

Faculty Application for HHMI Faculty Scholar Program

Howard Hughes Medical Institute – FIU Faculty Scholar Application

Name: ___ Dr. Emmy Noether _____

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Title: ___ Associate Professor _____

Course you are proposing to transform (ex PHY 2049): ___ MAC Calculus course _____

Expected Enrollment: ___ ~80 students (2 sessions of 40 students) _____

Primary student population in course

- Upper Division Majors: _____
- Lower Division Majors: ___ X _____
- Non-Science Majors: _____
- Service Course: _____

How frequently have you taught this course in the last 3 years? ___ Every semester _____

After you participate in the Faculty Scholar program, do you anticipate continuing to teach this course?

Yes, this is my regular assignment.

Please describe your motivation for transforming this course:

The Calculus sequence serves hundreds of students every year, from different STEM majors. Due to the nature of the material, many students struggle through this sequence, making it a critical course for student retention. Succeeding and forming a solid knowledge base in this calculus course, is necessary for students to thrive in future courses and stay on track in their STEM majors. I want to implement active learning strategies in class to support student learning and achievement in this course. By having students work in groups to solve problems or projects, and reducing the lecture time, they will engage with the material in a manner that enhances their learning and understanding.

Please describe what you anticipate the course will look like after your participation in FS program:

In-class time will be used for students to discuss the material and work in small groups to cooperatively solve problems. Learning Assistants (LAs) and myself will facilitate the small-group activities. These interactions with LAs will be essential to provide formative assessment and support students as they learn to take responsibility for mastering the material. Students will have at-home assignments, which will be discussed at the beginning of class through mini-

lectures and in-class discussion. I will also monitor the progress of the class as a whole by holding short report-out sessions after activities.

Have you identified any curricula for potential adoption? (This is non-binding)

If so, why have you identified this curriculum?

I intend to adapt the SCALE-UP (Student-Centered Activities for Large Enrollment University Programs) model to my class. SCALE-UP is a curriculum that promotes active learning in redesigned classrooms of 100 students or more. I will adopt this model for a smaller classroom setting of about 40 students, which has been successfully implemented in other universities. Briefly, in SCALE-UP classes, students work through activities in small groups of 3-4 students each. Hands-on activities include problems that require some kind of observation (“tangibles”) and problems that are not well defined and could be solved in more than one way (“ponderables”). The SCALE-UP format takes advantage of cooperative learning techniques that promote a student-centered environment. Additionally, facilitators (like learning assistants) circulate around the groups to ask leading questions and engage in interactions that emphasize guided inquiry.

The SCALE UP model started in Physics and has now been adapted to multiple disciplines. There are a variety of available resources on the web, including some from universities such as the University of North Carolina and Clemson University. Additionally, I have contacted Professor Xavier at Peer University, who has been using the SCALE-UP pedagogy in mathematics. He has agreed to share sample materials that will help in developing the curriculum for my course.

Are you aware of any assessments that could be used to allow us to gauge student learning in the class you will be transforming? (This may include national normed conceptual tests, common exams from national organizations, etc)

I am considering several possible assessments to check the effectiveness of my changes in the course. I will be using the following metrics and comparing data from previously taught courses, when available: (1) DFW rates, or the percentage of students who received a D or F letter grade or withdrew from the course; (2) The Calculus Concept Readiness (CCR) instrument to assess for calculus readiness at the beginning of the course; and (3) Calculus Concept Inventory (CCI) to measure conceptual understanding gains pre- and post- course. Additionally, I am interested in changes in student attitudes towards math, and administering an instrument like the Attitudes Toward Mathematics Inventory might be appropriate.

Do you anticipate using LAs in this course?

If so, what will the role of the LAs be?

As in other active learning models, Learning Assistants are absolutely essential in SCALE-UP since 70% of the class time will be spent in group work and problem-solving. The LAs will be present in every class period to circulate between student teams and ask questions, help students if they have difficulty with an activity, and also monitor how the class is doing. We will hold weekly prep meetings to reflect on the past week and get feedback on the progress of the

students. Additionally, we will plan for the upcoming week of activities, and think about areas students might get stuck in.

Do you anticipate using PLTL in this course?

If so, how will you?

I will be using LAs instead of PLTL in this course.

Do you have anything further you would like us to consider in your application?

I am interested in using one of the new active-learning classrooms for this course.