Prof. Suzanne White Brahmia, University of Washington

Bio:
Suzanne White Brahmia is an Associate Professor with the Physics Education Group at the University of Washington. Dr. White Brahmia began her career as a U. S. Peace Corps high school physics teacher in Central Africa, and then as a graduate student in solid state physics at Cornell University. Her early interests in teaching and social justice drew her to take a position as the first Director of Extended Analytical Physics program at Rutgers, the State University of New Jersey, designing and developing a program targeting equity and inclusion in calculus-based physics for students considered mathematically underprepared for engineering – a population mostly comprised of hard-working students from economically disadvantaged school districts. She completed her PhD at Rutgers under Eugenia Etkina, with a focus on mathematization in introductory physics - a dissertation topic that grew naturally out of her work with the Extended Physics Program. She currently leads a very active research group that works primarily at the intersection of mathematics and physics education at the tertiary level.

Dr. White Brahmia served on the National Research Council committee that produced the 2013 report "Adapting to a Changing World -- Challenges and Opportunities in Undergraduate Physics Education", has served in a variety of leadership roles at the national level toward the development of physics education research, promoting its products in education at the secondary and tertiary levels. She recently organized the 2023 APS Conference for Undergraduate Women in Physics, held at the University of Washington.

Title of talk:
Introductory physics: drawing inspiration from the mathematically possible to characterize the observable

Abstract:
Mathematics is the language of physics, and physics is a source of inspiration for mathematics -- calculus is a perfect example of both. Yet there is growing evidence that students struggle mathematizing the physical world - quantities, models and approximations - and its relationship to calculus. I will share research from both fields, and research-validated calculus materials, that show great promise in helping students better conceptualize the profound relationship -- in an inexact world -- between quantities and their rates of change. My intent is to enrich discussions about how to render this symbiotic disciplinary relationship transparent to our students.

Apl. Prof. Dr. Rainer Vosskamp, University of Kassel

Bio:
1983 - 1989: studies in mathematics, business administration and economics

1989: Diploma (equiv. master) in mathematics (University of Osnabrück)

1989 - 1997: research and teaching assistant (Unit Macroeconomics, University Osnabrück)

1995: Doctorate in economics (equiv. PhD) (University of Osnabrück)

1997 - 2003: assistant professor (Unit Public Finance, Chemnitz University of Technology)

2003: Habilitation in economics (equiv. second PhD) (Chemnitz University of Technology)

2003 - 2008: senior researcher (DIW Berlin and FiBS)

Since 2008: lecturer / senior lecturer and adjunct professor (Unit Quantitative Methods, University of Kassel)

Teaching areas (selection): mathematics for economists, macroeconomics, evolutionary economics, economics of education

Research areas (selection): empirical educational research, mathematics in economics, economics of education, economics of innovation

Title of talk:
Calculus in mathematics for economists

Abstract:
The teaching of mathematics for economics (ME) differs significantly from the teaching of mathematics in mathematics study programs, especially in the area of calculus. The reasons for this I will discuss first. By means of examples, I will work out by which features ME can be characterized. Among the features are the emphasis on mathematical modeling, the intensive use of simplifications, heuristics and applications. Finally, I will formulate theses on the opportunities and risks of using these features of ME. This can serve as a basis for further discussions among teachers and researchers from economics, mathematics and didactics.

Prof. Marcy Towns, Purdue University

Bio:
Dr. Marcy H. Towns is the Bodner-Honig Professor of Chemistry and Director of General Chemistry at Purdue University. She earned a BA in chemistry and mathematics from Linfield University, then MS and PhD. in chemical education and physical chemistry from Purdue University. Her research has focused undergraduate chemistry laboratory including the development and implementation of digital badging to assess hands-on skills, argumentation practices, visualization, and student understanding of the chemistry of climate science. Trained as a physical chemist, her interest in student understanding of mathematics in chemistry has led her to carry out research on student understanding of kinetics and thermodynamics. She developed a passion for research at the interface between mathematics and chemistry that continues to inspire her research trajectories.

She is a member of the National Academies of Science, Engineering and Medicine Board on Science Education. She received the 2017 ACS Award for Achievement in Research for the Teaching and Learning of Chemistry, the 2017 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry from the Northeast Section of the ACS, and the 2019 Nyholm Prize in Education from the Royal Society of Chemistry, in addition to numerous teaching awards from Purdue University. In 2021 she was named an IUPAC Distinguished Woman of Chemistry. She is a fellow of the Royal Society of Chemistry (2019), the American Chemical Society (2012), and the American Association for the Advancement of Science (2009).

Title of talk:
Foundations of calculus in chemistry: How is calculus used in the chemistry undergraduate curriculum

The discipline of chemistry uses mathematics to model and make sense of the physical world, both that which can be seen and measured macroscopically and that which is modeled and measured at the molecular level. This presentation will focus on the ways in which concepts from mathematics, with attention to those explored in calculus, are developed, and used in undergraduate chemistry. Connections will be drawn to concepts learned and explored in other science disciplines at the undergraduate level and to the issues surrounding the use of discrete experimental data to investigate and understand physical systems.

Dr. Brian Faulkner, MSOE University

Bio:
Brian Faulkner is an assistant professor of Elecrical Engineering at the Milwaukee School of Engineering. He teaches introductory circuit theory, engineering mathematics, non-majors circuits, and power systems courses. His educational research is centered on the development of mathematical modeling skills for engineering students, the role of calculus in engineering education, and the impact of practical applications on learning abstract skills.

Title of talk:
Calculus in engineering: Calculus forms a critical mathematical foundation for study in engineering

Abstract:
Calculus courses are required as prerequisite to nearly every engineering class; failure in calculus is devastating to students' graduation timeline. The way ideas manifest themselves in the context of engineering coursework. This talk illustrates the differences between mathematical training of engineering students and engineering study via three examples: The rigor of limits and continuity in engineering coursework, the difficulty of derivatives in engineering coursework, and the units of measure of integrals in engineering coursework.

Dr. Carrie Diaz Eaton, Bates College

Bio:
Dr. Carrie Diaz Eaton is an Associate Professor of Digital and Computational Studies at Bates College, with visiting research appointments at the math institutes ICERM at Brown University and IMSI at the University of Chicago. Diaz Eaton is the co-founder and PI of the Institute for a Racially Just, Open, and Inclusive STEM education (RIOS Institute), and was also a co-founder and former co-Director for QUBES Hub - an virtual center focusing on supporting instructors teaching at the interface of mathematics and biology. They are on the editorial board for two scholarships of teaching and learning journals: *PRIMUS* (math) and *CourseSource* (biology), and the chair of the Committee for Minority Participation in Mathematics for the Mathematical Association of America. Dr. Diaz Eaton values the complex interplay at the intersection of their identities, professional activism in STEM education, and research.

Title of talk:
STEM as Culture: Exploring exclusion and inclusion in mathematics and biology

Abstract:
Finding a path for calculus in the biological sciences is not just about asserting an inherent place, but by enhancing and communicating the value of calculus. Thus we should reflect on the culture of mathematics, the culture of biology, and the cultural space we create at the interface. Disciplinary culture is shaped by and shapes the disciplinary content we value, the language we use, and the way we treat each other. I share experiences in which the skills of boundary spanning between cultures were developed, critically refined, and empirically tested in the context of calculus for life and environmental science.