PROPOSED CHANGES TO THE _BS CHEMISTRY_ DEGREE PROGRAM IN THE
COLLEGE/SCHOOL OF __NATURAL SCIENCES__ SECTION IN THE UNDERGRADUATE CATALOG
2014-2016 or LAW SCHOOL CATALOG 2014-2016

Type of Change\(^1\) __X__ Academic Change
___ Degree Program Change (THECB\(^2\) form required)

1. IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST
CONSULT NEAL ARMSTRONG TO DETERMINE IF SACS-COC APPROVAL IS REQUIRED.
   • Is this a new degree program? Yes___ No_X__
   • Does the program offer courses that will be taught off campus? Yes___ No_X__
   • Will courses in this program be delivered electronically? Yes___ No_X__

2. EXPLAIN CHANGE TO DEGREE PROGRAM AND GIVE A DETAILED RATIONALE FOR EACH
INDIVIDUAL CHANGE (include page numbers in the catalog where changes will be made):
   1. Option III: Teaching.
      a. Req. 8.a.: Add SCI 360 (Topic 4: Physics by Inquiry) and PHY 108 (Topic: Physics by Inquiry) as an
         alternative to the second half of the physics sequence.

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

   2. All options: #3, D: add CH 353M (as alternative to CH 353 - 353 or 353M may count) Option I, # 9; add
the term “additional” to requirement for nine hours of majors-level coursework in
CNS/Engineering/Jackson School of Geological Sciences.

Rationale:
   2. All options (BS Chemistry); # 3, D: memo is already in place to allow CH 353M to count as alternative to
   CH 353; this is to update catalog.

   3. Option I, # 9: to clarify that nine additional hours are needed for this requirement (rather than for the
   student to assume that the coursework could be fulfilled with previously-taken coursework).

3. SCOPE OF PROPOSED CHANGE
   a. Does this proposal impact other colleges/schools? Yes__X__ No___

   If yes, then how? UTeach students currently take this class, which is designed for pre-service science
   teachers who might teach physics at the middle and/or high school level. Other interested UTeach students
   will be accommodated.
b. Will students in other degree programs be impacted (are the proposed changes to courses commonly taken by students in other colleges)?
   Yes___ No___
   If yes, then how?

c. Will students from your college take courses in other colleges?

If 3 a, b, or c was answered with yes:
   How many students do you expect to be impacted?

   Impacted schools must be contacted and their response(s) included:
   Person communicated with: (1) Marilyn Kameen, College of Education
   Date of communication: (1) 10/2/12
   Response: (1) Approved

   d. 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:

   e. Will this proposal change the number of hours required for degree completion? If yes, explain: No

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

PROPOSED NEW CATALOG TEXT:

Bachelor of Science in Chemistry

Four degree plans lead to the Bachelor of Science in Chemistry. Option I, chemistry, is intended to prepare students for professional careers as chemists, either upon graduation or after graduate study in chemistry or related fields. Option II, computation, is intended to prepare students for the workplace by giving them opportunities to develop hands-on computation skills. Option III, teaching, is intended to prepare students to enter the teaching profession. Option IV, chemistry honors, is intended to prepare students for academic or research careers. Students who plan to follow option IV must be admitted to the Dean’s Scholars Honors Program. The four degree plans may also serve as the basis for work in many areas outside pure chemistry, such as materials science, medicine and other health-related fields, pharmacology, patent law, business, computation, or environmental science. After general chemistry courses, depending on his or her background, the student makes an intensive core study of some of the major areas of chemistry—organic, physical, inorganic, and analytical chemistry. The chemistry coursework in these degree plans culminates in approximately three semesters of advanced work, allowing each student to study more broadly by taking courses in some areas of chemistry not covered in the core courses, such as macromolecular chemistry, biochemistry, or other areas of physical

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chemistry, or more deeply by taking advanced special topics courses in areas of special interest and by undertaking research projects. Throughout the curricula, emphasis is placed on laboratory experience—synthesis, separations and analysis, structure identification and determination, measurement of rates of reactions, determinations of energy changes accompanying reactions. Supporting work in mathematics and physics is an integral part of the degree programs. Compared to the program leading to the Bachelor of Arts degree, the Bachelor of Science in Chemistry degree programs are more thorough and demanding and potentially more rewarding to the student planning a career in chemistry.

**Prescribed Work Common to All Options**

All students pursuing an undergraduate degree must complete the University’s [Core Curriculum](http://www.utexas.edu). The core includes courses in language, literature, social sciences, natural sciences, and fine arts. In addition, students seeking the Bachelor of Science in Chemistry must complete the following degree-level requirements. In some cases, courses that fulfill degree-level requirements also meet the requirements of the core.

1. Two courses with a writing flag. One of these courses must be upper-division. Courses with a writing flag are identified in the *Course Schedule* available at [http://registrar.utexas.edu/schedules](http://registrar.utexas.edu/schedules). They may be used simultaneously to fulfill other requirements, unless otherwise specified.
2. Options I and II: One of the following foreign language/culture choices. Students in options III and IV are exempt from this requirement.
   a. Second-semester-level proficiency, or the equivalent, in a foreign language.
   b. First-semester-level proficiency, or the equivalent, in a foreign language and a three-semester-hour course in the culture of the same language area.
   c. Two three-semester-hour courses in one foreign culture area. The courses must be chosen from an approved list available in the dean’s office and the college advising centers.
3. The following courses:
   a. General chemistry: *Chemistry 301* or 301H, 302 or 302H, and 317.
   b. Organic chemistry: *Chemistry 128K, 128L, 328M*, and 328N; or 220C, 320M, and 320N.
   d. Physical chemistry: *Chemistry 353* or 353M, 153K, 154K, and either 354 or 354L.
   e. Inorganic chemistry: *Chemistry 431*.
   f. Analytical chemistry: *Chemistry 456* and 376K.
4. Thirty-six semester hours of upper-division coursework.
5. At least twenty-one semester hours of upper-division coursework, including at least twelve semester hours of upper-division coursework in chemistry, must be completed in residence at the University.

**Additional Prescribed Work for Each Option**

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Option I: Chemistry

6. Mathematics 408C and 408D, or 408N, 408S, and 408M; and at least three semester hours of upper-division coursework in mathematics or computer science.
7. One of the following sequences: Physics 301, 101L, 316, and 116L; 303K, 103M, 303L, and 103N; 317K, 117M, 317L, and 117N.
8. Six semester hours chosen from the following courses: Chemistry 339J, 339L, 341*, 354, 354L, 354S, 364C, 364D, 364E, 364F, 365D, 367C, 367L, 368, 369K*, 369L*, 370, 371K*, 372C*, 375K, and 475K. At least three of these six hours must be in a laboratory course; courses marked with an asterisk (*) may be used to fulfill this laboratory requirement. Chemistry 341 and 368 may be repeated for credit toward this requirement when the topics vary. No more than three semester hours in Chemistry 369K may be counted toward this requirement; three additional hours may be counted as electives. No more than three semester hours in Chemistry 371K may be counted toward this requirement; three additional hours may be counted as electives. No more than three hours in Chemistry 372C may be counted toward this requirement; three additional hours may be counted as electives.
9. Nine additional semester hours of coursework in the College of Natural Sciences (excluding chemistry), the Cockrell School of Engineering, and the Jackson School of Geosciences. Any course designed for science or engineering majors may be counted. With the exception of courses in the Elements of Computing Certificate program, a course may not be used to fulfill this requirement if it cannot be counted toward major requirements in the department that offers it. No more than six hours of laboratory or field research from the Jackson School or any department in the College of Natural Sciences or the Cockrell School may be counted.
10. Enough additional coursework to make a total of 127 semester hours.

Option II: Computation

Students who complete option II may simultaneously fulfill some of the requirements of the Certificate in Scientific Computation.

6. Mathematics 408C and 408D, or 408N, 408S, and 408M; and Statistics and Scientific Computation 329C or Mathematics 340L or 341.
7. One of the following sequences: Physics 301, 101L, 316, and 116L; 303K, 103M, 303L, and 103N; 317K, 117M, 317L, and 117N.
9. At least three semester hours chosen from the following laboratory courses: Chemistry 341, 369K, 369T, and 371K.
10. Statistics and Scientific Computation 222 and three of the following courses. The student must complete coursework from at least two of the following areas.
   b. Statistical methods: Biomedical Engineering 335, Mathematics 358K, 378K.

11. Enough additional coursework to make a total of 127 semester hours.

Option III: 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 one of the following areas: composite science certification with chemistry as the primary teaching field; physical sciences certification; or physical science, mathematics, and engineering certification. However, completion of the course requirements does not guarantee the student’s certification. Information about additional teacher certification requirements is available from the UTeach-Natural Sciences academic adviser.

6. Mathematics 408C and 408D, or 408N, 408S, and 408M.
7. History 329U or Philosophy 329U.
8. One of the following sequences:
   a. For students seeking composition science certification: Physics 301, 101L, 316, and 116L; or 303K, 103M, 303L, and 103N; or 317K, 117M, 317L, and 117N. Science 360 (Topic 4: Physics by Inquiry) and Physics 108 (Topic: Physics by Inquiry) may substitute for Physics 316 and 116L, 317L and 117N, or 303L and 103N. Physics 108 is offered on the pass/fail basis.
   b. For students seeking either physical sciences certification or, mathematics, physical science, and engineering certification: Physics 301, 101L, 316, 116L, 315, and 115L; or 303K, 103M, 303L, 103N, 315, and 115L.
9. The requirements of one of the following certification areas:
   a. For composite science certification:
      i. Biology 311C and 311D.
      ii. Six hours of coursework in geological sciences; courses intended for non-science majors may not be counted toward this requirement.
      iii. Enough additional approved coursework in biology, geological sciences, or physics to provide the required twelve hours in a second field.
      iv. Chemistry 368 (Topic 1: Research Methods: UTeach) or, with the consent of the UTeach-Natural Sciences academic adviser, an upper-division chemistry course that includes a substantial research component.
      v. In place of requirements 3c through 3f of the prescribed work above, the following courses, for a total of at least thirty-four semester hours of chemistry: Chemistry 339K and 339L, or 369; 353; and 455 or 456.
   b. For physical sciences certification:
      i. Mathematics 427K and 427L.
      ii. Chemistry 153K, 354L, and 154K.
      iii. Chemistry 354 and three hours of upper-division coursework in physics.

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iv. Chemistry 368 (Topic 1: Research Methods: UTeach) or, with the consent of the UTeach-Natural Sciences academic adviser, an upper-division chemistry course that includes a substantial research component.

v. In place of requirements 3c through 3f of the prescribed work above, the following courses, for a total of at least thirty-four semester hours of chemistry: Chemistry 339K and 339L, or 369; 353, and 455 or 456.

c. For mathematics, physical science, and engineering certification:
   i. Mathematics 315C, 360M or 375D (Topic: Discovery: Introduction to Advanced Study in Mathematics), 427K, and 333L.
   iii. Chemistry 368 (Topic 1: Research Methods: UTeach) or, with the consent of the UTeach-Natural Sciences academic adviser, an upper-division chemistry course that includes a substantial research component.
   iv. In place of requirements 3c through 3f of the prescribed work above, the following courses, for a total of at least thirty semester hours in chemistry: Chemistry 353 and 153K, 455, and 369.

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. 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.

12. Enough additional coursework, if needed, to make a total of 126 semester hours.

Option IV: Chemistry Honors

6. Breadth requirement: An honors mathematics course, Chemistry 301H and 302H, Physics 301, 101L, 316, and 116L, and a three-semester-hour honors course in biology or computer science. Credit earned by examination may not be counted toward this requirement.


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 Dean’s Scholars.

10. Chemistry 379H and a three-semester-hour upper-division research course approved by the departmental honors adviser, or six hours of Chemistry 379H.
11. Twenty-two additional 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.

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 7, and each of the professional development courses listed in requirement 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 11. For information about the portfolio review and additional teacher certification requirements, consult the UTeach-Natural Sciences academic adviser.

To graduate under option IV, students must remain in good standing in the Dean’s Scholars Honors Program, must earn grades of at least A- in the departmental research and thesis courses described in requirement 10 above, and must present their research in an approved public forum, such as the college’s annual Undergraduate Research Forum.

Order and Choice of Work

Students are strongly recommended to take the chemistry/biochemistry–major sections of the following courses: Chemistry 301 or 301H (if taken), 302 or 302H, 128K, 128L, 328M, and 328N. Students planning a graduate program are strongly recommended to take Physics 301, 101L, 316, 116L, 315, and 115L. Students in option II should consult the undergraduate adviser each semester regarding order and choice of work; those in option III should consult the UTeach-Natural Sciences academic adviser.

The following order of work is recommended as a typical minimum program for option I. It assumes that the student has high school credit in trigonometry, college algebra, and the first semester of general chemistry; is able to earn credit by examination for Chemistry 301; and is able to score well enough on the ALEKS placement examination to take Mathematics 408C or 408N in the first semester of the freshman year. Many students meet some of the following course requirements by credit by examination.

**First year:** Chemistry 302 or 302H, and 317; Mathematics 408C and 408D, or 408N, 408S, and 408M; Physics 301 and 101L, or 303K and 103M, or 317K and 117M (to be taken after
Mathematics 408C or 408N; Rhetoric and Writing 306; six semester hours to fulfill core curriculum requirements.

**Second year:** Chemistry 128K, 128L, 328M, and 328N, or 220C, 320M, and 320N; any coursework needed to meet a core curriculum requirement; three semester hours to be counted toward requirement 4 of the prescribed work; English 316K; Physics 316 and 116L, or 303L and 103N, or 317L and 117N; an upper-division mathematics course (such as Mathematics 427K) or an upper-division computer science course.

**Third year:** Chemistry 339K or 369, 353, 153K, 354L, 456; six semester hours of American and Texas government; six semester hours of American history; three semester hours of electives; a three-semester-hour course to fulfill a core curriculum requirement; three semester hours to be counted toward requirement 4 of the prescribed work.

**Fourth year:** Chemistry 431, 154K, 376K, and courses to fulfill requirement 3 of the prescribed work. The student must also take enough additional coursework to fulfill requirements 4, 5, 9, and 10 of the prescribed work. It is recommended that the majority of the elective courses taken to fulfill requirements 4 and 9 be chosen from upper-division courses in biology, chemistry, chemical engineering, mathematics, and physics.
1 See http://www.utexas.edu/provost/planning/cat_change/UnderGrad.html for detailed explanations.
2 Texas Higher Education Coordinating Board.
3 The proposed text should be based on the text of the current catalog available at http://www.utexas.edu/faculty/council/pages/catalog_chgs/catcopy.html. Strike through and replace (with underlines) only the specific language to be changed. Do NOT use “track changes”! For questions on completing this section, please contact Anita Ahmadi, fc@austin.utexas.edu, 471-5936 or Brenda Schumann, brenda.schumann@austin.utexas.edu, 475-7654.