PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN PHYSICS DEGREE PROGRAM IN THE COLLEGE OF NATURAL SCIENCES SECTION IN THE UNDERGRADUATE CATALOG 2016-2018

Type of Change\(^1\)  ☒ Academic Change
☐ Degree Program Change (THECB\(^2\) form required)

Proposed classification\(^3\)  ☐ 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:
Add CH 301 or 301H to options I, II, III, and IV.
Rationale: CH 302 is already required. The department assumed students placed into CH 302 through an advanced placement exam. However, a percentage of physics majors do not take the exam or score high enough. This addition will eliminate this hidden prerequisite. Options V and VI already require CH 301 or 301H.
Add CS 313E as an alternative to SDS 322 in option II, requirement 11a.
Rationale: SDS 322, Intro to Scientific Programming, has limited enrollment and it is difficult for physics majors to enroll. CS 313E, Elements of Software Design, covers roughly equivalent material.
Change ME 136N to ME 379M in option III, Radiation Physics.
Rationale: Engineering renumbered this course. The department has been making this substitution for a couple of years.
Change requirement of 13 hours of Aerospace Engineering to 12 hours of Aerospace Engineering in option IV, Space Sciences.
Rationale: The additional hour no longer has significance. There are no 1 or 4 hour courses to which physics majors have access. The department has the choice of either reducing the requirement or requiring students to take an additional 3 hour course, sometimes offered in another department. The faculty prefer to reduce the requirement.

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?
   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?
Impacted schools must be contacted and their response(s) included: Department of Mechanical Engineering
   Person communicated with:
   Date of communication:
   Response:

How many students do you expect to be impacted?
Impacted schools must be contacted and their response(s) included: Department of Aerospace Engineering
   Person communicated with:
   Date of communication:
   Response:

e. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? If yes, explain:
   If yes, undergraduate studies must be informed of the proposed changes and their response included:
   Person communicated with:
   Date of communication:
   Response:

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

5. COLLEGE/SCHOOL APPROVAL PROCESS

   Department approval date:
   College approval date:
   Dean approval date:

PROPOSED NEW CATALOG TEXT:

Bachelor of Science in Physics

All aspects of the physical universe are of interest to the physicist, who seeks to understand not only the smallest forms of matter and the rich phenomena present in our everyday lives but also the universe itself. Physics has played a critical role in human technological and intellectual development during the twentieth century. The tools of the physicist—observation, imagination, model building, prediction, and deduction—will enable physics to continue this influence into the new century. The Bachelor of Science in Physics degree program is designed to provide the skills, understanding, and outlook required for participation in the discovery of new knowledge about nature. The Bachelor of Science in Physics program is balanced and broad. It is designed to give the student a strong foundation for graduate study or work in physics and, with additional training, for work in a variety of other areas, such as astronomy, astrophysics, biophysics, chemical physics, computer science, engineering, geophysics, mathematics, medicine, physics teaching, and space sciences. Students who end their formal training with the
bachelor’s degree may seek employment in industry, in national laboratories, or in teaching; they should consider the options in computation, radiation physics, space sciences, biophysics, and teaching, which augment the broad instruction provided by the basic Bachelor of Science in Physics. For those who plan to teach physics in secondary school, the teaching option provides the courses needed for certification. Students who plan to follow option VI, physics 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 Physics 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 and VII: One of the following foreign language/culture choices. Students in options V and VI 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
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 physics, must be completed in residence at the University

**Prescribed Work Common to All Options for Each**

**Option I: Physics**

This option is designed to give the student a strong foundation for graduate study or work in physics and for further study or work in a variety of other areas.

6. Chemistry 301 or 301H, and 302 or 302H.
7. Six semester hours in biology, geological sciences, or astronomy; a course may not be used to fulfill this requirement if it cannot be counted toward major requirements in the department that offers it.
9. Mathematics 408C and 408D or the equivalent, 427K and 427L , and six additional semester hours of upper-division coursework in mathematics; the following courses are recommended: Mathematics 340L, 361, and 362K . Only courses at the level of calculus and above may be counted toward the total number of hours required for the degree.
11. Enough additional coursework to make a total of 126 semester hours.

**Option II: Computation**

This option is designed to provide the necessary foundation and hands-on skill in computation for the student who plans a career or further study in computational physics or computer science. Students who complete this option may simultaneously fulfill some of the requirements of the Certificate in Scientific Computation.
6. Chemistry 301 or 301H, and 302 or 302H.
7. Six semester hours in biology, geological sciences, or astronomy; a course may not be used to fulfill this requirement if it cannot be counted toward major requirements in the department that offers it.
9. Mathematics 408C and 408D or the equivalent, 427K and 427L, and six additional semester hours of upper-division coursework in mathematics or statistics and data sciences; Statistics and Data Sciences 329C and Mathematics 362K are recommended; only courses at the level of calculus and above may be counted toward the total number of hours required for the degree.
11. One of the following scientific computation options:
   a. Statistics and Data Sciences 222, Computer Science 303E and one of the following courses: Computer Science 313E or Statistics and Data Sciences 322. and In addition, two of the following courses: the student must complete two courses coursework from at least two of the following areas:
      ii. Statistical methods: Biomedical Engineering 335, Mathematics 358K, 378K.
   b. Twelve semester hours chosen from Electrical Engineering 306, 312, 316, 319K, and 422C.
12. Enough additional coursework to make a total of 126 semester hours.

Option III: Radiation Physics

This option is designed to provide the necessary foundation for the student who plans a career or further study in nuclear engineering, radiation engineering, or health physics.

6. Chemistry 301 or 301H, and 302 or 302H.
7. Six semester hours in biology, geological sciences, or astronomy; a course may not be used to fulfill this requirement if it cannot be counted toward major requirements in the department that offers it.
9. Mathematics 408C and 408D or the equivalent, 427K and 427L, and six additional semester hours of upper-division coursework in mathematics; the following courses are recommended: Mathematics 340L, 361, and 362K. Only courses at the level of calculus and above may be counted toward the total number of hours required for the degree.
10. Twenty-four semester hours of upper-division coursework in physics, including Physics 336K, 352K, 353L, 355, 362L, 369, and 373, or their equivalents.
12. Enough additional coursework to make a total of 126 semester hours.

Option IV: Space Sciences

This option is designed to provide the necessary foundation for the student who plans a career or further study in space sciences.

6. Chemistry 301 or 301H, and 302 or 302H.
7. Six semester hours in biology, geological sciences, or astronomy; a course may not be used to fulfill this requirement if it cannot be counted toward major requirements in the department that offers it.
9. Mathematics 408C and 408D or the equivalent, 427K and 427L, and six additional semester hours of upper-division coursework in mathematics; the following courses are recommended: Mathematics 340L, 361, and 362K. Only courses at the level of calculus and above may be counted toward the total number of hours required for the degree.
11. Either fifteen semester hours of upper-division coursework in aerospace engineering or thirteen twelve
    hours in aerospace engineering and three additional hours of upper-division coursework in physics.
12. Enough additional coursework to make a total of at least 126 semester hours.

Option V: 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 composite science certification with physics as the primary teaching
field, physical sciences certification, physics/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 requirements, students should consult the UTeach-Natural Sciences
academic adviser.

7. Mathematics 408C and 408D or the equivalent, 427K, and 427L.
8. At least eighteen semester hours of upper-division coursework in physics, consisting of Physics 341 (Topic 7:
    Research Methods: UTeach), 353L, 355, and three of the following courses: Physics 329, 333, 336K,
    338K, 352K, 373, Science 360 (Topic 4: Physics by Inquiry). With the consent of the UTeach-Natural
    Sciences undergraduate adviser, an upper-division physics course that includes a substantial research
    component may be substituted for Physics 341.
9. History 329U or Philosophy 329U.
10. The requirements of one of the following certification areas:
    a. For composite science certification:
       i. Biology 311C and 311D.
       ii. Chemistry 301 or 301H and 302 or 302H.
       iii. Six hours of coursework in geological sciences; courses intended for non-science majors
           may not be counted toward this requirement.
       iv. Enough additional approved coursework in biology, chemistry, or geological sciences to
           provide the required twelve hours in a second field.
    b. For physical sciences certification:
       i. Chemistry 301 or 301H, 302 or 302H, 204 or 317, 353, 153K, 154K, 354L, and 455 or
          456.
       ii. Three additional hours of upper-division coursework in physics.
    c. For physics/mathematics certification: Mathematics 315C, 325K, 333L, 341 or 340L, 358K,
       362K, 360M or 375D.
    d. For mathematics, physical science, and engineering certification:
       ii. Chemistry 301 or 301H, 302 or 302H, and 204.
       iii. Chemical Engineering 379 (Topic: Fundamentals of Engineering and Design), 379
           (Topic: Engineering Energy Systems), and Mechanical Engineering 379M (Topic: Design
           of Machines and Systems).
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. Enough additional coursework to make a total of at least 126 semester hours.
Option VI: Physics Honors

6. Breadth requirement: Biology 315H and 325H, Chemistry 301H and 302H, and Mathematics 427K and 427L; at least one of the math courses must be a designated honors section; credit earned by examination may not be counted toward this requirement.


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

11. A section of Rhetoric and Writing 309S that is restricted to students in the Dean’s Scholars Honors Program.

12. Physics 379H and a three-semester-hour upper-division research course approved by the departmental honors adviser.

13. Ten additional semester hours of coursework approved by the departmental honors adviser.

14. Six semester hours of coursework in the College of Liberal Arts or the College of Fine Arts.

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

Option VII: Biophysics

6. Chemistry 301 or 301H and 302 or 302H.

7. Either Biology 311C, 311D, and 325 or Biology 315H and 325H; Biology 206L.


9. Mathematics 408C and 408D or the equivalent, 427K and 427L, and six additional semester hours of upper-division coursework in mathematics; the following courses are recommended: Mathematics 340L, 361, and 362K.


11. Either Chemistry 320M or 328M, and Biochemistry 369.

12. Complete one of the following areas:
   b. Microbiology: Biology 326R.
   c. Developmental Biology: Biology 349.
   d. Neurobiology: Either Neuroscience 365R or Biology 371M.
   f. Computation: Statistics and Data Sciences 335 and Biology 337J or Statistics and Data Sciences 339 (Topic: Computational Biology) or (Topic: Computational Chemistry).

A list of recommended biology laboratory courses that complement the lecture courses listed in 12a through 12e are available in the advising center and the dean’s office.

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

Special Requirements

Students in all options must fulfill both the University's General Requirements for graduation and the college requirements. They must also earn a grade of at least C- in each mathematics and science course required for the degree, and a grade point average in these courses of at least 2.00. More information about grades and the grade point average is given in the General Information Catalog.

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 9 and in each of the professional development courses listed in requirement 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 12. Information about the portfolio review and additional teacher certification requirements is available from 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 earn grades of at least A- in the departmental research and thesis courses described in requirement 8 above, and must present their research in an approved public forum, such as the college’s annual Undergraduate Research Forum.

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1 See [http://www.utexas.edu/provost/planning/cat_change/UnderGrad.html](http://www.utexas.edu/provost/planning/cat_change/UnderGrad.html) for detailed explanations.
2 Texas Higher Education Coordinating Board.
3 Exclusive: of exclusive application and of primary interest only to a single college or school ("no protest" period is 5 working days); general: of general interest to more than one college or school (but not for submission to the General Faculty) ("no protest" period is 10 working days); major legislation must be submitted to the General Faculty for adoption ("no protest" period is 10 working days).
4 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](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 Victoria Cervantes, fc@austin.utexas.edu, 471-5936 or Brenda Schumann, brenda.schumann@austin.utexas.edu, 475-7654.