EMORY UNIVERSITY | Center for Faculty Development and Excellence

FUNDS FOR INNOVATIVE TEACHING APPLICATION

Application Cycle: AY 2019-2020 Semester Course Will Be Offered: Fall 2019

APPLICANT INFORMATION:

Last Name:	Manetta	First Name:	Manuela
School:	Emory University	Department:	
Title:	Lecturer	Email Address:	manuela.manetta@emory.edu

Co-Applicant Information:

Last Name:	Teague	First Name:	Lori
School:	Emory University	Department:	
Title:	Director and Associate Professor	Email Address:	lteague@emory.edu

CLASS INFORMATION:

Course Number: MATH297 (Directed Studies)

Proposal Title: Mathematics through Movement

FOR CFDE OFFICE USE ONLY:

GRANT FUNDING HISTORY _____ / _____ / _____

REVIEW ONE NOTES: _____

_____

_____

Suggestion: (circle one) Approve Deny

REVIEW TWO NOTES: _____

_____

_____

Suggestion: (circle one) Approve Deny

Amount Requested: $2000.00

Course Outline or Proposed Syllabus:

See pdf document sent via email

Proposed Innovation:

See pdf document sent via email

Budget Detail:

Support for teaching assistants and performance (details in pdf sent via email)

Schedule for Integration of the Proposed Project in a Classroom Setting:

See document sent via email

FUND FOR INNOVATIVE TEACHING
MATHEMATICS THROUGH MOVEMENT

MANUELA MANETTA (DEPARTMENT OF MATHEMATICS)
&
LORI TEAGUE (DANCE AND MOVEMENT STUDIES PROGRAM)

DIRECTED STUDIES
PAIRED WITH DIFFERENTIAL EQUATIONS (MATH 212) AND MOVEMENT IMPROVISATION (DANC150R)

1. INNOVATION

In mathematics *movement* (or motion) is used to indicate a change in position of an object, and it is described in terms of displacement, distance, speed, acceleration. In movement studies, *movement* is a language that captures the connections between the realm of the body and the world.

Our collaboration has started this Spring Semester, in running a Sidecar course (IDS 290-7) called "Dancing Dynamical Systems". Although it seems obvious to draw connections between math, physics and dance, as many people have studied "the physics of dance", our approach is experiential. We do not aim to explain movement through mathematics, but to learn mathematics through our bodies, to have unique experiences which allow us to understand mathematical concepts through our creativity and critical thinking. Moreover, images drawn from math can inspire the kinesthetic imagination, leading to original movement research and exploration.

Movers improvise and internalize concepts, by collaborating with others and playing with improvisational scores suggested by scientific words. Movement observation and mathematic knowledge foster discussion among the students, who are able to deeply connect their experience in class to their field of study and investigate the other. The point of the interdisciplinary research is to assemble different ways of understanding the world, in order to ask questions whose answers might not be accessible through the individual disciplines alone. The necessity of interdisciplinary approaches finds its roots in the theory of multiple intelligences developed in 1983 by Dr. Howard Gardner, professor of education at Harvard University: (1) Linguistic intelligence; (2) Logical-mathematical intelligence; (3) Spatial intelligence; (4) Bodily-Kinesthetic intelligence; (5) Musical intelligence; (6) Interpersonal intelligence; (7) Intrapersonal intelligence; (8) Naturalist intelligence. By connecting movement to mathematics and vice-versa, in a collaborative environment, we can test all of the above in a way that every student will be able to understand the concepts in their natural way.

2. CLASSROOM INTEGRATION

This course will be taught as MATH 297 (Directed Studies), for the total of 1 credit. Prerequisites/co-requisites are MATH 212 (Differential Equations) or DANC150R (Movement Improvisation).

In running Dancing Dynamical Systems with two Teaching Assistants, we recognize the importance of students in leading roles. Their presence in the classroom, and their willingness to take the challenge to experience new connections between different fields of study, have been extraordinary, and have helped with a collaborative environment, where the instructor, instead, may seem a lock box of knowledge trying to lead experiments of known results. As the goal of the course is to research and experiment on new associations of ideas between differential equations and movement, we request the presence of 2-4 students as Teaching Assistants of the course, with leading roles. These students will need extra time to study history of dance, history of mathematics, improvisation and differential equations, to meet and to research with the instructors on the unique connections between math and movement.

The class will meet every other week for 2 hours. This time frame will allow to experiment the concepts physically and to discuss and elaborate the interplay between actions and differential equations, as well as to give the students room for their own correlations or insights.

The following is a draft of the topics that will be covered in class:

(1) Walk, run, stop, fall: improvising with equations of motion.
(2) Basic definitions in differential equations and their body movements.
(3) The underscore and math graphs.
(4) Logistic equation in the body.
(5) A mass attached to a spring. Move it!
(6) Predator-prey model: experimenting with personal assets.
(7) Impulse function: what is it?
(8) Phase portraits: walking on trajectories.

Students need to work on a final project which will consist of an original score representing a mathematical concept. The work of the students throughout the semester will be presented during a performance at the end of the semester (place and time TBD).

3. BUDGET

We request funding to support teaching assistants for their research expenses (books, conferences, math/dance related shows), and for end of the semester performance (outreach).
Teaching assistants (each) $250.
Performance $1000.
Total requested $2000.

Additional Information about the FIT Grant Budget

Response:

The budget for the TAs is completed devoted to their expenses for research. From books to dance show tickets, or math exhibitions. There are many useful resources to explore math and movement in Atlanta.

As for the performance, we will need material for artifacts that will help understanding the connections between math and movement, costumes for the performers, and/or rent a venue.