STEM Teaching Symposium

Date & Time: Friday, Sept. 19, 10:00 am - 2:15 pm
Location and Building: Maraschi Room, Fromm Complex

AGENDA

10:00 - 10:15 AM: LIGHT BREAKFAST AND WELCOME REMARKS

SESSION 1

10:15 - 10:30 AM: Paul Haskell (CS): Increase Student Engagement through Student Contests

As instructors, we always look for teaching techniques and assignments that engage our students. As students' are increasingly familiar with online AI tools, too frequently we see that routine or predictable assignments get AI-generated responses, depriving students of the practice and learning they need. In this talk, I will share several introductory computer programming assignments I gave my classes over the past few years. I will give a mix of poorly- and well-received assignments. As I learned from my teaching mistakes, I have seen that students are very excited and engaged with assignments that include competition between students but that do not use competition results in grading.

10:30 - 10:45 AM: Ellen Veomett (CS): Recorded Lectures for a Flipped Classroom

In a traditional classroom, class time is used for content delivery via lecture, and out-of-class time is used for tackling difficult problems in assignments. In a "flipped classroom," those are flipped: content delivery happens outside of class, and class time is used to tackle difficult problems together. In this presentation, we'll discuss using recorded lectures as a part of the flipped classroom approach. I'll show how one can use the Explain Everything app to create engaging lectures. We'll also discuss strategies for optimizing learning and engagement in a flipped classroom.

10:45 - 11:00 AM: Renee Brunelle Hubert (MATH): Calculus Recitation Project

Calculus is a stumbling block for many STEM students, especially those who come to the university with a less rigorous background in mathematics. The Math & Stats Dept conducted a four-semester recitation pilot program in Fall 2023 - Spring 2025, under the direction of Renee Brunelle Hubert, to see if recitations could help to improve student performance and engagement. In this presentation, Renee will summarize the development, delivery, and results of the project, discuss active learning techniques that were used in the recitations as well as in the classroom, and explain how the Math & Stats Dept has and will continue to use the information gathered by this experiment.

11:00 - 11:15 AM: BREAK

SESSION 2

11:15 - 11:30 AM: MEREDITH PROTAS (BIO): USE OF ORIGINAL RESEARCH PROJECTS IN NEW COURSE: EXTREME BIOLOGY

Here, I will discuss my plans to utilize original research projects in the development of a new course that I will be teaching Spring 2026: Extreme Biology. For the lab portion of this course, students will investigate two projects- one on regeneration in an isopod crustacean and the other investigating the genetic basis of adaptation to sulfidic water. Students will develop their own hypothesis regarding the regeneration project, test the hypothesis and track the results over the course of the semester. For the second project, students will acquire skills in molecular biology techniques which will be helpful in future courses and potentially applying for internships/jobs in the biotech field. Students will write up their results in a report at the end of the semester and students will also be encouraged to present their results at CARD. Challenges I expect to encounter in this class include unequal progress in timing of individual students' projects and inevitable struggles with working with live animals. Advantages I expect to encounter in this class include high student engagement and students developing the skills to work independently on a research project.

11:30 - 12:00 PM: SARAH HILLENBRAND (NEUR): SCIENCE AS CONVERSATION: BUILDING RHETORICAL AWARENESS AND MEDIA LITERACY INTO INTRODUCTORY COURSES

Doing science isn't about acing exams. Grading AI-written submissions is increasingly demoralizing. Social media and the pandemic have altered the way we all communicate. We can better serve our students by training skills like thinking on their feet, contributing meaningfully to discussions, working with sources, and distinguishing between evidence and argument. Integrating rhetorical analysis and media literacy practice into science courses can help students critically evaluate scientific claims they encounter in the wild. I will trace a broad outline of learning goals for students' undergraduate degrees and highlight several specific projects from introductory and upper-division neuroscience courses.

12:00 - 12:15 PM: NOUR AL-MUHTSAIB & LESLIE KING (BIO): BUILDING AN INCLUSIVE OER WITH INTERACTIVE ACTIVITIES

This presentation outlines the development of an inclusive Open Educational Resource (OER) for a human physiology course with a focus on active learning. This session will detail our framework, focusing on redistributive justice in access, recognitive justice in valuing diverse knowledge, and representational justice in content. We will also showcase how active learning activities were integrated throughout the OER to foster student engagement and create a more equitable and dynamic learning environment.

12:15 - 1:00 PM: LUNCH

SESSION 3

1:00 - 1:15 PM: JENNIFER TRIPP (CHEM): A TEMPLATE FOR THE CREATION OF CUSTOM CASE STUDIES IN GREEN CHEMISTRY

The most recent American Chemical Society (ACS) guidelines for undergraduate chemistry programs encourage instructors to use case studies to introduce their students to green and sustainable chemistry, and also require coursework demonstrating the interconnectedness of

chemistry with other disciplines. To assist instructors in developing suitable case studies tailored to their courses, we (myself and colleagues from the ACS, Villanova University, and Beyond Benign) have developed a versatile template that guides instructors to build their own effective case studies for classroom use. The template helps instructors to select a suitable real-world example and identify its connections to green and sustainable chemistry, as well as environmental, health, regulatory, and business considerations. Instructors are then led to write effective learning objectives and create course materials including activities, slides, and assessments. The template allows instructors to create a complete curriculum package that is usable in their own classrooms and suitable to be shared with others, leading to broader impact across the community of chemistry educators. While designed for chemistry instructors, the template has wide applicability in other STEM fields.

1:15 - 1:30 PM: Aleksandra Dimitrijevic Stamenov (CHEM): Inquiry-Based Enzyme Mechanism Activity for the Undergraduate Biochemistry Class

Enzymes are vital biological catalysts and understanding of their reaction mechanisms is crucial in biochemistry education. Traditional approaches to teaching how enzymes work can be ineffective, since they encourage passive learning and stifle active engagement and social interaction. An inquiry-based activity was incorporated into the Biochemistry class curriculum to engage students and help them use problem-solving skills on new challenges. Before the introduction of the activity, the lectures covered common enzyme catalytic strategies and the general mechanism of serine proteases – a large family of enzymes that cleave certain peptide bonds in other proteins. One class period was solely dedicated to the activity, in which students were divided into groups and tasked to answer questions and draw a step-by-step mechanism of well-studied serine protease, chymotrypsin. Students were further asked to apply that knowledge to a new problem and propose mechanism of lipases, a related group of enzymes that cleave ester bonds in lipids and are among most widely used biocatalysts in various industrial applications. A survey of student responses, as well as the data on exam performance, indicated that this activity helped improve student engagement, promote collaborative work and increased understanding, confidence and interest in the topic.

~~1:30 - 2:00 PM: Osasere Evbuomwan: Meeting the Moment: Flexible Pathways, AI, and the Future of STEM Education - Cancelled~~

~~STEM education is at a turning point. Students are arriving less academically prepared, working longer hours, and seeking flexible learning options that often reduce classroom engagement. At the same time, artificial intelligence has become a tool widely used by students, whether faculty embrace it or not. Layered onto these challenges are demographic shifts that intensify recruitment and retention pressures, and growing demands from employers for graduates who are adaptable, collaborative, and future-ready. This presentation will highlight current challenges facing STEM students and share a few examples of how institutions and instructors are rethinking curriculum design, transfer pathways, and instructional practices to better align with student realities and workforce needs. We will also consider the role of AI as both a challenge and an opportunity in STEM teaching. Participants will be invited into a discussion on how we can collectively reimagine STEM education to not only meet today's challenges but to prepare students for the rapidly changing world ahead.~~

2:00 - 2:15 PM: DISCUSSION, REFLECTION & CLOSING REMARKS