

Mathematics Department 2021 Program Review Response

Submitted by: James H. Mike, Ph.D., Dean of the College of Natural and Health Sciences
Brian Wissman, Ph.D., Chairperson, Mathematics Department

Note: Guiding Questions from the Dean for strategic consideration are in RED. Chairperson comments and responses are in BRICK.

Dean Comments and Notes with Department/Chairperson Responses:

1. The Program Review is a well-written and clear document. It is clear that the department developed planning in 2012 that carried forward and led to significant program improvements.
 - a. They utilized assessments to inform modifications to the curriculum and simultaneously worked to align with system-wide “standards” for course numbering.
 - b. They participated in the development and implementation of the Data Science initiative.
 - c. The curriculum realignment resulted in a clearer pathway for students and eliminated a bottleneck course.
 - d. They worked with administration to improve infrastructure, integrated OER (Open Educational Resources) approaches to help lower student costs, and identified areas of challenge for students that were related to disconnections between the lecture and lab portions of Calculus courses, which is an ongoing initiative.
 - e. They have worked to improve mathematics placements.
 - f. They developed the STEM Honors Certificate (Dr. Raina Ivanova), demonstrating an excellent record of accomplishment with 100% placement of students in graduate schools (22 students.) The Honors Certificate curriculum is well developed and PLOs and SLOs are appropriate for the content. Institutionalization of the Honors program encountered a roadblock after many approvals – and it is currently awaiting direction from the Chancellor.
 - g. They identified staffing issues, especially relative to being able to offer service classes through lecturers.
2. The department has 10 full time faculty, 6 Tenure/Tenure-Track and 4 Instructors.
 - a. The review notes that instructors/lecturers have delivered about 60% of the total SSH.
 - i. Because of the impact of having instructors/lecturers teaching in the lower division, a good question for consideration would be what level of faculty development is available to these individuals? Does the department have an expectation for such professional development?

Math Chair Comment: The Mathematics department has a culture of collaborative development of classes where faculty, instructors, and lecturers share their course materials and discuss teaching strategies. Because of this, most development has, historically, originated from inside of the department. Given that the four instructors in the Mathematics department have as many classes (often at the 100 level) as the six tenure track faculty, faculty development for instructors would have a wide impact. (i.e., Learning content and reducing DFW.) Working on increasing/supporting these opportunities is a good goal for the next few years and beyond, especially now that there are more frequent options for online webinars.

3. There is a well-structured curriculum with two tracks – Traditional and Teaching, along with well-articulated learning outcomes outlined for each track.
 - a. The Mathematics minor track appears to be rather heavy, with 26 credit hours.
 - i. Is there a way to make the minor more attractive for students and more manageable within curriculum plans with fewer credit hours? For example, minors of around 18-21 hours seem aligned with national norms.

Math Chair Comment: Aligning credit requirements for a minor in Mathematics with the national norm is something for Mathematics to consider and explore.

4. The department generates a considerable amount of SSH – one of the top producers at the University. Even though SSH production has decreased since 2017, it appears to track with the overall SSH declines at the university.
 - a. The department is sensitive to, and addresses, cognate needs of other departments (e.g., Psychology.)
 - b. There had been a decline in majors (declared first-majors) by about 25%. They have adjusted their curriculum in both tracks resulting in improved numbers now.
 - c. A significant number of majors are Native Hawaiian, which according to the data provided amounts to about a third of the total number of majors.
 - d. Except for Math 310 and 311, which are taught every year, other courses are taught in alternating years.
 - i. How do students lagging in the major catch up – especially if declaring in an “off” year?

Math Chair Comment: After the Fall 2019 program change, students on a compressed graduating timeline can opt take MATH 314: Topology or MATH 324: Ring Theory directly after Calculus II; however, this is a more difficult pathway than the on-sequence MATH 310: Discrete Mathematics then 314/324. The Mathematics department continues to discuss how to balance the transition between computational mathematics classes and proof-based classes.

- ii. The teaching track is declining in enrollments. What might be done to improve this?

Math Chair Comment: The Teaching Track requirements are more prescriptive compared to the Traditional Track where students have the option to take different classes. This rigid schedule makes it less attractive compared to the Traditional Track (even for those who are interested in teaching.) Moreover, double majors generally declare the Traditional Track as it allows classes from outside MATH to count toward their degree. A program change that improves flexibility will likely improve the numbers in the teaching track. Another option, because our major count is relatively small, is to build a single degree program that meets the needs of both tracks of students. The Mathematics department would need to continue discussions on this, but regardless of direction, building flexibility into a scaffolded program is tricky.

- iii. Is there a possibility to combine Math 103 and 135 due to shared content? Is the department investigating this possibility?

Math Chair Comment: It is possible, but students need the time to develop these foundational skills.

- iv. What is the success of students taking developmental math in courses beyond algebra? For example, is Math 135T being tracked for subsequent success data? What would be the success of STEM students, for example, coming from a similarly focused class meeting their needs?

Math Chair Comment: As MATH 135T launched Fall 2020, it is still early to see patterns. There are several academic pathways to get to MATH 241: Calculus I, starting at MATH 103 or MATH 135T. (Both take a minimum of two semesters.) The MATH 135T class has been working well for COBE students because it removes the need for MATH 103 when students do not place directly into MATH 125/135. For CNHS and other sciences we will need to monitor student progress to see if 103+140X (or 103+135+140) is a better way to proceed. Now that several cohorts have made their way through the MATH 135T sequence, we have more data to understand the long-term success of these students. This is a worthy place to spend time and monitor progress.

5. The department has demonstrated success for their graduates, tracking them beyond graduation.
6. Program goals include using the 2+2 model to increase majors; focus on improving efficiency to adapt to budgetary challenges; collaborating with other departments; improving student retention; incorporate SLO3 into the existing classes; create a capstone.

Math Chair Comment: The inclusion of a Capstone course would be an opportunity for the department to incorporate the remaining program SLOs and university SLOs.

Strategic Considerations:

- Develop a strategy for student retention through increased effectiveness of developmental and/or introductory courses and pathways in Mathematics. This could be focused both internally for the department for majors and externally for the larger student body. Consider assessment of Mathematics placements with respect to the immediate effectiveness (success) within the placed course, but also looking at effectiveness (success) in subsequent courses and programs.

Math Chair Comment: Yes. At this point we have a few semesters worth of data to see how well the Math Placement Assessment is placing students into their first class at UHH. Revision of our lower division pathway (leading to upper division classes) is something that could be part of a program revision.

- Examine differences in effectiveness and success for course placement and mathematics development for students anticipating STEM and other math-intensive, algebraic/calculus-based majors vs. students in other majors needing more statistical approaches. Develop similar or disparate approaches, depending upon analysis of effectiveness, to address any identified issues. Effectiveness of co-curricular, competency-based, and other models should be considered.

Math Chair Comment: Yes, there are enough data now to, hopefully, see patterns of success.

- Work collaboratively to fully develop a Data Sciences degree program.

Math Chair Comment: Yes, the Mathematics department supports this initiative.

- Consider revising the Math minor, with an eye toward streamlining it to require fewer hours.

Math Chair Comment: Agreed.

- Fully explore and develop the Mathematics Education track, outlining a pathway for 4+1, as well as examining the possibility of a 2+2+1 articulation (Associate/Bachelor/Masters) that collaborates with Hawaii Community College and others.

Math Chair Comment: Yes, this could be a fruitful collaboration between HawCCs and Education that provides opportunities for students, and could be part of a larger program revision.

- Explore the need and feasibility for faculty development in teaching, especially the needs of instructors/lecturers, but also of tenure/tenure-track faculty.

Math Chair Comment: Yes! With more training being offered as webinars this would be a big plus for Tenure Track and Non-Tenure Track faculty.

- Explore and develop ways to enhance the community interactions of the department.

Brian's Comments: Agreed, however, a major obstacle is time and faculty willingness when they are already overworked.

Goals for Consideration for the Next Review:

1. Develop and implement a strategy for improving student retention through increased effectiveness of developmental and/or introductory courses and pathways in Mathematics. Assess Mathematics placements for both short- and long-term student success.
2. Develop and implement a strategy for improving student retention and graduation within the major through development of a capstone experience.
3. Work collaboratively to fully develop a Data Sciences degree program.
4. Consider revising the Math minor to make it more accessible to students, with an eye toward streamlining it to require fewer hours.
5. Fully explore and develop the Mathematics Education track, outlining a pathway for 4+1, as well as examining the possibility of a 2+2+1 articulation (Associate/Bachelor/Masters) that collaborates with Hawaii Community College and others.
6. Explore the need and feasibility for faculty development in teaching, especially the needs of instructors/lecturers, but also of tenure/tenure-track faculty.
7. Explore and develop ways to enhance the community interactions of the department that complement the time and availability of the faculty.