TEXAS HIGHER EDUCATION COORDINATING BOARD
<u>**Summary Notes/Minutes**</u>
Mathematics Field of Study Advisory Committee Meeting
1200 East Anderson Lane, Board Room
Austin, Texas
August 7, 2018, 1:00 PM – 5:00 PM
August 8, 2018, 8:30 AM – 12:00 PM

The webcasts of these meetings are available at the following links:
https://www.youtube.com/watch?v=vt2OGqjMrPs
https://www.youtube.com/watch?v=xRNkwgz7rZc

Day 1: August 7, 2018

1. Call to order and introductions

    Allen Michie called the meeting to order at 1:00 PM.

    The following committee members were present:
James Álvarez, The University of Texas at Arlington
William Ardis, Collin College
Billye Cheek, Grayson College
Mary Cottier, Alamo Community College-St. Philip's College
Thomas Finnegan, Del Mar College
Sonia Ford, Midland College
Sharon Gronberg, Texas State University
Yvette Hester, Texas A&M University
Jennifer Mauch, Wharton County Junior College
Brady McCary, The University of Texas at Dallas
Michael Monticino, University of North Texas
Jang-Woo Park, University of Houston-Victoria
Lorenzo Sadun, The University of Texas at Austin
Ann Wheeler, Texas Woman's University

    The following committee members were absent:
Claudia Davis, Lone Star College
Tammy Calhoun, Hill College

    Coordinating Board Staff present:
Allen Michie, Program Director
Garry Tomerlin, Deputy Assistant Commissioner for Workforce

2. Consideration of appointing a recording secretary
James Álvarez volunteered to serve as recording secretary and was elected by acclamation.

3. Consideration of election of co-chairs

Sonia Ford (Midland College) was nominated to serve as co-chair from two-year institutions and was elected by acclamation. Lorenzo Sadun (The University of Texas at Austin) was nominated from four-year institutions and was elected by acclamation.

4. Public testimony

No one was available for public testimony.

5. Break for consultation between Coordinating Board staff and Co-Chairs

The committee recessed for 15 minutes.

6. Overview of Field of Study rules and mission – Dr. Allen Michie

Michie provided an overview of the Fields of Study (FOS) statute, how it is part of a wider range of transfer success initiatives, and how it contributes to the Texas Higher Education Coordinating Board's *60x30TX* strategic plan.

Michie stated the goals of the meeting:
-Review curricula from programs at representative two- and four-year institutions
-Review approved courses in the *Academic Course Guide Manual* (ACGM)
-Decide which lower division courses are necessary for success in upper division courses in a major
-Adjust course objectives and descriptions as necessary
-Balance student freedom with institution priorities
-Create a guaranteed pathway to the degree and minimize the number of excess hours that students take

Michie answered questions about FOS and the approval process.

7. Discussion and consideration of the Mathematics Field of Study curriculum

The committee began by reviewing the courses in the *Lower-Division Academic Course Guide Manual* (ACGM) to see which ones may be contentious.

A motion was made to include Elementary Statistical Methods (MATH 1342) in the Field of Study (FOS). Finnegan felt that it should be counted as a mathematics elective. Monticino said it should be part of a mathematician's training and that it should be required because it leads to a junior-level course. Sadun said it is not part of the degree requirements at The University of Texas at Austin. Monticino suggested the course be moved to the 2000 level. Other members expressed concern that the course is used by students in majors, but it is not appropriate for math majors. The motion failed, 1 ("definitely yes") to 10 ("definitely no").

There was consensus to include Calculus I (MATH 2413) and Calculus II (MATH 2414), and discussion about whether to include Calculus III (MATH 2415). The committee agreed not to make the entry-level point of the FOS any course in pre-Calculus Math, including College Algebra (MATH 1414). The opinion was that most Mathematics majors begin college-level work prepared to enter Calculus I, and those who need leveling courses are free to take them as electives or for the core curriculum. Most Mathematics programs do not count College Algebra toward the degree program.

The committee discussed whether to require the 3 semester credit hour (SCH) or 4 SCH versions of Calculus I and Calculus II. Tomerlin addressed the group to explain how the committee might handle the differences between 3 SCH and 4 SCH Calculus courses: there are pros and cons of including "or" options in the FOS, and there can be two or more tracks within the FOS for different types of degree programs (such as Math Education). After reviewing current requirements in existing Mathematics major programs, the consensus was to require the 4 SCH versions.

In discussion of Calculus III, committee members considered whether most institutions offer the course at the lower-division or upper-division level. The consensus was to use the 4 SCH version of Calculus III. Michie clarified that institutions cannot require Calculus III as a lower-division course for transfer students if it is not in the FOS.

Committee members also discussed whether their institutions offer Linear Algebra, Differential Equations, and Discrete Mathematics at the 2000 or 3000 level.

Cheek proposed multiple tracks in the FOS, perhaps one for teachers and one for Statistics majors, with different requirements for Calculus III. Cottier proposed requiring Calculus III only for pure Mathematics majors. Sadun proposed aligning a separate track with The University of Texas' U-Teach degree plans.

A motion was made to include the 4 SCH version of Calculus III in the FOS. The motion carried, 9-1.

The committee consensus was to not include Differential Equations and Linear Algebra (MATH 2321) in the FOS.

A motion was made to include the 3 SCH version of Differential Equations (MATH 2320). The motion carried, 7-2.

Sadun asked if there are other courses in other departments that need to be in the FOS. The committee discussed courses that could count toward the Life Sciences section of the core curriculum. Tomerlin clarified that courses do not have to have a MATH prefix to be in the Math FOS.

Sadun turned the discussion to the FOS needs for Math Education programs. Wheeler said that Texas Woman's University has Math certifications in grades 4-8 and 7-12. Alvarez said that The University of Texas institutions with the U-Teach program have courses mostly at the upper-division level.

8. Adjournment

The meeting adjourned at 5:00 PM.

Day 2: August 8, 2018

1. Call to order

Ford and Sadun called the meeting to order at 8:30 AM.

2. Discussion and consideration of the Mathematics Field of Study curriculum

The committee resumed discussion on the General Mathematics track. A show of hands demonstrated that few institutions offer Linear Algebra, Differential Equations, or Discrete Mathematics at the lower-division level.

Michie clarified that an institution cannot require additional lower-division courses beyond the FOS unless a student transfers in with an incomplete FOS.

McCrary, Ford, Monticino, Sadun, Wheeler, and others discussed Discrete Mathematics, Linear Algebra and Differential Equations and whether they belong at the upper division. Gronberg replied that it depends on how the course is taught. Sadun said that Linear Algebra is important for Engineering majors. Hester said the problem is universities having to count lower-division courses as the equivalent of upper-division courses.

Hester proposed adding Computer Science and leaving Linear Algebra, Discrete Mathematics, and Differential Equations for institutions to offer at the upper division.

The committee consensus was to have the General Mathematics FOS not apply to Applied Math (CIP code 27.0300.00) or Statistics (CIP code 27.0500.00).

Hester said that is better to include Linear Algebra so that students will be prepared. It is less egregious for the institutions since they can make adjustments to their curricula. Hester made a motion to include Linear Algebra (MATH 2318) in the FOS. The motion carried, 12-2.

The committee discussed Differential Equations (MATH 2320). The committee reviewed data that show how many institutions offer it at the lower level, and members discussed the program requirements at their institutions. Finnegan made a motion to include Differential Equations in the FOS. In discussion, Finnegan and Cheek said that it is important for the Mathematics sequence, and Engineering students will take the course. The motion carried, 8-4.

Alvarez made a motion to include Calculus I (MATH 2413), Calculus II (MATH 2414), and Calculus III (MATH 2415) in their 4 SCH versions. The motion carried, 11-1.

Monticino made a motion to include Programming Fundamentals (COSC 1336), its equivalent, or a more advanced course in Computer Science. In discussion, Monticino suggested having a

selection of courses so institutions could be flexible as computing languages change. Monticino amended his motion to include COSC 1336, or a more advanced course that requires COSC 1336 as a prerequisite. The motion passed unanimously.

The committee discussed Statistics. Cottier and Mauch expressed concern about the length of the proposed FOS. Because many institutions have Math majors take statistics at the upper-division level, the consensus was to not have Statistics in the FOS.

Hester brought up the 8 SCH of Science required in the core curriculum and whether the FOS should specify Physics. Hester said it is the science that is most like applied calculus, and it is useful for Math teachers. Members discussed the requirements at their institutions. Hester made a motion to include calculus-based University Physics I (PHYS 2425, or PHYS 2325 plus PHYS 2125) to the FOS. The motion carried 9-5.

Hester made a motion that the FOS would apply only to CIP 27.0101.00, not including teaching. It would not include programs in the four-digit CIP code 27.03 including Applied Mathematics, or programs in the four-digit CIP code 27.05 which includes Statistics and Actuarial Science. The motion passed unanimously.

The committee discussed a separate track in the FOS for Teaching. (It would not include grades K-8, which are covered by the general Education degree.) Members discussed the requirements at their institutions. Some institutions required field experiences, and the committee discussed the possibility of adding a field experience course to the ACGM.

Hester made a motion to leave a separate teaching track out of the FOS. The motion passed unanimously.

2. Overview of the timeline for public comments and Field of Study approval – Dr. Allen Michie

Michie stated that the proposed FOS would go out for a 30-day public comment period. Committee members would be given a copy of each comment for a response. If changes are made, the revised FOS would go out for a second 30-day comment period. The FOS curriculum would go before the Coordinating Board's Committee on Academic and Workforce Success committee and the full Board for final approval.

Michie said that there could be a second committee meeting, depending upon the number and nature of the public comments received and whether committee members indicate that they want to make significant changes.

3. Consideration of authorization of Co-Chairs to approve minutes and final Field of Study documents

A motion was made to authorize the co-chairs to approve the final meeting minutes and carry other related business for the FOS approval process before the Board. The motion passed unanimously.

4. Adjournment

The meeting adjourned at 11:45 AM.

Final Proposed Field of Study:

Proposed 2018 FOS Curriculum for Mathematics

Course Title	Course Number	SCH
Calculus I	MATH 2413	4
Calculus II	MATH 2414	4
Calculus III	MATH 2415	4
Linear Algebra*	MATH 2318	3
Differential Equations	MATH 2320	3
University Physics I plus lab	PHYS 2425 or PHYS 2325 and PHYS 2125	4
Choose Programming Fundamentals I or a course that includes it as a prerequisite. • Programming Fundamentals I • Programming Fundamentals II • Programming Fundamentals III • Computer Organization	COSC 1336 COSC 1436 COSC 1337 COSC 1437 COSC 2336 COSC 2436 COSC 2325 COSC 2425	3
TOTAL		**25**

*Note: Some receiving institutions may require the 4 SCH version of Linear Algebra (MATH 2418). Students are encouraged to check the requirements of the institution to which they plan to transfer.