Office for Faculty Excellence
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MONTCLAIR
STATE UNIVERSITY

MATH 122

Updated: 05/31/2025
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Program

Teaching Innovations Program (TIP): a year-long program that supports faculty teams in developing or redesigning a course or academic program

Intervention

Design and implement a modality of coordination between all sections of MATH 122 (Calculus I) to standardize student experience, improve student success,and decrease section variance in DFW rates. Among other objectives we hope to achieve are increased attendance, engagement and sense of belonging.

Participating faculty

Lead faculty and Calculus I coordinator: Bogdan G. Nita.
Other faculty members that participated: Jonathan Cutler, Deepak Bal, Aihua Li, Mark Korlie, Arup Mukherjee, Mark Trongone (adjunct), Paul Centore (adjunct), Diyunugalage Jayarathne (adjunct), Kobra Rahimi (adjunct).

Implementation

The implementation started in the Fall 2023 and was tweaked and completed during the 2024-2025 academic year.

Course Redesign Goals and Analysis

Summary

Goal 1: Standardize student experience
Status: Achieved
Discussion: We have completely implemented our plans to coordinate all Sections of Calculus I. These are the elements that are currently in place

- Same book: Openstax Calculus I
- Similar pacing schedule (distributed by the coordinator)
- Common Syllabus (pushed on Canvas by the coordinator)
- Same grading scheme, assignment weights, etc.
- Same homework assignments (using Edfinity)

- Coordinated exams: set around the same dates, same number of problems, same topics.
- Common final exam (tried for one semester and put on hold for now)

With all these elements in place we can definitely say that every student taking Calculus I is going through the same experience, learning the same topics, at the same pace, and is being assessed similarly to any other student in the course.

Goal 2: Decrease section variance in DFW rates
Status: Ongoing / Partially Achieved
Discussion: Data shows that there has been improvement in the DFW rate variance between sections. But this needs further assessment and work as the cause of the variance is not always the lack of coordination between sections. We are taking steps towards understanding the student population in each section, their background and prerequisites, and planning on looking at more uniform grading policies between sections (like having common graders among all sections for tests and quizzes).

Goal 3: Improve student success
Status: Ongoing
Discussion: We are continuously trying to improve the DFW rates in Pre-calculus and Calculus classes, using multiple strategies. The coordination we implemented in MATH 122 was initially designed for standardizing and optimizing student experience. Any activity to improve student success is much easier introduced and applied in a course that is already structured similarly and strongly coordinated between all of its sections.

With that being said, the DFW rates are still high, over 40% for the past academic year. This number drops dramatically to a percentage in the 20s if we discount the W grades. Disengaged students are a problem but there are other factors, some of them beyond our control. Here are some strategies that we are working on to improve the DFW rates in MATH 122.

- We have adopted a new placement tool, ALEKS, that will further help students, and us, understand their level of preparation before coming into the Calculus sequence. This tool can also be used as a review tool to catch up with forgotten topics from Algebra.
- We have introduced a new course MATH 108, that better prepares students for Precalculus and ultimately for Calculus. Obviously this takes time to reap the benefits and might take several semesters of adjustment and tweaking to optimize alignment between MATH 108 and MATH 111.
- We need to think more about the alignment between MATH 111 and 122 and we are assessing how student success in MATH 111 factors in their performance in MATH 122.
- In MATH 122 we are developing multiple strategies to keep students engaged:
    1. Involve students in more activities, for example IBIS (group work), semester long project
    2. Diversify assignments methods, for example: homework, participation, project, test, quizzes, IBIS worksheets
    3. Encourage student participation in supplementary instruction activities, for example recitations, CAST, Instructor GAs and SIs office hours, online practice problems.

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4. Implement elements of "Strong Student" campaign

Goal 4: Increase attendance, engagement, sense of belonging
Status: Ongoing
Discussion: We feel that lack of engagement, poor attendance and a weak sense of belonging, in the course and in general in Math and Sciences, is part of the low DFW rates. We are trying different strategies in MATH 122 to improve this. A few examples are:

- Implement "Strong Student" campaign strategies, like taking attendance, require engagement by making attendance part of the grade, classroom climate policies, note taking
- Promote a sense of belonging by using student names when addressing them, involving students in class participation, personalized assignments
- Encourage and require engagement through personalized major specific projects, calling random students' names during class to give their opinion or help with a problem, make class participation part of grade.

Next Steps

We are closely watching the data that we collect in our sequence of courses MATH 108 - 111 - 122 and strategize and tweak our approach. Coordinating in one course alone is not enough, we need alignment between the entire sequence of courses and we need to understand how student performance in the lower prerequisite courses factors in their outcome in MATH 122. We are currently looking at new metrics that would help us understand this interplay a little better.