CNS BS IN MATHEMATICS

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**PROPOSED CHANGES TO THE <u>BS IN MATHEMATICS</u> IN THE COLLEGE OF
NATURAL SCIENCES SECTION IN THE *UNDERGRADUATE CATALOG 2018-2020***

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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 SACSCOC APPROVAL IS REQUIRED.**

    - Is this a new degree program?   Yes ☐ No ☒
    - Is this program being deleted?   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:**

<u>Option I (Actuarial Science) and VII (Mathematics)</u>

Add statement that a mathematics independent inquiry flagged course may substitute for a course that is identified as containing an inquiry-based learning component.
Reason: Mathematics courses that have earned an independent inquiry flag is appropriate to meet the inquiry-based learning requirement.

<u>Option V: Teaching</u>

Update engineering courses under the mathematics, physical science, and engineering certification.
Reason: Engineering and UTeach reviewed and approved the new courses for teaching certifications in the College of Natural Sciences.

<u>Option VI: Mathematics Honors</u>

Replace an honors section of M 427K with an honors section of M 427J.
Reason: The Department of Mathematics is no longer teaching an honors section of M 427K.

Change 6 hours from Fine Arts or Liberal Arts to 6 hours from Fine Arts and Liberal Arts.
Reason: In practice, the Dean's Scholars Program allows students to take 6 hours from a single college or a mixture of 6 hours from both colleges. The change will synch catalog copy to advising practice and eliminate the need for petitions.

<u>Option VII: Mathematics</u>

Break requirement 8 into requirements 8 through 12. Require a minimum of 33 upper-division hours in Mathematics.
Reason: This option was new in the 2016-18 catalog. For the 2016-18 catalog, the department wanted students to complete 11 upper-division math courses with semester credit values of 3 or 4 hours. The purpose was to prevent students from counting courses with variable credit hours of 1 or 2 hours toward the total hours of upper-division mathematics. The 2016-18 proposal was altered to require students to complete a minimum of 33 upper-division hours regardless of the courses chosen for requirement 8a. In practice, students who did not choose M 408M ended up taking more than 33 upper-division hours. The department began writing petitions to reduce requirement 8d to 17 hours for students in this situation. This 2018-20 revision is intended to resolve these issues without requiring

Degree Program Impact Statement revised July 2016 1

individual petition approvals.

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 would you do so?

        Option V, Teaching
        Very few students seek the mathematics, physical science, and engineering certification. The UTeach Program did not provide an estimate of the number of students who might take E S 301 and M E 377K. However, the additions are approved by UTeach Engineering.

        Option VI, Mathematics Honors
        The original legislation stated that Dean's Scholars must choose 6 hours from either the College of Liberal Arts (COLA) or the College of Fine Arts (COFA). In practice, students are allowed to count 6 hours from one of the colleges, or a mixture from the colleges. This change will eliminate the need for petitions in situations where students choose to take a mixture of COLA and COFA coursework. In a constant state, the Dean's Scholars Program has approximately 200 majors.

        There is no way to predict how this change will impact the College of Fine Arts and the College of Liberal Arts. Specific courses are not prescribed and the change is to match catalog language to current advising practice. Making an estimate, perhaps 10 seats per year distributed across all courses in both colleges may be impacted. Because the number of seats across both colleges is estimated to be so small, the College of Fine Arts and the College of Liberal Arts were not formally consulted for permission to make this change.

    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 <u>students from outside</u> of your college taking <u>classes in your college</u>? 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 <u>students from your college</u> taking <u>courses in other colleges</u>? 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? Not provided by UTeach Engineering or UTeach Natural Sciences; minimal number.
        Impacted schools must be contacted and their response(s) included: UTeach Engineering
            Person communicated with: David Allen, director
            Date of communication: September 22, 2017

Response: Suggested proposed changes.

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? No.

Note: THECB Semester Credit Hour Change Form required, download from URL:

http://www.thecb.state.tx.us/reports/DocFetch.cfm?DocID=2419&format=doc

If yes, explain:

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: March 14, 2017   Approved by whom: Mathematics Curriculum Committee

Dean's Scholars approval: May 10, 2017   Approved by whom: Dean's Scholars Steering Committee

UTeach Program: September 22, 2017 Approval by whom: David Allen, UTeach Program, director

College approval date: April 6, 2017   Approved by whom: Course and Curriculum Committee

September 27, 2017

Dean approval date: September 27, 2017 Approved by whom: David Vanden Bout, Associate Dean for Undergraduate Education

PROPOSED NEW CATALOG TEXT:[4]

Bachelor of Science in Mathematics
 [no change]

Prescribed Work Common to All Options
[no change]

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. Complete one of the following:
   1. Mathematics 408C*, 408D, and 427L
   2. Mathematics 408N, 408S, and 408M
   3. Mathematics 408K, 408L, and 408M

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

7. Economics 304K and 304L

8. Accounting 310F or both 311 and 312

9. Finance 357

10. Computer Science 303E

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

         One of the courses fulfilling requirement 11a through 11f must be taught in the inquiry based learning (IBL) format <u>or with an independent inquiry flag</u>. 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. <u>Courses with an independent inquiry flag are identified in the Course Schedule.</u>

12. At least six semester hours of upper-division coursework must be outside both mathematics and the fields of study listed in requirement 1. Philosophy courses in logic, computer science courses in discrete mathematics, engineering courses, and actuarial foundation courses may not be used to fulfill this requirement.
13. Enough additional coursework to make a total of 120 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. History 329U or Philosophy 329U

6. One of the following sequences:
    1. Mathematics 408C* and 408D
    2. Mathematics 408N and 408S
    3. Mathematics 408K and 408L

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

7. Mathematics 315C

8. Biology 337 (Topic 2: *Research Methods: UTeach)*, Chemistry 368 (Topic 1: *Research Methods: UTeach)* or Physics 341 (Topic 7: *Research Methods: UTeach)*
9. The requirements of one of the following certification areas:
    a. For mathematics certification:
      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 375D
      iv. Mathematics 361K or 365C
      v. Mathematics 343K or 373K

    vi. Mathematics 427J.

    vii. Two courses chosen from: Mathematics 328K, 339J, 339U, 343K, 343L, 348, 361, 365C, 365D, 368K, 373K, 373L, 378K. A course used to fulfill requirements 9ai through 9avi may not also be counted toward requirement 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, 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

  b. For mathematics, physical science, and engineering certification:

    i. Mathematics 325K or 328K, 427J, 333L, 341, 358K, and 362K. Mathematics 328K is recommended for students with substantial experience in writing proofs

    ii. Mathematics 361K or 365C

    iii. Mathematics 375D

    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*)~~ <u>Engineering Studies 301; and Mechanical Engineering 377K upon approval of the project by the UTeach Program.</u>

10. 18 semester hours of professional development coursework consisting of:

 a. Curriculum and Instruction 651S

 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. Students seeking mathematics, physical science, and engineering certification may not seek middle grade certification.

12. Enough additional coursework to make a total of at least 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 <u>427J</u> ~~427K~~, and six semester hours of coursework chosen from Mathematics 365C, 367K, and 373K

7. 20 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. 30 additional semester hours of coursework approved by the departmental honors adviser

12. Six semester hours of coursework ~~in~~ <u>from</u> the College of Liberal Arts ~~or~~ <u>and/or</u> the College of Fine Arts

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

Option VII: Mathematics

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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
   9. ~~b.~~ Mathematics 325K or 328K. Mathematics 328K is recommended for students with substantial experience in writing proofs
   10. ~~c.~~ One of the following: Mathematics 343K, 361K, 365C, 367K, 373K
   11. ~~d. 21 additional~~ <u>Complete thirty-three</u> hours of <u>upper-division</u> mathematics, ~~chosen~~ from <u>requirements 8, 9, 10, and the following courses:</u> 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<u>, and 375T</u>. ~~Mathematics 375, 375C, and 375T may be applied toward this requirement with prior approval of the faculty adviser~~ <u>Mathematics 374M may not count toward both requirement 11 and 13</u>
   12. ~~e.~~ One <u>upper-division mathematics</u> course identified as taught in the inquiry based learning (IBL) format <u>or with an independent inquiry flag</u>. 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<u>. Courses with an independent inquiry flag are identified in the Course Schedule. Courses counted toward requirements 8, 9, 10, and 11 may also count toward this requirement.</u>

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

13. ~~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 Engineering 411, 325, 360C, 362K
    e. Physics 329, 336K, 352K

Courses in requirements ~~9b through 9d~~ <u>13b through 13e</u> may require additional prerequisites. Mathematics 374M may not count toward both requirement ~~8 and 9~~ <u>11 and 13</u>.

14. ~~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.

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

Special Requirements
[no change]

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[4] The proposed text should be based on the text of the current catalog available at
http://catalog.utexas.edu/undergraduate/
Strike through and replace (with underlines) only the specific language to be changed. Do NOT use track changes, and do not include hyperlinks in the catalog copy. 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.