proposed Changes to the Bachelor of Science in Computer Science (D 14360-14367)
- Proposed Changes to the Bachelor of Science in Mathematics (D 14368-14377)

The proposed changes include a decrease in the number of required semester credit hours to complete the degrees. Therefore, notification to the Texas Higher Education Coordinating Board is required.

Sincerely,

Judith H. Langlois
Executive Vice President and Provost, *ad interim*

JHL: lac

Enclosure

cc: Gregory L. Fenves, President of the University

ec: Hillary Hart, Secretary, Office of the General Faculty
Carol Longoria, Assistant Deputy to the President
David Vanden Bout, Associate Dean, College of Natural Sciences
Judith Quinney, Manager, College of Natural Sciences
Brenda Schumann, Associate Registrar
Linda Dickens, Sr. Director, Institutional Accreditation and Effectiveness
Cynthia Cruz, Administrative Manager, Provost's Office
IRRIS Team
Suzanne Revisore, Assistant to the EVCAA, UT System
Debbie Roberts, Executive Assistant, Office of the General Faculty
Victoria Cervantes, Sr. Administrative Associate, Office of the General Faculty

OFFICE OF THE FACULTY COUNCIL

THE UNIVERSITY OF TEXAS AT AUSTIN

P. O. BOX 7816 • Austin, TX 78713-7816
(512) 471-5934 • Fax: (512) 471-5984 • http://www.utexas.edu/faculty/council

February 25, 2016

Judith H. Langlois
Interim Executive Vice President and Provost
The University of Texas at Austin
MAI 201
Campus Mail Code: G1000

Dear Dr. Langlois:

Enclosed for your consideration and action are proposed changes to the College of Natural Sciences chapter in the *Undergraduate Catalog, 2016-2018* . Yesterday, Faculty Council approved the legislation on a no-protest basis. The proposals were classified as being of *general* application and of primary interest to more than one college or school. The authority to grant final approval resides with the UT System.

- Proposed Changes to the Flags in the BSA Degree Program (D 14269-14280)
- Proposed Changes to the Internal and External Transfer Policies (D 14281-14286)
- Proposed Changes to the Bachelor of Science in Biology (D 14355-14359l).
- Proposed Changes to the Bachelor of Science in Computer Science (D 14360-14367).
- Proposed Changes to the Bachelor of Science in Mathematics (D 14368-14377).

Please let me know if you have questions or if I can provide other information concerning these items.

Sincerely,

Hillary Hart, Secretary
General Faculty and Faculty Council

HH:dlr

Enclosure

xc: Gregory L. Fenves, president
Janet Dukerich, senior vice provost for faculty affairs

ec: Carol Longoria, deputy to the president
David Vanden Bout, associate dean for curriculum and programs, College of Natural Sciences
Judith Quinney, manager, records office, College of Natural Sciences
Allen Walser, manager of reporting and analysis, IRRIS
Brenda Schumann, associate registrar
Lydia Cornell, program coordinator, provost's office
Michelle George, administrative manager for faculty affairs, provost's office

DOCUMENTS OF THE GENERAL FACULTY

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN BIOLOGY DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE *UNDERGRADUATE CATALOG 2016-2018*

Dean Linda Hicke in the College of Natural Sciences has filed with the secretary of the Faculty Council the following changes to the *Undergraduate Catalog, 2016-2018*. The secretary has classified this proposal as legislation of *general* interest to more than one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the changes on February 4, 2016, and forwarded the proposal to the Office of the General Faculty. The Faculty Council has the authority to approve this legislation on behalf of the General Faculty. The authority to grant final approval on this legislation resides with UT System.

If no objection is filed with the Office of the General Faculty by the date specified below, the legislation will be held to have been approved by the Faculty Council. If an objection is filed within the prescribed period, the legislation will be presented to the Faculty Council at its next meeting. The objection, with reasons, must be signed by a member of the Faculty Council.

To be counted, a protest must be received in the Office of the General Faculty by February 24, 2016.

Hillary Hart, Secretary
General Faculty and Faculty Council

Posted on the Faculty Council website (http://www.utexas.edu/faculty/council/) on February 11, 2016.

14356

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN BIOLOGY DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE *UNDERGRADUATE CATALOG 2016-2018*

Type of Change ☒ Academic Change
☐ Degree Program Change (THECB form required)

Proposed classification ☐ Exclusive ☒ General ☐ Major

1. **IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST CONSULT LINDA DICKENS, DIRECTOR OF ACCREDITATION AND ASSESSMENT, TO DETERMINE IF SACS-COC APPROVAL IS REQUIRED.**
   - Is this a new degree program? Yes ☐ No ☒
   - Does the program offer courses that will be taught off campus? Yes ☐ No ☒
   - Will courses in this program be delivered electronically? Yes ☐ No ☒

2. **EXPLAIN CHANGE TO DEGREE PROGRAM AND GIVE A DETAILED RATIONALE FOR EACH INDIVIDUAL CHANGE:**

Bachelor of Science in Biology

Remove warning to students that degree has little flexibility.
Rationale: The newly created common biology core and standardization of course lists across degree options provides flexibility that students did not have in previous catalogs. In several options, specified requirements have been trimmed.

Prescribed Work Common to All Options

1) Removal of the minimum hours of upper-division biology and minimum of one biology course from three areas (breadth).
   Rationale: The removal of the breadth requirement in general for all degree options (it still exists as it was in some of the options) affords students that have decided on a particular area of biology to have the flexibility to satisfy breadth through a minor in another field of science, certificate, or to select a broad range of upper division courses as electives. In short - removing the list of specific courses required to satisfy "breadth" enables students to choose their own meaning of "breadth" while staying within 120 hours.
2) Relocate and standardize the introductory courses in biology, chemistry, mathematics, physics, and statistics and data sciences. Reduce calculus requirement in most options to 1 semester; add M 408R as an alternative to M 408C or 408N.
   Rationale: There was never a common introductory science core in existence before. In some ways this is more of a presentation change than an actual change as most of the Biology Options already contained most of these courses. The changes were made to standardize the specific Mathematics, Physics, and Chemistry courses required so that students could more easily change their minds about which option to pursue without retaking different introductory courses specific to that option. The biology-related departments determined that 1 semester of calculus is sufficient for most options.
3) Addition of BIO 370, Evolution, to the Prescribed Work Common to All Options.
   Rationale: Like BIO 325, Genetics, every biology degree holder should have a thorough understanding of evolution, as such knowledge is necessary for every upper other division course.
4) Remove foreign language/foreign culture requirement from the following options: Ecology, Evolution, and Behavior; Marine and Freshwater Science; Microbiology and Infectious Diseases; Cell and Molecular Biology; Plant Biology; and Computational Biology.

Rationale: As most scientific literature is in English, this is no longer relevant for biology majors. Students can still take foreign languages as electives as most of the requirements in the options are under 120 hours.

Option I: Ecology, Evolution, and Behavior

1) Addition of 1 course chosen from list in cellular, developmental, genetics, microbiology, molecular, or neurobiology coursework.
   Rationale: This replaces the standard breadth requirement in a manner more targeted to the specific option.
2) Specifying list from which students will choose 1 additional laboratory course (requirement 8). Previously, students chose a lab from a diverse list containing options from across the sub-disciplines in biology.
   Rationale: The labs on the new list are the ones most relevant to the option.
3) Rearrange already required coursework and identify lab choices in requirement #8.
   Rationale: The remainder of the changes in this option are a rearrangement of already existing required coursework, and specification of lab choices for an additional laboratory course in requirement 8.

Option II: Human Biology

1) Deletion of the concentration requirements in Group A and Group B.
   Rationale: Removed for simplification.
2) Adoption of the use of 3 lists of approved courses: 1) genetics, genomics, and computational biology; 2) cellular, developmental, and molecular biology; and 3) ecology, environment, and health.
   Rationale: A list of 4 biology disciplines was adopted to make the breadth requirements in the different options consistent where possible, and also updated to reflect 21st century categorizations of sub-disciplines.
3) Specify list from which students will choose 1 additional laboratory course (requirement 8). Previously, students chose a lab from a diverse list containing options from across the sub-disciplines in biology.
   Rationale: The listed labs are those most relevant to the option.

Option III: Marine and Freshwater Science

1) Addition of BIO 373 as a specific requirement.
   Rationale: Upper-division courses in Marine Science assume a foundation in ecology. BIO 373, Ecology, was removed from the required coursework for all BS BIO options, so it was included in required courses for the Marine and Freshwater Science option, to ensure that all students had appropriate preparation for Marine Science coursework.
2) Reduction of organic chemistry sequence to CH 320M.
   Rationale: Upon further faculty review, it was determined that only the first semester of organic chemistry is necessary as a foundation for other coursework.
3) Removal of 3 hours of geological sciences chosen from courses that may count toward a major in geological sciences. Addition of GEO 341G as an option for one of the sequences in requirement 9.
   Rationale: Not all GEO courses that count towards a Geology degree are relevant to Marine Science. After review of current GEO offerings, applicable courses were included under the two-course sequence in requirement 9.
4) Addition of requirement to complete 1 two-course sequence chosen from variety composed of BIO pairs and GRG pairs of courses.

Rationale: Several departments offer courses whose topics are very related to Marine Science. The two-course sequence directs students to pursue a "focus" area that is offered to augment and broaden their background in areas relevant to marine science.

5) Removal of additional upper-division laboratory requirement.
Rationale: Almost all upper-division Marine Science courses include a significant lab or field component. After reviewing the list of upper-division courses, it became apparent that the two requirements were redundant. It is not possible to complete 12 hours of upper-division coursework in Marine Science without simultaneously completing the laboratory requirement.
6) Update of BIO 101C (Topic 1: Marine Science Seminar) to MNS 101.
Rationale: Course description for BIO X101C now states "may not be counted toward a degree in the College of Natural Sciences." This change was made without recalling how it would impact this requirement. Since the Marine Science Seminar is required for all MNS majors, Marine Science is establishing its own course number.
7) Reduce to 12 upper-division hours from approved list in BIO, GEO, and MNS.
Rationale: The hours from an approved list of BIO, GEO, and MNS courses was reduced from 21 to 12 hours due to the inclusion of other requirements such as the two-course sequence and BIO 373.

Option IV: Microbiology and Infectious Diseases

1) Laboratory requirement changes: Requiring both lab courses to be chosen from a list of 3 courses. Previously, only 1 of the 2 labs had to be chosen from a specific list. Deletion of BIO 206L as a specific lab requirement.
Rationale: BIO 206L was deleted because it does not really prepare students for the upper-division microbiology labs as well as BIO 226L does. Requiring two upper-division labs gives the students a more rigorous training in Microbiology.

Option V: Cell and Molecular Biology

1) Specifying 2 labs from list of 5 upper-division courses. Previously, students chose labs from a diverse list containing options from across the sub-disciplines in biology.
Rationale: Listed labs are more targeted to this option. Many of these labs did not exist when the original degree plan was written.
2) Addition of 18 hours in upper-division biochemistry, biology, and chemistry.
Rationale: This replaces the previous standard breadth requirement and targets the hours to courses most relevant to the option.

Option VI: Neurobiology (deletion of option)

1) Delete Neurobiology degree option.
Rationale: Replaced by BS in Neuroscience, Option III: Neuroscience (proposed for 2016 catalog). The Department of Neuroscience will continue to offer coursework to allow neurobiology students under the 2014-16 catalog to complete the degree prior to the catalog expiration in August 2022.

Option VII: Plant Biology

1) Specifying particular biology courses instead of requiring 21 hours from a list of 19 courses/pairs of courses.
Rationale: The specification is to ensure that students in this option are taking a sufficient number of plant biology courses.
2) Creation of two sequences from which students choose 1: 1) plant molecular biology, and 2) plant environmental biology.

Rationale: Students interested in environmental studies do not require some of the more molecularly-oriented background courses, such as organic chemistry.

2) Addition of 18 upper-division hours in biochemistry, biology, chemistry, and marine science.
Rationale: This requirement replaces the previous standard breadth requirement and targets it to courses most relevant to the option, while still giving students a lot of choice.

Option VIII: Teaching

1) Reduction in choice of biology courses from which to choose.
Rationale: This was not a reduction of biology courses in total. Some were pulled into the common biology core.
2) Elimination of a course containing a significant field component.
Rationale: It is difficult for students to get seats in field courses. Therefore, the faculty broadened the requirement to include a choice of courses with a field component and other courses that emphasized organism-level biology, which is considered the most helpful for secondary level teachers.

Option IX, Biology Honors

1) Adoption of 4 approved lists from which students choose 24 hours: 1) cellular, developmental, and molecular biology; 2) genetics and genomics; 3) physiology, neurobiology, and behavior; and 4) ecology, evolution, and biodiversity.
Rationale: A list of 4 biology disciplines was adopted to make the breadth requirements in the different options consistent where possible, and also updated to reflect 21st century categorizations of sub-disciplines.

Option X: Computational Biology

1) Adoption of 3 approved lists form which students choose 6 hours: 1) cellular, developmental, and molecular biology; 2) physiology, neurobiology, and behavior; and 3) ecology, evolution, and biodiversity.
Rationale: Three of the 4 biology disciplines was adopted to make the breadth requirements in the different options consistent where possible, and also updated to reflect 21st century categorization of subdisciplines.
2) Specification of lab requirements (1 lab from core biology coursework; 1 additional lab from requirement 9, chosen from specific list).
Rationale: The labs on the new list are the ones most relevant to this option.

Option XI: Biology (proposed option)

1) Add option titled Biology.
Rationale: The Biology option is for students who want a broad education in all aspects of Biology. This degree option will enable the students to explore all areas of biology, and also to explore a particular area in more depth, or to take a minor in another field of science, or a certificate. A student can continue to explore areas of biology the entire time that they are undergraduates and focus on a specialty as juniors or seniors when they find one, or not, and still have a solid biology degree within the constraints of 120 hours. This option prepares students for graduate school, medical school, or an entry-level biotechnology job. It is also highly flexible for students who need time to find what interests them the most, or for students who want the broadest possible biology education.

Option XII: Genetics and Genomics (proposed option)

1) Add option titled Genetics and Genomics

Rationale: Genetics and Genomics are among the most important disciplines in biology in the 21st century. This option allows interested students to focus in depth on this important and rapidly changing field that is surely to touch on every aspect of their lives. The option is for pre-medical students, pre-vet students, pre-graduate school students, and for students wanting a career in biotechnology with or without post-baccalaureate education.

3. THIS PROPOSAL INVOLVES (Please check all that apply)

- ☒ Courses in other colleges
- ☐ Courses in proposer's college that are frequently taken by students in other colleges
- ☐ Flags
- ☐ Course in the core curriculum
- ☒ Change in course sequencing for an existing program
- ☐ Courses that have to be added to the inventory
- ☐ Change in admission requirements (external or internal)
- ☐ Requirements not explicit in the catalog language (e.g., lists of acceptable courses maintained by department office)
- X Deletion of 1 degree option.
- X Addition of 2 degree options.

4. SCOPE OF PROPOSED CHANGE

a. Does this proposal impact other colleges/schools? Yes ☒ No ☐

If yes, then how?

1) Students seeking the BS in Biology will no longer be required to take foreign language and/or foreign culture courses.

2) Option VII, Marine and Freshwater Science: Courses in the Department of Geography and the Environment are included as options. This may result in a very small increase in the number of Marine and Freshwater Science majors in these courses.

b. Do you anticipate a net change in the number of students in your college? Yes ☐ No ☒

If yes, how many more (or fewer) students do you expect?

c. Do you anticipate a net increase (or decrease) in the number of students from outside of your college taking classes in your college? Yes ☐ No ☒

If yes, please indicate the number of students and/or class seats involved.

d. Do you anticipate a net increase (or decrease) in the number of students from your college taking courses in other colleges? Yes ☒ No ☐

If yes, please indicate the number of students and/or class seats involved.

1) We anticipate a decrease in the number of students who take coursework in Liberal Arts. Most students seeking this degree either have foreign language via placement (no impact on Liberal Arts from these students) or take six hours of foreign culture. It is this second group that will impact seats in Liberal Arts, though the seats are spread across a wide range of fields of study. The fourteen areas of foreign culture are organized thematically in language/culture/geographic areas, such as Japan, Central and South America, and Middle East. Each list may be composed of 20 to 80 courses, in a wide range of fields of study (anthropology, classical civilization, geography, history, philosophy, sociology, e.g.). Thus, students who completed foreign culture for this requirement were not concentrated in any particular set of courses or fields of study.

2) We anticipate at most a very small increase (3-4 students per year) in seats for the Geography and Geology courses added to Option VII, Marine and Freshwater Science.

If 4 a, b, c, or d was answered with yes, please answer the following questions. If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted?

Impacted schools must be contacted and their response(s) included: College of Liberal Arts

Person communicated with: Richard Flores, Senior Associate Dean

Date of communication: February 4, 2016

Response: No objection to removal of foreign language/foreign culture requirement during CUDPR meeting.

How many students do you expect to be impacted? 3 to 4 seats per year
Impacted schools must be contacted and their response(s) included: Jackson School of Geosciences (addition of GEO 341G in Option VII)
Person communicated with: Richard Ketcham, Associate Dean for Academic Affairs
Date of communication: August 22, 2015
Response: I have finally managed to verify with the instructor that including this course in your plan would be fine.

How many students do you expect to be impacted? 3 to 4 seats per year
Impacted schools must be contacted and their response(s) included: Department of Geography and the Environment (GRG courses in Option VII)
Person communicated with: Sheryl Beach (chair) via response from Craig Gilden, senior academic advisor
Date of communication: April 14, 2015
Response: I just want to confirm with you that the department is happy to have some of its classes on the MNS course lists.

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

f. Will this proposal change the number of hours required for degree completion? If yes, explain: **Yes.** If yes, explain: All options other than Option VIII, Teaching, will reduce the overall hours from 126 to 120. This will reduce the need for students to take an overload or enroll in a summer session or additional long semester.

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: April 6, 2015; August 24, 2015 (MNS only); September 15, 2015
College approval date: May 27, 2015; September 2, 2015 (MNS only); September 28, 2015
Dean approval date: September 28, 2015, David Vanden Bout, Associate Dean

PROPOSED NEW CATALOG TEXT:

BACHELOR OF SCIENCE IN BIOLOGY

The Bachelor of Science in Biology degree program offers ~~ten~~ eleven 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. 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.
2. One course with a quantitative reasoning flag.

Courses with flags are identified in the *Course Schedule*. They may be used simultaneously to fulfill other requirements, unless otherwise specified.

~~3. Options I, III–VII and X: One of the following foreign language/culture choices. Students in options II, 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 chosen from an approved list available in the dean's office and the college advising centers.~~

~~4. 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.~~

3. Courses common to all Bachelor of Science in Biology degree options except for option IX.
   a. ~~Cellular, developmental, and molecular biology: Biology 320, 326R, 344, 349.~~ Mathematics 408C, 408R, or 408N and 408S. Students who intend to take additional calculus coursework should begin the sequence with 408C or 408N.
   b. ~~Physiology and neuroscience: Biology 328, 361T, 365S, Neuroscience 365R.~~ Statistics and Data Sciences 328M.
   c. ~~Ecology, evolution, and behavior: Biology 357, 359K, 370, 373.~~ Chemistry 301 or 301H, 302 or 302H, and 204.
   d. One of the following sequences:
      i. Physics 317K, 117M, 317L, and 117N (recommended)
      ii. Physics 301, 101L, 316, and 116L
      iii. Physics 303K, 103M, 303L, and 103N
      iv. Physics 302K, 102M, 302L, and 102N

      Option VIII Teaching majors may substitute Science 365 and Physics 108 for Physics 316 and 116L, 317L and 117N, 303L and 103N, or 302L and 102N; Physics 108 is offered on the pass/fail basis.
   e. Biology, including:
      i. Biology 311C, 311D, and 325, or 315H and 325H.
      ii. Biology 206L, 208L, or 226L. This requirement must be completed prior to progressing to additional laboratory requirements in the degree options. Students pursuing option III, Marine and Freshwater Science, and option IV, Microbiology and Infectious Diseases, must complete Biology 226L. Students pursuing option VIII, Teaching, must complete either Biology 206L or 208L.
      iii. Biology 370.
4. ~~5.~~ All students must complete at least thirty-six semester hours of upper-division coursework; at least twenty-one semester hours of upper-division coursework in biology must be completed in residence at the University.

Additional Prescribed Work for Each Option

Option I: Ecology, Evolution, and Behavior

5. ~~Mathematics 408C and 408D, or 408N and 408S.~~ One course or pair of courses in each of the following areas:

a. Ecology: Biology 357, 373, or Marine Science 320 and 120L.
b. Behavior and comparative physiology: Biology 322 and 122L, 359K, or 361T.
c. Taxon-based course: Biology 321L, 324 and 124L, 327 and 127L, 340L, 448L, 351, 352, 353F, 453L, 354L, 455L, 463L, 369F, 369L, Marine Science 352D, 354, 354C, 354E.

6. ~~An eight-semester-hour sequence of coursework in physics chosen from the following:~~ Three additional courses or pair of courses chosen from coursework in 5a through 5c and from Biology 438L, 471G, 456L, 359R, 364, 364E, 472L, 373L, 374 and 174L, 375, 478L, Marine Science 352C and 354Q.
~~d. Physics 301, 101L, 316, and 116L;~~
~~e. Physics 317K, 117M, 317L, and 117N;~~
~~f. Physics 303K, 103M, 303L, and 103N; or~~
~~g. Physics 302K, 102M, 302L, and 102N~~
7. ~~Chemistry 301 or 301H, 302 or 302H, and 204.~~ One course in cellular, developmental, genetics, microbiology, molecular, or neuroscience: Biology 320, 320L, 325L, 325T, 326R, 328, 331L, 344, 349, 349L, 350M, 366R, Neuroscience 365R.
8. ~~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.~~ One laboratory course or pair of courses containing a substantial field component: Biology 321L, 340L, 353F, 453L, 354L, 455L, 456L, 369L, 373L, Marine Science 320 and 120L, 352C, 352D, 354, 354C, 354E. A laboratory course or pair of courses may also count toward requirements 5 through 7.
9. ~~10. 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, 456L, 369L, 373L, Marine Science 352D, 354, 354C.~~ One additional laboratory course: Biology 320L, 321L, 124L, 127L, 325L, 331L, 438L, 340L, 448L, 349L, 353F, 453L, 354L, 455L, 456L, 369L, 472L, 373L, 174L, 478L, Marine Science 120L, 352C, 352D, 354, 354C, 354E, 354Q. One-hour laboratory courses may require credit for or registration in a complementary lecture course. A laboratory course may also count toward requirements 5 through 7. A course counted toward requirement 8 may not also count toward requirement 9.
10. ~~11. Statistics and Data Sciences 328M and three hours of coursework~~ One course chosen from the following: Chemistry 320M, Computer Science 303E or 313E ~~or the equivalent~~, Geological Sciences 401 or 303, ~~or an upper-division mathematics courses~~ Statistics and Data Sciences 332 or 348.
11. ~~12.~~ Enough additional coursework to make a total of 120 semester hours. ~~In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete the following courses; no single course may be used to meet more than one of these requirements:~~
~~h. Ecology: Biology 357, 373, or Marine Science 320.~~
~~i. Evolution: Biology 370.~~
~~j. Behavior and comparative physiology: Biology 322 and 122L, 359K, or 361T.~~
~~k. One of the following taxon-based diversity courses or pairs of courses: Biology 321L, 324 and 124L, 327 and 127L, 340L, 448L, 352, 353F, 453L, 354L, 455L, 369L, Marine Science 352D, 354, 354C, 354E.~~
~~l. Six additional hours chosen from the following:~~
~~i. Evolution: 472L, 374 and 174L, 478L.~~
~~ii. Ecology: Biology 456L, 364, 364E, 373L, Marine Science 120L, 352C.~~
~~iii. Behavior: Biology 438L, 359J, 359R.~~
~~iv. Conservation biology: Biology 375, Marine Science 354Q.~~

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

Option II: Human Biology

5. ~~Mathematics 408C or 408N, and Statistics and Data Sciences 328M*.~~ Chemistry 320M, 320N, 220C.
6. ~~7. One of the following courses: Mathematics 408D, 408S, or Statistics and Data Sciences 348.~~ Biochemistry 369 or 339F.
7. ~~8. An eight-semester-hour sequence of coursework in physics chosen from the following:~~ Biology 346.
~~a. Physics 301, 101L, 316, and 116L;~~
~~b. Physics 317K, 117M, 317L, and 117N;~~

~~c. Physics 303K, 103M, 303L, and 103N; or~~
~~d. Physics 302K, 102M, 302L, and 102N~~

8. ~~Chemistry 301 or 301H, 302 or 302H, and 204.~~ Three hours from genetics, genomics, and computational biology: Biochemistry 339N, Biology 321G, 325T, 327E, 327G, 354C, 366, 366R, 471, Statistics and Data Sciences 348.
9. ~~10. 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.~~ Six hours from cellular, developmental, and molecular biology: Biochemistry 339J, 339M, 346F, Biology 320, 326R, 330, 335, 336, 339, 339M, 343M, 344, 347 or 360K, 349, 350M, 360M, 361.
10. ~~11. At least four laboratory courses in biology and related fields, including Biology 206L or 208L. Three of these courses must be upper-division, including one course in biology. Courses that may count toward the laboratory requirement are marked with an asterisk.~~ Three hours from ecology, environment, and health: Biology 326R, 327D, 329, 330, 361, 364, Nutrition 306 or 312.
11. ~~12. Chemistry 220C, 320M, and 320N.~~ Four hours from physiology and anatomy: Biology 446L, 365S and 165U, 478L.
12. ~~13. In fulfilling requirement 4 of the Prescribed Work Common to All Options 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 d~~ One additional laboratory course from: Biology 320L, 122L, 323L, 124L, 128L, 129L, 325L, 328D, 230L, 331L, 340L, ~~446L~~, ~~448L~~, 349L, 353F, 453L, 354L, 455L, 456L, 160L, 361L, 463L, 165U, 369F, 369L, 371L, 472L, 373L, 174L, 478L, Marine Science 120L, 152L. One-hour laboratory courses may require credit for or registration in a complementary lecture course.

~~e. Cellular and molecular biology: Biology 320, 320L*, 323L*, 325L*, 325T, 226L and 326R, 344.~~
~~f. Physiology: Biology 361T, 365S, Neuroscience 365R.~~
~~g. Behavior and psychology: Biology 359K, 359R, Psychology 332.~~
~~h. Evolution and ecology: Biology 357, 364, 370, 373.~~

~~13.~~ ~~In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete at least fifteen semester hours of coursework, including at least nine hours of upper-division work, from one of the two following groups of concentrations. A course counted toward requirement 13 may not also be counted toward requirement 14.~~ Enough additional coursework to make a total of 120 semester hours.

~~Group A: Biochemistry 369 and twelve additional hours chosen from the following concentrations.~~

~~a. Cellular, molecular, and developmental biology: Biology 320, 320L*, 323L*, 325L*, 325T, 226L*, 326R, 327E, 328D*, 330, 230L*, 331L*, 332, 337 (Topic: *Genomics*), 339, 339M, 345, 349, 349L*, 365N, 366R.~~
~~b. Genetics and biotechnology: Biology 325L*, 325T, 226L*, 326R, 327D, 327E, 335, 337 (Topic: *Genomics*), 339, 347, 361, 366, 366R, Philosophy 325M.~~
~~c. Pathogenesis and immunity: Biology 226L*, 326R, 327E, 330, 230L*, 327D, 331L*, 332, 336, 337 (Topic: *Genomics*), 339, 347, 360K, 160L*, 360M, 361, 361L*, 361P, 366, Neuroscience 365T.~~

~~Group B: Fifteen hours chosen from the following concentrations; only one of the following courses may be counted: Anthropology 432L*, Biology 446L*, 478L*, or Kinesiology 324K*. Sociology 319 and 369K may not both be counted.~~

~~a. Social aspects of health and disease: Biochemistry 369, Geography 357, Pharmacy 310K or 350K, Philosophy 325M, Sociology 307E, 307M, 307P, Sociology 308 (Topic 3: *Life and Death Decisions*; Topic: *Conquest of Disease*), Sociology 319, 321K, 330C, 336C, 336D, 354K, 358D, 369K.~~
~~b. Problems of developing countries: Biology 351, Geography 340D, 342C, 346, 356, 356T (Topic: *Global Societies*), 357, 358, Sociology 319, 324K, 340C, 369K, 369L.~~
~~c. Human impact on the environment: 373, 373L*, 375, Geography 334, 335N, 336C, 346, 356T (Topic: *Environment, Development, and Food Production*), 366K, 367K, Marine Science 320, 120L*, 354Q, Philosophy 325C, Sociology 319.~~
~~d. Human variation and evolution: Biochemistry 369 and twelve hours chosen from the following courses:Anthropology 432L*, 346L, 346M, 347C, 348, 348K (approved topics only), 349C, 350C, 351E, Biology 446L*, 478L*, Kinesiology 324K*.~~

~~15. Enough additional coursework to make a total of 120 semester hours.~~

Option III: Marine and Freshwater Science

5. ~~Mathematics 408C and 408D, or 408N and 408S.~~ Chemistry 320M.
6. ~~7. An eight semester hour sequence of coursework in physics chosen from the following:~~ Biology 326R~~, 226L,~~ and 373.
   - ~~a. Physics 301, 101L, 316, and 116L;~~
   - ~~b. Physics 317K, 117M, 317L, and 117N;~~
   - ~~c. Physics 303K, 103M, 303L, and 103N; or~~
   - ~~d. Physics 302K, 102M, 302L, and 102N~~
7. ~~Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, and 320N.~~ Marine Science 101, 310, 320, and 120L.
8. ~~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.~~ Twelve hours of coursework chosen from: Biology 321L, 354L, Marine Science 440, 348 (*Topic 1: Training Cruise(s)*), 352, 352C, 352D, 352E, 152L, 152S, 252S, 152T, 252T, 353, 354, 354C, 354E, 354J, 354Q, 354T, 354U, 355C, 356, 357, 367K, 170, 270, 370. Six hours must be completed at the Marine Science Institute in Port Aransas, Texas.
9. ~~10. At least four laboratory courses in biology, of which three must be upper-division; the student must complete Biology 206L or 208L. One of the following sequences:~~ Six hours of related courses chosen from one of the following options:
   a. Biology 320 and 344
   b. Biology 328 and 361T
   c. Biology 357 and 375
   d. Biology 364 and 366 or Geology 341G
   e. Geography 301C or 301K and 333K
   f. Geography 301C and 356 or 356T
   g. Geography 306C and 334, 339C, or 356
   h. Geography 310C and 360G or 355N
10. ~~Biology 328M or Statistics and Data Sciences 328M.~~ Enough additional coursework to make a total of 120 semester hours.

~~12. Marine Science 310; Biology 101C (Topic 1: *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.~~

~~13. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete the following courses:~~

- ~~i. Biology 226L and 326R.~~
- ~~j. Marine Science 320 and 120L.~~
- ~~k. At least twenty-one semester hours of coursework chosen from the following: Biology 321L, 327, 127L, 328, 128L, 354L, 361T, 370, 375, Geological Sciences 422K, Marine Science 440, 352C, 352D, 353 (Topic 17: *Marine Fish Physiology*), 354C, 354Q, 354T, 354U, 356, 357, 367K, 170, 270, 370, Biology 448L or Marine Science 354, Biology 364 or Marine Science 354E; six hours of this coursework must be completed at the Marine Science Institute at Port Aransas.~~

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

Option IV: Microbiology and Infectious Diseases

5. ~~Mathematics 408C or 408N and Statistics and Data Sciences 328M.~~ Biochemistry 369 or 339F, and Chemistry 320M.
6. ~~7. An eight-semester-hour sequence of coursework in physics chosen from the following:~~ Biology ~~226L,~~ 326R, 330, 339, 339M, 361, 360K, 366.
   - ~~a. Physics 301, 101L, 316, and 116L;~~
   - ~~b. Physics 317K, 117M, 317L, and 117N;~~
   - ~~c. Physics 303K, 103M, 303L, and 103N; or~~
   - ~~d. Physics 302K, 102M, 302L, and 102N~~

7. ~~Chemistry 301 or 301H, 302 or 302H, 204, and Chemistry 220C, 320M, 320N, and Biochemistry 369.~~ Two upper-division biology laboratory courses chosen from: Biology 230L, 160L, and 361L. Biology 377-FRI/377/379H may be used for one of the laboratory courses if approved in advance by the microbiology faculty adviser.
8. ~~9. 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.~~ Fifteen additional hours in upper-division biochemistry, biology, and chemistry.
9. ~~10. Biology 206L.~~ Enough additional coursework to make a total of 120 semester hours.

~~11. Two upper-division biology laboratory courses, one of which must be chosen from Biology 230L, 160L, and 361L; ***Biology 377-FRI***/377/379H may be used for the second course if approved in advance by the microbiology faculty adviser; Biology 226L may not be used to fulfill this requirement.~~
~~12. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete the following courses: Biology 226L, 326R, 330, 339, 360K, 366, 370, and 320 or 344.~~
~~13. Enough additional coursework to make a total of 126 semester hours.~~

Option V: Cell and Molecular Biology

5. ~~Mathematics 408C or 408N and Statistics and Data Sciences 328M.~~ Biochemistry 369 or 339F, and Chemistry 320M.
6. ~~7. An eight semester hour sequence of coursework in physics chosen from the following:~~ Biology 320, 326R, 349, and 344 or 350M.
    ~~1. Physics 301, 101L, 316, and 116L;~~
    ~~2. Physics 317K, 117M, 317L, and 117N; or~~
    ~~3. Physics 303K, 103M, 303L, and 103N~~
7. ~~Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, 320N, and Biochemistry 369.~~ Two laboratory courses chosen from: Biology 320L, 230L, 323L, 325L, 331L, 349L.
8. ~~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.~~ One additional upper-division laboratory course in biology. ***Biology 377-FRI***/377/379H may be used if approved in advance by the cell and molecular biology faculty adviser.
9. ~~10. At least four laboratory courses in biology, of which three must be upper-division; ***Biology 377-FRI***/377/379H may be used for the second course if approved in advance by the cell and molecular biology faculty adviser.~~ Eighteen additional hours in upper-division biochemistry, biology, and chemistry.
10. ~~11. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete the following courses:~~ Enough additional coursework to make a total of 120 semester hours.

    ~~d. Biology 320 and 344.~~
    ~~e. Biology 226L, 326R, 349, 370, and one of the following: 320L, 331L, 349L.~~
    ~~f. Biology 328, 365S, Neuroscience 365R.~~
    ~~g. At least six semester hours chosen from the following: Biology 323L, 325L, 325T, 327D, 330, 230L, 335, 336, 337J, 339, 339M, 347, 349L, 350M, 360K, 160L, 360M, 365N, 366, 366R, Chemistry 353 or 353M, and Neuroscience 365D, 365L, 365T, 365W.~~

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

~~**Option VI: Neurobiology**~~

~~6. Mathematics 408C and 408D, or 408N and 408S.~~
~~7. An eight semester hour sequence of coursework in physics chosen from the following:~~
    ~~a. Physics 301, 101L, 316, and 116L;~~
    ~~b. Physics 317K, 117M, 317L, and 117N;~~
    ~~c. Physics 303K, 103M, 303L, and 103N; or~~
    ~~d. Physics 302K, 102M, 302L, and 102N~~
~~8. Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, and 320N.~~
~~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. At least four laboratory courses in biology. The student must complete Biology 206L, and at least nine semester hours chosen from the following courses: Biology 320L, 325L, 331L, 371L, 478L, Electrical Engineering 374L, Neuroscience 365L, 366L, 478L,366P,366S.~~

~~11. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete the following courses:~~

~~a. Biology 320, 344, 349, 370, and Neuroscience 365R.~~

~~b. Six semester hours chosen from the following courses: Biology 359K, 365N,Neuroscience 365D, 365T, 365W, 366C, 366D, 466G, Psychology 353K.~~

~~c. Six semester hours chosen from the following courses: Biology 328M or Statistics and Data Sciences 328M, Biology 321G, 337J, Chemistry 353 or 353M, 354, Biochemistry 369, 370, Computer Science 313E, 323E, 324E, 326E, 327E, Electrical Engineering 411, 313, 325, 438, 438K , 351K, 374K.~~

~~d. Three additional semester hours chosen from the following courses: Computer Science 303E, Psychology 308, 332, or 353K.~~

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

Option VII: Plant Biology

5. ~~Mathematics 408C or 408N and Statistics and Data Sciences 328M~~. Biology 328, 373, and 322 and 122L, 324 and 124L, or 463L.
6. ~~7. An eight-semester-hour sequence of coursework in physics chosen from the following:~~ Two additional upper-division laboratory courses; ***Biology 377-FRI***/377/379H may be used for one of the laboratory courses if approved in advance by the plant biology faculty adviser.
   ~~a. Physics 301, 101L, 316, and 116L;~~
   ~~b. Physics 317K, 117M, 317L, and 117N;~~
   ~~c. Physics 303K, 103M, 303L, and 103N; or~~
   ~~d. Physics 302K, 102M, 302L, and 102N~~
7. ~~Chemistry 301 or 301H, 302 or 302H, 204, 220C, 320M, and 320N.~~ One of the following sequences:
   a. Plant molecular biology: Biochemistry 369 or 339F, Biology 320 and 350M, and Chemistry 320M.
   b. Plant environmental biology: Biology 357, 347, and 375.
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.~~ Eighteen additional hours in upper-division biochemistry, biology, chemistry, and marine science.
9. ~~10. Four biology laboratory courses, of which three must be upper-division; one of which must be chosen from chosen from Biology 206L or 208L; Biology 377 FRI/377/379H may be used for the second course if approved in advance by the plant biology faculty adviser~~ Enough additional coursework to make a total of 120 semester hours.

~~11. In fulfilling requirement 4 of the Prescribed Work Common to All Options 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, 328D, 331L, 350M, 351, 352, 370, 472L, 373, 373L, 374 and 174L, 375, and Biochemistry 369.~~

~~12. 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.~~

~~13. 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.~~

~~6. An eight-semester-hour sequence of coursework in physics chosen from the following:~~

~~a. Physics 301, 101L, 316, and 116L;~~

~~b. Physics 317K, 117M, 317L, and 117N;~~
~~c. Physics 303K, 103M, 303L, and 103N; or~~
~~d. Physics 302K, 102M, 302L, and 102N~~

~~Science 360 (Topic 4: *Physics by Inquiry*) and Physics 108 may substitute for Physics 316 and 116L, 317L and 117N, 303L and 103N, or 302L and 102N; Physics 108 is offered on the pass/fail basis.~~

5. ~~Chemistry 301 or 301H, 302 or 302H, 204, and either~~ Chemistry 320M, 320N, and 220C or 320M and Biochemistry 369.
6. ~~8. Either Biology 311C, 311D, and 325 or 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.~~
7. ~~10. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete the following courses~~: Biology courses:
   a. Biology 320, 226L, 326R, ~~370,~~ and either 324 and 124L, ~~or~~ 322 and 122L, or 328 and 128L.
   b. At least three semester hours chosen from the following courses in physiology, neurobiology, and behavior: Biology ~~322, 122L, 328, 328D, 128L, 329, 129L,~~ 438L, ~~339, 345, 359J,~~ 359K, 359R, ~~360K, 160L, 361, 361L,~~ 361T, 365N or Neuroscience 365N, 365S, ~~371L,~~ Neuroscience ~~365L,~~ 365R.
   c. ~~One of the following courses with a substantial field component: Biology 321L, 340L, 453L, 455L, 456L, 373L, Marine Science 352D, 354, 354C.~~ At least three semester hours chosen from: Biology 340L, 448L, 453L, 455L, 456L, 463L, 364, 369L, 373, Marine Science 352D, 354, 354C.
8. 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*).
9. ~~12.~~ History 329U or Philosophy 329U.
10. ~~13.~~ One of the following:
    a. For composite science certification: Biochemistry 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, physics, and science courses used to fulfill requirements ~~7 and 8~~ 3c, 3d, 3ei, and 5.
    b. For life science certification: Biology 373, and three additional semester hours of biology chosen from the courses listed in requirements 7b and 7c ~~11b~~.
11. Eighteen semester hours of professional development coursework consisting of:
    a. Curriculum and Instruction 650S.
    b. Curriculum and Instruction 365C or UTeach-Natural Sciences 350.
    c. Curriculum and Instruction 365D or UTeach-Natural Sciences 355.
    d. Curriculum and Instruction 365E or UTeach-Natural Sciences 360.
    e. UTeach-Natural Sciences 101, 110, and 170.
12. 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.
13. ~~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~~ an additional three-hour honors-designated course from a department in the College of Natural Sciences. ~~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. ~~7.~~ An eight-semester-hour sequence of coursework in physics chosen from the following:
   a. Physics 301, 101L, 316, and 116L;
   b. Physics 317K, 117M, 317L, and 117N; or
   c. Physics 303K, 103M, 303L, and 103N

~~Courses used to satisfy this requirement may also be counted toward requirement 6~~.

7. Biology 206L or 208L and Chemistry 204. ~~, 128K, 128L, 328M, and 328N.~~
8. ~~9. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete Biology 320 or 344, 349, 370, Neuroscience 365R, 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.~~ Complete twenty-four hours chosen freely from the following lists:
    a. Biology 370.
    b. Cellular, developmental, and molecular biology: Biochemistry 369 or 339F, 339J, 339M, 346F, Biology 320, 326R, 330, 335, 336, 339, 339M, 343M, 344, 347 or 360K, 349, 350M, 360M, 361.
    c. Genetics and genomics: Biochemistry 339N, Biology 321G, 325T, 327E, 327G, 354C, 366, 366R, 471, Statistics and Data Sciences 348.
    d. Physiology, neuroscience, and behavior: Biology 328, 438L, 359K, 359R, 361T, 365N, 365S, 374, Marine Science 355, Neuroscience 365R.
    e. Ecology, evolution, and biodiversity: Biology 322, 324, 346, 351, 357, 364, 471G, 373, 375, Marine Science 320, 352C, 352D, 352E, 353, 354, 354C, 354E, 354Q, 356, 357.
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 ~~9~~.
10. ~~11.~~ A section of Undergraduate Studies 302 or 303 that is approved by the departmental honors adviser.
11. ~~12.~~ A section of Rhetoric and Writing 309S that is restricted to students in the Dean's Scholars Honors Program.
12. ~~13.~~ Two semesters of Biology 379H.
13. ~~14.~~ Fifteen additional semester hours of coursework approved by the departmental honors adviser.
14. ~~15.~~ Six semester hours of coursework in the College of Liberal Arts or the College of Fine Arts.
15. ~~16.~~ 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 Data Sciences 329C or Mathematics 340L or 341; Mathematics 362K or Statistics and Data Sciences 321; and ~~Mathematics 358K or 378K or~~ Statistics and Data Sciences 348 ~~321 or 325H or 328M~~.
6. ~~7. Computer Science 303E; Computer Science 313E or Statistics and Data Sciences 222; and one of the following courses: Computer Science 323E, 323H, 324E, 327E, 329E, 337, 367, Statistics and Data Sciences 329D, 335, 374D, 374E, Mathematics 348, 372K, 376C.~~ Two courses from: Computer Science 303E, 313E, 323E, 323H, 324E, 326E, 327E, 329E, Mathematics 408D, 358K, 362K, 378K, Statistics and Data Sciences 322, 323, 329D, 332, 335, 352, 353, 358, 374C, 374D, 374E.
7. ~~8. An eight-semester-hour sequence of coursework in physics chosen from the following:~~ Two courses from genetics, genomics, and computational biology: Biochemistry 339N, Biology 321G, 325T, 327E, 327G, 354C, 366, 366R, 471.
    ~~a. Physics 301, 101L, 316, and 116L;~~
    ~~b. Physics 317K, 117M, 317L, and 117N; or~~
    ~~c. Physics 303K, 103M, 303L, and 103N~~
8. ~~Chemistry 301 or 301H, 302 or 302H, and 204.~~ Six hours chosen freely from the following lists:
    a. Cellular, developmental, and molecular biology: Biochemistry 369 or 339F, 339J, 339M, 346F, Biology 320, 326R, 330, 335, 336, 339, 339M, 343M, 344, 347 or 360K, 349, 350M, 360M, 361.
    b. Physiology, neuroscience, and behavior: Biology 328, 438L, 359K, 359R, 361T, 365N, 365S, 374, Marine Science 355, Neuroscience 365R.
    c. Ecology, evolution, and biodiversity: Biology 322, 324, 346, 351, 357, 364, 471G, 373, 375, Marine Science 320, 352C, 352D, 352E, 353, 354, 354C, 354E, 354Q, 356, 357.
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~~. One additional laboratory course chosen from: Biology 320L, 122L, 323L, 124L, 128L, 129L, 325L, 328D, 230L, 331L, 340L, 446L,

448L, 349L, 353F, 453L, 354L, 455L, 456L, 160L, 361L, 463L, 165U, 369F, 369L, 371L, 472L, 373L, 174L, 478L, Marine Science 120L, 152L.

10. ~~11. In fulfilling requirement 4 of the Prescribed Work Common to All Options above, the student must complete Biology 321G, 370, and six additional hours of upper-division coursework in biology.~~ Nine hours of additional upper-division biochemistry, biology, chemistry, marine science, mathematics, physics, and statistics and data sciences.

11. ~~12. Four biology laboratory courses, of which three must be upper-division; Biology 321G and Statistics and Data Sciences 328M may fulfill two of these upper-division requirements~~. Enough additional coursework to make a total of 120 semester hours.

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

Option XI: Biology

5. Two courses from cellular, developmental, and molecular biology: Biochemistry 369 or 339F, 339J, 339M, 346F, Biology 320, 326R, 330, 335, 336, 339, 339M, 343M, 344, 347 or 360K, 349, 350M, 360M, 361.
6. Two courses from genetics, genomics, and computational biology: Biochemistry 339N, Biology 321G, 325T, 327E, 327G, 354C, 366, 366R, 471, Statistics and Data Sciences 348.
7. Two courses from physiology, neurobiology, and behavior: Biology 328, 438L, 359K, 359R, 361T, 365N, 365S, 374, Marine Science 355, Neuroscience 365R.
8. Two courses from ecology, evolution, and biodiversity: Biology 322, 324, 346, 351, 357, 364, 471G, 373, 375, Marine Science 320, 352C, 352D, 352E, 353, 354, 354C, 354E, 354Q, 356, 357.
9. Two additional laboratory courses: Biology 320L, 122L, 323L, 124L, 128L, 129L, 325L, 328D, 230L, 331L, 340L, 446L, 448L, 349L, 353F, 453L, 354L, 455L, 456L, 160L, 361L, 463L, 165U, 369F, 369L, 371L, 472L, 373L, 174L, 478L, Marine Science 120L, 152L. One-hour laboratory courses may require credit for or registration in a complementary lecture course.
10. Twelve additional hours in upper-division biochemistry, biology, chemistry, marine science, mathematics, statistics and data sciences, and physics.
11. Enough additional coursework to make a total of 120 semester hours.

Option XII: Genetics and Genomics

5. Biochemistry 369 or 339F.
6. Biology 325T, 349, 344, and 325L.
7. Chemistry 320M.
8. Three hours from: Biochemistry 339N, Biology 321G, Statistics and Data Sciences 348.
9. Six hours from: Biology 326R, 327E, 327G, 354C, 366, 366R.
10. Biology 320L or 349L.
11. Twelve additional hours in upper-division biochemistry, biology, chemistry, mathematics, and statistics and data sciences.
12. Enough additional coursework to make a total of 120 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~~ 9, and in each of the professional development courses listed in requirement ~~14~~ 11 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~~ 12. 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. More information about the Undergraduate Research Forum is available at https://cns.utexas.edu/.

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, 408N, or 408R ~~or 408N~~. ~~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.

DOCUMENTS OF THE GENERAL FACULTY

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE *UNDERGRADUATE CATALOG 2016-2018*

Dean Linda Hicke in the College of Natural Sciences has filed with the secretary of the Faculty Council the following changes to the *Undergraduate Catalog, 2016-2018*. The secretary has classified this proposal as legislation of *general* interest to more than one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the changes on February 4, 2016, and forwarded the proposal to the Office of the General Faculty. The Faculty Council has the authority to approve this legislation on behalf of the General Faculty. The authority to grant final approval on this legislation resides with UT System.

If no objection is filed with the Office of the General Faculty by the date specified below, the legislation will be held to have been approved by the Faculty Council. If an objection is filed within the prescribed period, the legislation will be presented to the Faculty Council at its next meeting. The objection, with reasons, must be signed by a member of the Faculty Council.

To be counted, a protest must be received in the Office of the General Faculty by February 24, 2016.

Hillary Hart, Secretary
General Faculty and Faculty Council

Posted on the Faculty Council website (http://www.utexas.edu/faculty/council/) on February 11, 2016.

14361

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE *UNDERGRADUATE CATALOG 2016-2018*

Type of Change ☒ Academic Change
☐ Degree Program Change (THECB form required)

Proposed classification ☐ Exclusive ☒ General ☐ Major

1. **IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST CONSULT LINDA DICKENS, DIRECTOR OF ACCREDITATION AND ASSESSMENT, TO DETERMINE IF SACS-COC APPROVAL IS REQUIRED.**
   - Is this a new degree program? Yes ☐ No ☒
   - Does the program offer courses that will be taught off campus? Yes ☐ No ☒
   - Will courses in this program be delivered electronically? Yes ☐ No ☒

2. **EXPLAIN CHANGE TO DEGREE PROGRAM AND GIVE A DETAILED RATIONALE FOR EACH INDIVIDUAL CHANGE:**
   1. Streamline the first science sequence requirements in Options I, II, and IV by removing the biology and chemistry labs and the two-course geological sciences sequence. Create more flexibility for students who want to study physics by allowing any calculus-based physics sequence, including mixed sequences, to count without need of petitions.
      Rationale: Experience with lab work in biology and chemistry is not necessary for computer scientists working in biology and chemistry as computational specialists. The physics laboratory courses are co-requisites for the physics lecture courses; hence these labs cannot be removed. Computer science students often take the engineering physics sequence but any calculus-based physics sequence is suitable. Writing the requirement as the first half of the three sequences and the second half of the three sequences allows students who switch sequences midstream without the need to file petitions. These changes are a formalization of a long-standing departmental policy of counting other calculus-based physics sequences, including mixed sequences.
      The Jackson School of Geosciences restricts enrollment in its major-level coursework to majors, making it extremely difficulty for students to complete this sequence. The only geological science courses readily available are GEO 401 or courses designed for non-science majors that are not suitable for computer science majors.
   2. Reduce the second science sequence requirement in Options I, II, and IV from a full-year sequence to a one semester experience. Allow requirement to be completed with a course from one of the sequences previously listed in requirement #7, geological sciences, or upper-division course in mathematics as an alternative.
      Rationale: The computer science faculty determined that exposure to science outside of computer science is beneficial but that another year of science is unnecessary. In addition, the science courses are not prerequisites for other requirements on the BS in Computer Science. Computer science is closely related to mathematics and is a good choice for students who wish to explore the theoretical foundations of computer science.
   3. Increase by 1 the number of upper-division computer science honors courses required; exclude CS 429H from applying toward this requirement, in Option II.
      Rationale: Prior to the computer science curriculum overhaul in the 2014-16 catalog, Option II majors were required to complete 5 upper-division computer science honors courses when choosing courses to fulfill requirements 9a through 9e. The number was reduced to 4 in the 2014-16 catalog, in error.
      Regarding the exclusion of CS 429H, the course is primarily made up of content previously offered as CS 310H and EE 316. An introductory course in systems was not applicable toward the 5 required

honors courses.
Taken together, these changes re-establish the honors requirement as intended by the Department of Computer Science.

4. Remove CS 353, Theory of Computation, in Option IV, 9d; consequently, delete 9e and move its requirements up to 9d.
Rationale: CS 353 was listed as a required course in error in the 2014-16 catalog. Its removal corrects this error.
5. Reduce the total hours to 120 in Options I and II.
Rationale: Reducing science requirements outside of computer science creates the opportunity to reduce the overall hours of the degree to 120 hours. The faculty would prefer that students graduate earlier or have more free time in their schedules to explore extracurricular activities that may assist them in personal and professional growth. Options III and IV are already at 120 hours. Option V, Teaching, cannot be reduced due to extensive certification requirements of the state of Texas.
6. Remove CS 312H from list of classes that may be taken by students who are not yet admitted to the Computer Science major. Clarify that enrollment in CS 312, 311 or 311H, and 314 or 314H is restricted to students admitted to the CS entry-level major.
Rationale: CS 312 is removed because the course has never been developed and consequently will never be offered. The statement that CS 312, 311 or 311H, and 314 or 314H are open only to CS entry-level majors is added to reflect ongoing enrollment restrictions.

3. THIS PROPOSAL INVOLVES (Please check all that apply)

☒ Courses in other colleges	☐ Courses in proposer's college that are frequently taken by students in other colleges	☐ Flags
☐ Course in the core curriculum	☐ Change in course sequencing for an existing program	☐ Courses that have to be added to the inventory
☐ Change in admission requirements (external or internal)	☐ Requirements not explicit in the catalog language (e.g., lists of acceptable courses maintained by department office)	

4. SCOPE OF PROPOSED CHANGE

a. Does this proposal impact other colleges/schools? Yes ☒ No ☐
If yes, then how? Removing one geology course and the electrical engineering sequences will slightly reduce enrollments in the impacted courses for these two departments. See details below.

b. Do you anticipate a net change in the number of students in your college? Yes ☐ No ☒
If yes, how many more (or fewer) students do you expect?

c. Do you anticipate a net increase (or decrease) in the number of students from outside of your college taking classes in your college? Yes ☐ No ☒
If yes, please indicate the number of students and/or class seats involved.

d. Do you anticipate a net increase (or decrease) in the number of students from your college taking courses in other colleges? Yes ☒ No ☐
If yes, please indicate the number of students and/or class seats involved.

If 4 a, b, c, or d was answered with yes, please answer the following questions. If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted? At most, 18 seats in GEO 401 across the academic year; and eighteen seats in other lower-division GEO courses across the academic year.

Impacted schools must be contacted and their response(s) included:

Person communicated with: Rich Ketcham, Associate Dean, Jackson School of Geosciences

Date of communication: February 10, 2016

Response: approved compromise proposed by Natural Sciences (reduction of GEO from two courses to one)

How many students do you expect to be impacted? At most, eighteen seats in EE 313 across the academic year; and 18 seats in EE 331 across the academic year.

Impacted schools must be contacted and their response(s) included:

Person communicated with: Dr. Ahmed Tewfik, Department of Electrical and Computer Engineering

Date of communication: April 10, 2015

Response: "Hi Doug, Our curriculum committee is fine with this change. Regards, Ahmed"

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

f. Will this proposal change the number of hours required for degree completion? If yes, explain: **Yes.**
Options I and II will be reduced to 120 hours (from 127 hours). If yes, explain:
Due to the reduction in science coursework apart from computer science and mathematics, students may fulfill the degree requirements within 120 hours, including room for electives.

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: March 4, 2015
College approval date: May 20, 2015
Dean approval date: September 28, 2015, David Vanden Bout, Associate Dean

PROPOSED NEW CATALOG TEXT:

BACHELOR OF SCIENCE IN COMPUTER SCIENCE
[no changes]

Prescribed Work Common to All Options
[no changes]

Additional Prescribed Work for Each Option

Option I: Computer Science

6. Mathematics 408C and 408D, or 408N, 408S, and 408M; either 340L or 341 or Statistics and Data Sciences 329C; and Mathematics 362K or Statistics and Data Sciences 321.
7. One of the following sequences of coursework:
    a. Either Biology 311C and 311D, or Biology 315H and 325H~~, and Biology 206L or 208L~~.
    b. Chemistry 301 or 301H, and 302 or 302H~~, and 204~~.
    c. ~~Geological Sciences 401 and either 404C or 405~~. Physics 303K and 103M, 301 and 101L, or 317K and 117M; and 303L and 103N, 316 and 116L, or 317L and 117N.
    d. ~~Physics 303K, 303L, 103M, and 103N.~~
8. Three additional hours of majors-level coursework chosen from:
    a. a different sequence listed in requirement 7.
    b. geological sciences.

c. upper-division mathematics, excluding 325K, 340L, 341, and 362K. ~~An additional sequence chosen from those in requirement 7 above, or one of the following:~~

~~a. At least six hours of upper-division coursework in biology approved by the undergraduate adviser.~~

~~b. Chemistry 128K, 128L, 328M, and 328N, or Chemistry 220C, 320M, and 320N, or at least six hours of upper-division coursework in chemistry approved by the undergraduate adviser.~~

~~c. Geological Sciences 416K and 426P, or at least six hours of upper-division coursework in geological sciences approved by the undergraduate adviser.~~

~~d. Physics 315 and at least three hours of upper-division coursework in physics approved by the undergraduate adviser.~~

~~e. At least six hours of upper-division coursework in mathematics approved by the undergraduate adviser; a course may not be counted toward both requirement 6 and requirement 8.~~

~~f. Electrical Engineering 313 and 331.~~

9. The following courses in computer science:
   a. Theory: Computer Science 311 or 311H, 331 or 331H, and three additional hours from an approved list available in the department.
   b. Programming: Computer Science 312 ~~or 312H~~, 314 or 314H, and three additional hours from an approved list in the department.
   c. Systems: Computer Science 429 or 429H, 439 or 439H, and three additional hours from an approved list available in the department.
   d. Fifteen additional hours of upper-division courses in computer science.
10. Enough additional coursework to make a total of ~~127~~ 120 semester hours.

Option II: Turing Scholars Honors

6. Mathematics 408C and 408D, or 408N, 408S, and 408M; either 340L or 341 or Statistics and Data Sciences 329C; and Mathematics 362K or Statistics and Data Sciences 321.
7. One of the following sequences of coursework:
   a. Either Biology 311C and 311D, or Biology 315H and 325H~~; and Biology 206L or 208L~~.
   b. Chemistry 301 or 301H, and 302 or 302H~~, and 204~~.
   c. ~~Geological Sciences 401 and either 404C or 405~~. Physics 303K and 103M, 301 and 101L, or 317K and 117M; and 303L and 103N, 316 and 116L, or 317L and 117N.
   ~~d. Physics 303K, 303L, 103M, and 103N.~~
8. Three additional hours of majors-level coursework chosen from:
   a. a different sequence listed in requirement 7.
   b. geological sciences.
   c. upper-division mathematics, excluding 325K, 340L, 341, and 362K.

~~An additional sequence chosen from those in requirement 7 above, or one of the following:~~

~~a. At least six hours of upper-division coursework in biology approved by the undergraduate adviser.~~

~~b. Chemistry 128K, 128L, 328M, and 328N, or Chemistry 220C, 320M, and 320N, or at least six hours of upper-division coursework in chemistry approved by the undergraduate adviser.~~

~~c. Geological Sciences 416K and 426P, or at least six hours of upper-division coursework in geological sciences approved by the undergraduate adviser.~~

~~d. Physics 315 and at least three hours of upper-division coursework in physics approved by the undergraduate adviser.~~

~~e. At least six hours of upper-division coursework in mathematics approved by the undergraduate adviser; a course may not be counted toward both requirement 6 and requirement 8.~~

~~f. Electrical Engineering 313 and 331.~~

9. The following courses in computer science:
   a. Theory: Computer Science 311 or 311H, 331 or 331H, and three additional hours from an approved list available in the department.

b. Programming: Computer Science 314 or 314H, and three additional hours from an approved list available in the department.
c. Systems: Computer Science 429 or 429H, 439 or 439H, and three additional hours from an approved list available in the department.
d. Computer Science 178H and 379H.
e. Twelve additional hours of upper-division courses in computer science.

The courses the student chooses to fulfill requirements a through c must be approved by the Turing Scholars program director. In addition to Computer Science 429H, 178H and 379H, at least ~~four~~ five upper-division courses chosen to fulfill requirements a through e must be honors courses. The honors thesis the student completes in Computer Science 379H must be approved by the program director.

10. Enough additional coursework to make a total of ~~127~~ 120 semester hours.

Option III: Computer Science Honors

6. Breadth requirement: An honors mathematics course; Computer Science 311H and 314H; one of the following two-semester sequences: Biology 315H and 325H, Chemistry 301H and 302H, Physics 301, 101L, 316, and 116L; and either an additional three hours chosen from these courses or Physics 315 and 115L. Credit earned by examination may not be counted toward this requirement.
7. At least six semester hours of upper-division coursework in mathematics.
8. Computer Science 429H, 331H, 439H, and twelve additional hours of upper-division coursework in computer science.
9. A section of Undergraduate Studies 302 or 303 that is approved by the departmental honors adviser.
10. A section of Rhetoric and Writing 309S that is restricted to students in the Dean's Scholars Honors Program.
11. Computer Science 379H and a three-semester-hour upper-division research course approved by the departmental honors adviser.
12. Twenty-five additional semester hours of coursework approved by the departmental honors adviser.
13. Six semester hours of coursework in the College of Liberal Arts or the College of Fine Arts.
14. Enough additional coursework to make a total of 120 semester hours.

Option IV: Integrated Program

6. Mathematics 408C and 408D, or 408N, 408S, and 408M; either 340L or 341 or Statistics and Data Sciences 329C; and Mathematics 362K or Statistics and Data Sciences 321.
7. One of the following sequences of coursework:
   ~~a.~~ Either Biology 311C and 311D, or Biology 315H and 325H; ~~and Biology 206L or 208L.~~
   b. Chemistry 301 or 301H, and 302 or 302H, ~~and 204~~.
   c. ~~Geological Sciences 401 and either 404C or 405~~. Physics 303K and 103M, 301 and 101L, or 317K and 117M; and 303L and 103N, 316 and 116L, or 317L and 117N.
   ~~d. Physics 303K, 303L, 103M, and 103N.~~
8. Three additional hours of majors-level coursework chosen from:
   a. a different sequence listed in requirement 7.
   b. geological sciences.
   c. upper-division mathematics, excluding 325K, 340L, 341L and 362K.

~~An additional sequence chosen from those in requirement 6 above, or one of the following:~~
~~a. At least six hours of upper-division coursework in biology approved by the undergraduate adviser.~~
~~b. Chemistry 128K, 128L, 328M, and 328N, or Chemistry 220C, 320M, and 320N, or at least six hours of upper-division coursework in chemistry approved by the undergraduate adviser.~~
~~c. Geological Sciences 416K and 426P, or at least six hours of upper-division coursework in geological sciences approved by the undergraduate adviser.~~
~~d. Physics 315 and at least three hours of upper-division coursework in physics approved by the undergraduate adviser.~~

~~e. At least six hours of upper-division coursework in mathematics approved by the undergraduate adviser; a course may not be counted toward both requirement 6 and requirement 8.~~

~~f. Electrical Engineering 313 and 331.~~

9. The following courses in computer science:
    a. Theory: Computer Science 311 or 311H, 331, or 331H, and three additional hours from an approved list available in the department.
    b. Programming: Computer Science 312 ~~or 312H~~, 314 or 314H, and three additional hours from an approved list available in the department.
    c. Systems: Computer Science 429 or 429H, 439 or 439H, and three additional hours from an approved list available in the department.
    d. ~~Computer Science 353 or 331 or 331H~~ Nine additional hours of upper-division courses in computer science.
    ~~e. Nine additional hours of upper-division courses in computer science.~~
10. Enough additional coursework to make a total of 120 semester hours.

Option V: Teaching (Senior grades)

6. History 329U or Philosophy 329U.
7. Mathematics 408C and 408D, or 408N, 408S, and 408M; either 340L or 341 or Statistics and Data Sciences 329C.
8. One of the following sequences of coursework:
    a. Biology 311C and 311D~~; and Biology 206L or 208L~~.
    b. Chemistry 301 or 301H, and 302 or 302H~~, and 204~~.
    ~~c. Geological Sciences 401 and either 404C or 405.~~ Physics 303K and 103M, 301 and 101L, or 317K and 117M; and 303L and 103N, 316 and 116L, or 317L and 117N.
    ~~d. Physics 303K, 303L, 103M, and 103N.~~
9. The following courses in computer science:
    a. Theory: Computer Science 311 or 311H, 331 or 331H, and three additional hours from an approved list available in the department.
    b. Programming: Computer Science 312 ~~or 312H~~, 314 or 314H, and three additional hours from an approved list available in the department.
    c. Systems: Computer Science 429 or 429H, 439 or 439H, and three additional hours from an approved list available in the department.
10. The requirements of one of the following certification areas:
    a. For computer science certification:
        i. Mathematics 362K and Statistics and Data Sciences 321.
        ii. An additional sequence chosen from the following:
            1. Biology 325 and 337 (Topic 2: *Research Methods: UTeach*).
            2. At least three hours of upper-division coursework in chemistry approved by the undergraduate adviser; and Chemistry 368 (Topic 1: *Research Methods: UTeach*).
            3. Physics 315 and 341 (Topic 7: *Research Methods: UTeach*).
        iii. Fifteen additional hours of approved computer science upper-division coursework.
    b. For computer science and mathematics certification:
        i. Mathematics 315C, 333L, 362K, either 360M or 375D, and Statistics and Data Sciences 321
        ii. Twelve additional hours of approved computer science upper-division coursework.
        iii. Biology 337 (Topic 2: *Research Methods: UTeach*), or Chemistry 368 (Topic 1: *Research Methods: UTeach*), or Physics 341 (Topic 7: *Research Methods: UTeach*).
11. Eighteen semester hours of professional development coursework consisting of:
    a. Curriculum and Instruction 650S.
    b. Curriculum and Instruction 365C or UTeach-Natural Sciences 350.
    c. Curriculum and Instruction 365D or UTeach-Natural Sciences 355.
    d. Curriculum and Instruction 365E or UTeach-Natural Sciences 360.
    e. UTeach-Natural Sciences 101, 110, and 170.

12. Enough additional coursework to make a total of 127 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 6, and in each of the professional development courses listed in requirement 11 and must pass the final teaching portfolio review. For information about the portfolio review and additional teacher certification requirements, students should consult the UTeach-Natural Sciences academic adviser.

~~With the exception of~~ Enrollment in Computer Science 312 ~~or 312H~~, 311 or 311H, and 314 or 314H~~,~~ is restricted to computer science entry-level majors. ~~all~~ All other computer science courses that may be counted toward a degree in computer science are restricted to students who have been admitted to the computer science major or have the consent of the undergraduate faculty adviser.

An undergraduate may not enroll in any computer science course more than once without written consent of an undergraduate adviser in computer science. No student may enroll in any computer science course more than twice. No student may take more than three upper-division computer science courses in a semester without written consent of an undergraduate adviser in computer science.

Additional Requirements for Option II
[no changes]

Additional Requirements for Option III
[no changes]

Additional Requirements for Option IV

Satisfactory Progress
[no changes]

Probation
[no changes]

Dismissal
[no changes]

Graduation
[no changes]

Order and Choice of Work
[no changes]

DOCUMENTS OF THE GENERAL FACULTY

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN MATHEMATICS DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE *UNDERGRADUATE CATALOG 2016-2018*

Dean Linda Hicke in the College of Natural Sciences has filed with the secretary of the Faculty Council the following changes to the *Undergraduate Catalog, 2016-2018*. The secretary has classified this proposal as legislation of *general* interest to more than one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the changes on February 4, 2016, and forwarded the proposal to the Office of the General Faculty. The Faculty Council has the authority to approve this legislation on behalf of the General Faculty. The authority to grant final approval on this legislation resides with UT System.

If no objection is filed with the Office of the General Faculty by the date specified below, the legislation will be held to have been approved by the Faculty Council. If an objection is filed within the prescribed period, the legislation will be presented to the Faculty Council at its next meeting. The objection, with reasons, must be signed by a member of the Faculty Council.

To be counted, a protest must be received in the Office of the General Faculty by February 24, 2016.

Hillary Hart, Secretary
General Faculty and Faculty Council

Posted on the Faculty Council website (http://www.utexas.edu/faculty/council/) on February 11, 2016.

14369

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN MATHEMATICS DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE *UNDERGRADUATE CATALOG 2016-2018*

Type of Change ☒ Academic Change
☐ Degree Program Change (THECB form required)

Proposed classification ☐ Exclusive ☒ General ☐ Major

1. **IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST CONSULT LINDA DICKENS, DIRECTOR OF ACCREDITATION AND ASSESSMENT, TO DETERMINE IF SACS-COC APPROVAL IS REQUIRED.**
   - Is this a new degree program? Yes ☐ No ☒
   - Does the program offer courses that will be taught off campus? Yes ☐ No ☒
   - Will courses in this program be delivered electronically? Yes ☐ No ☒

2. **EXPLAIN CHANGE TO DEGREE PROGRAM AND GIVE A DETAILED RATIONALE FOR EACH INDIVIDUAL CHANGE:**
   1. Deletion of the foreign language/foreign culture requirement.
      Rationale: When reviewing requirements to remove to reach 120 hours total, the faculty determined that the foreign language/foreign culture requirement is the one that has the least impact on meeting the needs of mathematics graduates.
   2. Deletion of Options II (Applied Mathematics), III (Mathematical Sciences), IV (Pure Mathematics); addition of Option VII (Mathematics).
      Rationale: The Department of Mathematics has not updated the Bachelor of Science degree in a number of years. Taking on this task was spurred by the advent of the BSA degree and a desire to reduce the degree to a total of 120 hours. The updates are made in the general spirit of providing fewer but more flexible options for students. Other than the Teaching and Honors options, the former options are being folded into one.
      Currently, many mathematics majors gravitate toward the easiest options and easiest courses, leading students to take courses that do not prepare them to for their future goals. Mathematics majors pursuing the revised options will be guided by advising tracks that provide a better assort of course choices to meet their needs.
   3. Inclusion of a course instructed in the Inquiry-based Learning (IBL) format in Option I, Actuarial Science, and Option VII, Mathematics.
      Rationale: Inquiry-based Learning has a long tradition in the Department of Mathematics. This requirement also dovetails with the Independent Inquiry Flag. Most IBL courses also meet the II flag.
   4. Addition of Mathematics in Context requirement in Option VII, Mathematics.
      Rationale: Most mathematics alumni do not pursue graduate studies in mathematics. For the majority of alumni, it is useful for them to have experience applying mathematics to other fields of study. The approved list will have options chosen from chemistry, computer science, electrical engineering, mathematics, and physics. For students who do not want to pursue this experience outside of mathematics, the department will accept M 374M, a mathematical modeling course.
   5. Replace M 427K with M 427J in Option III, Teaching.
      Rationale: M 427J, differential equations and linear algebra, will replace M 427K, differential equations.
   6. Restricting middle grade certification in Option III, Teaching, to mathematics certification.
      Rationale: Uteach confirms that students seeking mathematics, physical science, and engineering certification donot seek middle grade certification. By removing this option, the department is able to reduce the option total to120 hours.

3. THIS PROPOSAL INVOLVES (Please check all that apply)

- ☒ Courses in other colleges
- ☐ Courses in proposer's college that are frequently taken by students in other colleges
- ☐ Flags
- ☐ Course in the core curriculum
- ☐ Change in course sequencing for an existing program
- ☒ Courses that have to be added to the inventory
- ☐ Change in admission requirements (external or internal)
- ☐ Requirements not explicit in the catalog language (e.g., lists of acceptable courses maintained by department office)

M 339C, Actuarial Case Studies, is a new course. M 329F, Theory of Interest, replaces ACF 329, Theory of Interest. Both are specific to the Actuarial Science option.

4. SCOPE OF PROPOSED CHANGE

a. Does this proposal impact other colleges/schools? Yes ☒ No ☐
If yes, then how? The Mathematics in Context approved list is comprised of courses outside of the College of Natural Sciences, in addition to M 374M. We anticipate a slight decrease in the number of seats spread across a variety of geological sciences courses.

b. Do you anticipate a net change in the number of students in your college? Yes ☐ No ☒
If yes, how many more (or fewer) students do you expect?

c. Do you anticipate a net increase (or decrease) in the number of students from outside of your college taking classes in your college? Yes ☐ No ☒
If yes, please indicate the number of students and/or class seats involved.

d. Do you anticipate a net increase in the number of students from your college taking courses in other colleges? Yes ☒ No ☐
If yes, please indicate the number of students and/or class seats involved. We anticipate the number of seats needed in the following courses:
Over an academic year, we anticipate the following increases: M 374M (45), CH 353 (8), 354 (8); CS 341 (4), 342 (4), 345 (4), 346 (4), 353 (4), 367 (4); EE 411 (4), 325 (4), 360C (4), 362K (4); PHY 329 (8), 336K (8), 352K (8).
We anticipate a slight decrease in the number of seats spread across a variety of geological sciences courses.

If 4 a, b, c, or d was answered with yes, please answer the following questions. If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted?
Impacted schools must be contacted and their response(s) included: Department of Electrical and Computer Engineering
Person communicated with: Brian Evans
Date of communication: April 21, 2015
Response: approval to include EE courses

How many students do you expect to be impacted?
Impacted schools must be contacted and their response(s) included: Department of Chemistry
Person communicated with: Graeme Henkelman
Date of communication: April 20, 2015
Response: approval to include CH courses

How many students do you expect to be impacted?
Impacted schools must be contacted and their response(s) included: Department of Computer Science
Person communicated with: Bruce Porter via Mohamed Gouda

Date of communication: April 24, 2015
Response: approval to include CS courses

How many students do you expect to be impacted?
Impacted schools must be contacted and their response(s) included: Department of Physics
Person communicated with: Greg Sitz
Date of communication: April 20, 2015
Response: approval to include PHY courses

Impacted schools must be contacted and their response(s) included: College of Liberal Arts
Person communicated with: Richard Flores, Associate Dean
Date of communication: February 4, 2016
Response: no objection to removal of foreign language/foreign culture during CUDPR meeting

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

f. Will this proposal change the number of hours required for degree completion? If yes, explain: Yes. With the option deletions, addition, and changes, all of the BS in Mathematics degree options will be 120 semester hours.

5. COLLEGE/SCHOOL APPROVAL PROCESS
Department approval date: April 10, 2015
College approval date: May 27, 2015
Dean approval date: September 28, 2015, David Vanden Bout, Associate Dean

PROPOSED NEW CATALOG TEXT:

BACHELOR OF SCIENCE IN MATHEMATICS

As an alternative to the Bachelor of Science and Arts and the Bachelor of Arts degrees, the Bachelor of Science in Mathematics is designed with a twofold purpose: to offer students a more extensive scientific program that may better prepare them for graduate study or employment, and to recognize students who choose to pursue a more demanding program. Students are given the opportunity to develop greater breadth and depth in their mathematical programs as well as to combine mathematics with a concentration in another scientific discipline. ~~To accomplish these goals, the minimum number of semester hours is increased and the maximum limit is removed. Specialization in one additional scientific area is encouraged, and the foreign language requirement is shortened by one semester.~~

Students seeking the Bachelor of Science in Mathematics ~~must~~ select one ~~of six~~ option~~s~~: actuarial science, ~~applied mathematics, mathematical sciences, pure mathematics,~~ mathematics for secondary teaching, ~~and~~ mathematics honors, or mathematics. ~~Students who choose the option in mathematical sciences must also select a specialization in either scientific computation or statistics, probability, and data analysis.~~ Students who plan to follow option VI, mathematics honors, must be admitted to the Dean's Scholars Honors Program.
Prescribed Work Common to All Options

In addition, students seeking the Bachelor of Science in Mathematics 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.
2. One course with a quantitative reasoning flag.

Courses with flags are identified in the *Course Schedule*. They may be used simultaneously to fulfill other requirements, unless otherwise specified.

~~3. Options I-IV: One of the following foreign language/culture choices:~~
~~a. Second-semester-level proficiency in a foreign language course.~~
~~b. First-semester-level proficiency in a foreign language and a three-semester-hour course in the culture of the same language area.~~
~~c. Two three-semester-hour culture courses chosen from one foreign culture category from an approved list in the dean's office and college advising centers. Students in options V and VI are exempt from this requirement.~~

3. ~~4.~~ Forty-two semester hours of upper-division coursework. At least twenty-one semester hours of upper-division coursework must be completed in residence at the University.
4. ~~5.~~ Eighteen semester hours in mathematics must be completed in residence at the University.

Additional Prescribed Work for Each Option

Option I: Actuarial Science

5. Eight semester hours of majors-level coursework in one of the following areas: astronomy, biology, chemistry, geological sciences, and physics.
6. ~~7. Mathematics 408C and 408D, or 408N, 408S, and 408M.~~ Complete one of the following:

    a. Mathematics 408C, 408D, and 427L.
    b. Mathematics 408N, 408S, and 408M.
    c. Mathematics 408K, 408L, and 408M.

    Mathematics 408N and 408S, or 408K and 408L, may substitute for 408C.
7. ~~8. Actuarial Foundations 329.~~ Economics 304K and 304L.
8. ~~9. Economics 304K and 304L.~~ Accounting 310F or both 311 and 312.
9. ~~10. Accounting 310F or both 311 and 312.~~ Finance 357.
10. ~~11. Finance 357.~~ Computer Science 303E.
11. ~~12. At least thirty-two semester hours of upper-division coursework in mathematics and supporting areas, consisting of~~

    ~~One of the following courses: Mathematics 328K, 343K, 361, 361K, 365C, 367K, 373K.~~
    ~~Mathematics 340L or 341.~~
    ~~Mathematics 362K and either 358K or 378K.~~
    ~~Four courses chosen from the following: Mathematics 339J, 339U, 339V, 339D, 339W, 349P, and 349R.~~
    ~~Enough additional coursework to provide a total of at least thirty-two hours. In addition to upper-division mathematics courses, the following courses in supporting areas may be counted toward this requirement: Economics 420K, Finance 354, 367, 377 (Topic 2: *Financial Risk Management*), Legal Environment of Business 320F, 323, Management Information Systems 325, Risk Management 357E, 369K, 377. Courses used to satisfy this requirement may not be counted toward requirement 13.~~

    Upper-division mathematics courses, including:

    a. Mathematics 325K or 328K. Mathematics 328K is recommended for students with substantial experience in writing proofs.
    b. Mathematics 341. Mathematics 340L may be substituted for 341 if the course was completed prior to entry into the mathematics entry-level major.
    c. Mathematics 362K and either 358K or 378K.
    d. Mathematics 329F, 339D, 339J, and 339U.

e. Two courses chosen from the following: 339V, 339W, and 349P.

f. One additional course chosen from: Mathematics 339C, 339V, 339W, 349P, 349R, 378K.

One of the courses fulfilling requirement 11a through requirement 11f must be taught in the inquiry based learning (IBL) format. IBL courses are identified each semester through a notation under the unique number in the course schedule and through a list maintained in the mathematics advising office in Robert Lee Moore Hall, room 4.101.

12. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 5 ~~6~~. Philosophy courses in logic, computer science courses in discrete mathematics, engineering courses, and actuarial foundation courses ~~counted toward requirement 12e~~ may not be used to fulfill this requirement.
13. ~~14.~~ Enough additional coursework to make a total of ~~126~~ 120 semester hours.

~~**Option II: Applied Mathematics**~~

~~6. Eight semester hours in one of the following areas: astronomy, biology, chemistry, geological sciences, and physics.~~
~~7. Mathematics 408C and 408D, or 408N, 408S, and 408M.~~
~~8. Computer Science 303E or the equivalent.~~
~~9. Thirty-two semester hours of upper-division coursework in mathematics, consisting of the following courses; the student should consult the applied mathematics adviser for information on other courses that may be counted toward this requirement.~~
~~a. Mathematics 340L or 341.~~
~~b. Mathematics 427K, 348, 362K, and 374M.~~
~~c. Mathematics 361 and 365C.~~
~~d. Mathematics 343K or 373K.~~
~~e. Enough of the following coursework to provide a total of at least thirty-two hours: Mathematics 346, 365D, 368K, 372K, 376C.~~
~~10. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 6. Philosophy courses in logic, computer science courses in discrete mathematics, and engineering courses may not be used to fulfill this requirement.~~
~~11. Enough additional coursework to make a total of 126 semester hours.~~

~~**Option III: Mathematical Sciences**~~

~~Specialization in Statistics, Probability, and Data Analysis~~

~~6. Eight semester hours in one of the following areas: astronomy, biology, chemistry, geological sciences, and physics.~~
~~7. Mathematics 408C and 408D, or 408N, 408S, and 408M.~~
~~8. Computer Science 303E or the equivalent.~~
~~9. At least thirty-two semester hours of upper-division coursework in mathematics and related areas, consisting of~~
~~a. Mathematics 325K.~~
~~b. Mathematics 427K and 362K.~~
~~c. Mathematics 340L or 341.~~
~~d. Mathematics 361K or 365C.~~
~~e. Mathematics 358K and 378K.~~
~~f. Mathematics 328K, 343K, 346, or 373K.~~
~~g. Additional coursework chosen from the following: Computer Science 327E or 347, Economics 341K, 350K (Topic 4: *Advanced Econometrics*), 350K (Topic 6: *Advanced Microeconomic Theory*), 350K (Topic 7: *Applied Economic Analysis*), 354K, Electrical Engineering 366L, 379K (Topic 15: *Information Theory*), Geography 360G, 360L, Mathematics 339J, 339U, 339V, 343L, 343M, 346, 348, 349P, 349R, 365D, 368K, 373L, 374G, 374M, Mechanical Engineering 366L, 366Q, 366R, 367S, Psychology 325K, Risk~~

Management 357E. Courses used to satisfy this requirement may not be counted toward requirement 10.

Most of these courses have substantial prerequisites, sometimes including courses in other departments. Some have restricted enrollment. The student is responsible for meeting prerequisites and other requirements for enrollment in the courses selected to fulfill this requirement. Courses should be chosen in consultation with the specialization adviser to form a coherent program consistent with the student's background and goals.

Educational Psychology 371 may not be counted toward this degree if it is taken after Mathematics 358K or 378K.

10. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 6 Philosophy courses in logic, computer science courses in discrete mathematics, engineering courses, and courses counted toward requirement 9g may not be used to fulfill this requirement.
11. Enough additional coursework to make a total of 126 semester hours.

Specialization in Scientific Computation

Students who complete this specialization may simultaneously fulfill some of the requirements of the Elements of Computing Certificate or the Certificate in Scientific Computation. These certificate programs are described in Transcript-Recognized Certificate Programs.

6. Eight semester hours in one of the following areas: astronomy, biology, chemistry, geological sciences, and physics.
7. Mathematics 408C and 408D, or 408N, 408S, and 408M.
8. One of the following sequences: Statistics and Data Sciences 318 and 222; Computer Science 312 and 314; or Computer Science 303E and 313E.
9. At least thirty-two semester hours of upper-division coursework in mathematics and related areas, consisting of
    a. Mathematics 340L or 341.
    b. Mathematics 427K, 348, 362K, and 368K.
    c. Mathematics 361K or 365C.
    d. Students who fulfill the requirements of the Elements of Computing Certificate or the Certificate in Scientific Computation may count up to six hours of upper-division certificate coursework toward this requirement. Computer Science 323E may not be counted toward this requirement. Courses used to satisfy this requirement may not be counted toward requirement 10.
    e. Additional coursework chosen from the following: Mathematics 325K or 328K (but not both), 427L, 343K or 373K (but not both), 343L, 346, 358K, 361, 365D, 372K, 374M, 376C, 378K.
10. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 6. Philosophy courses in logic, computer science courses in discrete mathematics, engineering courses, and courses counted toward requirement 9e may not be used to fulfill this requirement.
11. Enough additional coursework to make a total of 126 semester hours.

Option IV: Pure Mathematics

6. Eight semester hours in one of the following areas: astronomy, biology, chemistry, geological sciences, and physics.
7. Mathematics 408C and 408D, or 408N, 408S, and 408M.
8. At least thirty-two semester hours of upper-division coursework in mathematics, consisting of
    a. Mathematics 340L or 341.
    b. Mathematics 427K, 361, 362K, 365C, and 373K.
    c. One of the following two-course sequences: Mathematics 427K and 372K, 358K and 378K, 362K and 339J, 348 and 368K, 365C and 365D, 367K and 365G, 367K and 367L, 373K and 373L.

~~d. Additional hours of upper-division coursework in mathematics chosen with the approval of the mathematics adviser. Either Mathematics 343K or 361K may be counted toward this requirement, but not both.~~

~~9. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 6. Philosophy courses in logic, computer science courses in discrete mathematics, and engineering courses may not be used to fulfill this requirement.~~

~~10. Enough additional coursework to make a total of 126 semester hours.~~

Option V: Teaching

This option is designed to fulfill the course requirements for certification as a middle grades or secondary school mathematics teacher in Texas; the student chooses mathematics certification or mathematics, physical science, and engineering certification. However, completion of the course requirements does not guarantee the student's certification. For information about additional certification requirements, students should consult the UTeach-Natural Sciences academic adviser.

Students are encouraged to become familiar with a variety of mathematical software relevant to middle grades or secondary teaching, such as computer geometry systems, spreadsheets, and statistical software. Whenever possible, the student should take courses and sections of courses that use these types of software.

5. ~~6.~~ History 329U or Philosophy 329U.
6. ~~7. Mathematics 408C and 408D, or 408N, 408S, and 408M.~~ One of the following sequences:
    a. Mathematics 408C and 408D.
    b. Mathematics 408N and 408S.
    c. Mathematics 408K and 408L.

    Mathematics 408N and 408S, or 408K and 408L, may substitute for 408C.

~~8. At least six semester hours of upper-division coursework must be outside mathematics. Philosophy courses in logic, computer science courses in discrete mathematics, and engineering courses may not be used to fulfill this requirement.~~

7. ~~9.~~ Mathematics 315C.
8. ~~10.~~ Biology 337 (Topic 2: *Research Methods: UTeach)*, Chemistry 368 (Topic 1: *Research Methods: UTeach)* or Physics 341 (Topic 7: *Research Methods: UTeach)*.
9. ~~11.~~ The requirements of one of the following certification areas:
    a. For mathematics certification: ~~At least thirty-two semester hours of upper-division coursework in mathematics consisting of:~~
        i. Mathematics 340L or 341.
        ii. Mathematics 325K or 328K, 333L, 358K, and 362K. Mathematics 328K is recommended for students with substantial experience in writing proofs.
        iii. Mathematics ~~360M or~~ 375D ~~(Topic: *Discovery: Introduction to Advanced Study in Mathematics)*~~.
        iv. Mathematics 361K or 365C.
        v. Mathematics 343K or 373K.
        vi. Mathematics 427J ~~427K or 378K~~.
        vii. ~~Enough of the following coursework to provide a total of at least thirty-two semester hours:~~ Two courses chosen from: Mathematics ~~427K,~~ 328K, 339J, 339U, 343K, 343L, 348, ~~360M,~~ 361, 365C, 365D, 368K, 373K, 373L, ~~175T (Topic: *Seminar for Prospective Teachers)*, 375D (Topic: *Discovery: Introduction to Advanced Study in Mathematics)*~~, 378K. A course used to fulfill requirements ~~11i~~ 9ai through ~~11vi~~ 9avi may not also be counted toward requirement ~~11vii~~ 9avii.
        viii. A three-semester-hour supporting course that uses mathematics but is in a field other than mathematics. The following courses may be used to fulfill this requirement: Accounting 310F or 311, Architectural Engineering 323K, Astronomy 307, 352K, 352L, 358, 367M, Chemistry 301 or 301H, 303, Civil Engineering 321, 341, Computer Science 303E, ~~and~~ 313E, Economics 420K, Electrical Engineering 302, 366, 366L, Geological Sciences 346C, 354, 476K, Geography 360L, Government 341M, Human Development and Family Sciences 322, Mechanical Engineering 320, 326, 366L, 366Q, 366R, Petroleum

and Geosystems Engineering 310, Physics 301, 303K, 303L, Psychology 325K, 332, Sociology 369L. ~~The supporting course may not also be counted toward other requirements in the prescribed work.~~

b. For mathematics, physical science, and engineering certification:
   i. Mathematics 325K or 328K, ~~427K,~~ 427J, 333L, 341, 358K, and 362K.
   ii. Mathematics 361K or 365C.
   iii. Mathematics ~~360M or~~ 375D ~~(Topic: *Discovery: Introduction to Advanced Study in Mathematics)~~.
   iv. Physics 301, 101L, 316, 116L, 315, and 115L.
   v. Chemistry 301 or 301H, 302 or 302H, and 204.
   vi. Chemical Engineering 379 (Topic: *Fundamentals of Engineering and Design)*, 379 (Topic: *Engineering Energy Systems*), and Mechanical Engineering 379M (Topic: *Design of Machines and Systems*).

10. Eighteen semester hours of professional development coursework consisting of:
    a. Curriculum and Instruction 650S.
    b. Curriculum and Instruction 365C or UTeach-Natural Sciences 350.
    c. Curriculum and Instruction 365D or UTeach-Natural Sciences 355.
    d. Curriculum and Instruction 365E or UTeach-Natural Sciences 360.
    e. UTeach-Natural Sciences 101, 110, and 170.
11. ~~13.~~ 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. Students seeking mathematics, physical science, and engineering certification may not seek middle grade certification.
12. ~~14.~~ Enough additional coursework to make a total of at least ~~126~~ 120 semester hours.

Option VI: Mathematics Honors

5. Breadth requirement: An honors mathematics course; one of the following two-semester sequences: Biology 315H and 325H, Chemistry 301H and 302H, or Physics 301, 101L, 316, and 116L; and nine additional semester hours chosen from the preceding courses, Physics 315 and 115L. Credit earned by examination may not be counted toward this requirement
6. An honors section of Mathematics 427K, and six semester hours of coursework chosen from Mathematics 365C, 367K, and 373K
7. Twenty additional semester hours of upper-division coursework in mathematics approved by the departmental faculty adviser
8. A section of Undergraduate Studies 302 or 303 that is approved by the departmental honors adviser.
9. A section of Rhetoric and Writing 309S that is restricted to students in the Dean Scholars Honors Program.
10. Mathematics 379H.
11. Thirty additional semester hours of coursework approved by the departmental honors adviser.
12. Six semester hours of coursework in the College of Liberal Arts or the College of Fine Arts.
13. Enough additional coursework to make a total of 120 semester hours.

Option VII: Mathematics

5. Eight semester hours of majors-level coursework in one of the following areas: astronomy, biology, chemistry, geological sciences, and physics.
6. Computer Science 303E.
7. One of the following sequences:
   a. Mathematics 408C and 408D.
   b. Mathematics 408N and 408S.
   c. Mathematics 408K and 408L.

   Mathematics 408N and 408S, or 408K and 408L, may substitute for 408C.
8. Additional mathematics, including:

a. Three of the following: Mathematics 408M or 427L, 427J, 341, 362K. Mathematics 340L may be substituted for 341 if the course was taken prior to entry into the mathematics entry-level major.
b. Mathematics 325K or 328K. Mathematics 328K is recommended for students with substantial experience in writing proofs.
c. One of the following: Mathematics 343K, 361K, 365C, 367K, 373K.
d. Twenty-one additional hours of mathematics, chosen from Mathematics 325K, 427J or 427K, 427L, 328K, 329F, 333L, 339C, 339D, 339J, 339U, 339V, 339W, 340L or 341, 343K, 343L, 344K, 346, 348, 349P, 349R, 358K, 361, 361K, 362K, 362M, 365C, 365D, 365G, 367K, 367L, 368K, 372K, 373K, 373L, 374G, 374M, 375D, 378K, and 379H. Mathematics 375, 375C, and 375T may be applied toward this requirement with prior approval of the faculty advisor.
e. One course identified as taught in the inquiry based learning (IBL) format. IBL courses are identified each semester through a notation under the unique number in the course schedule and through a list maintained in the mathematics advising office in Robert Lee Moore Hall, room 4.101.

Mathematics courses listed in requirements 8a through 8d may only be applied toward one requirement.

9. Mathematics in context. One course chosen from:
   a. Mathematics 374M
   b. Chemistry 353, 354
   c. Computer Science 341, 342, 345, 346, 353, 367
   d. Electrical and Computer Engineering 411, 325, 360C, 362K
   e. Physics 329, 336K, 352K

Courses in requirements 9b through 9d may require additional prerequisites. Mathematics 374M may not count toward both requirement 8 and 9.

10. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 5. Philosophy courses in logic, computer science courses in discrete mathematics, engineering, and actuarial foundation courses may not be used to fulfill this requirement.
11. Enough additional coursework to make a total of 120 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 requirements 5 and 8 and in each of the professional development courses listed in requirement ~~11~~ 10 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 ~~12~~ 11. For information about the portfolio review and additional teacher certification requirements, students should consult the UTeach-Natural Sciences academic adviser.

To graduate under option VI, 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.