

Monica F. Cox, Ph.D.

Professor and Department Chair

Dr. Cox earned her Bachelors in Mathematics from Spelman College, a Master's degree in Industrial Engineering from the University of Alabama, and a Ph.D. in Leadership and Policy Studies from Vanderbilt University. She is also the Director of the International Institute of Engineering Education Assessment (i2e2a) and the CEO of STEMinent LLC, a company that houses educational assessment, Prepared to Be a Pioneer® professional development, and Quirky Time® media offerings. In 2011, she became the first African American female to earn tenure in the College of Engineering at Purdue University. Her research focuses on the use of mixed methodologies to explore significant research questions in engineering education; to explore issues of intersectionality among women, particularly **Women of Color** in engineering; and to develop,

disseminate, and commercialize reliable and valid assessment tools for use in science, technology, engineering, and mathematics (STEM) education

Dr. Cox has led and collaborated on multidisciplinary projects totaling approximately \$15 million, and has authored over 100 publications.

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David A. Delaine, Ph.D.

Assistant Professor

Dr. Delaine is a co-founder and past president of the Student Platform for Engineering Education Development (SPEED) and has served two terms as an executive member of the International Federation of Engineering Education Societies (IFEES) as a Vice President for Diversity & Inclusion. Ongoing research includes an NSF funded project entitled "Community-Engaged Student Learning (CESL) for the Development of Empathy in Engineering" which pursues knowledge into how CESL can foster the development of empathy in engineers and enhance learning outcomes. Additionally, a collaborative research effort with the Biomedical Engineering Department entitled "Analyzing inequities in undergraduate workforce opportunities between biomedical and other engineering disciplines," seeks to understand the elements which can inhibit engineers' ability to enter the workforce. Lastly, a collaborative effort with OSU Medical campus is performing research on the integration of mentorship and wellness to support university faculty members.



Department of Engineering Education

RESEARCH HIGHLIGHTS

At the Department of Engineering Education (EED) many of our faculty and staff do more than teach. In addition to educating, they are conducting groundbreaking research in many areas at The Ohio State University and world-wide. These are the highlights of research interests from the 2017-2018 academic year to the present.

Emily Dringenberg, Ph.D.

Assistant Professor

Dr. Dringenberg is an Assistant Professor at The Ohio State University in the Department of Engineering Education. Her research lab utilizes qualitative methods to explore beliefs in engineering. For example, she currently has two NSF-funded projects to study the beliefs that engineering students hold about 1) intelligence and 2) types of reasoning for decision making in the context of design. Her research has an overarching goal of leveraging engineering education

research to shift the culture of engineering to be more realistic and inclusive. She is also interested in neuroscience, growth mindset, engineering ethics, and race and gender in engineering. In general, she is always excited to learn new things and work with motivated individuals from diverse backgrounds to improve the experiences of people at any level in engineering education.

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Lisa Abrams, Ph.D.

Associate Chair and Professor of Practice

Dr. Abrams' areas of interest are recruitment, retention, and success of undergraduate students, especially those populations who are under-represented in engineering; climate and culture in an engineering environment; and faculty and staff mentoring. Dr. Abrams has designed and taught courses and workshops to empower women and assist men in finding ways to be allies to all in both academic and industrial settings. She is also interested in building on these initiatives to measure behavior change, and their impact on the climate.

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Jeffrey E. Froyd, Ph.D.

Professor

Dr. Froyd is interested in analyzing institutional student data to discern patterns and develop visualizations that offer opportunities to improve persistence and graduation of all engineering students, but especially underrepresented minorities, women, and first-generation populations; developing assessment approaches to evaluate student performance, learning, achievement, development, etc. with respect to outcomes, such as innovation and creative thinking, computational thinking, systems thinking, engineering design, entrepreneurship, written communication, oral communication, project management, and leadership; collecting, analyzing, and evaluating data on department, college, and institutional climates to develop action plans to improve climate; developing processes, approaches, and resources for institutionalization and propagation of educational innovations; and studying and improving computing and engineering education.

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Deborah M. Grzybowski, Ph.D.

Associate Professor of Practice

Dr. Grzybowski has a broad multidisciplinary engineering background with degrees in Chemical and Biomolecular Engineering and Biomedical Engineering. She also brings 12 years of industrial experience and 12 years of biomedical research in ophthalmology to the EED. This background has provided the basis for her research agenda of using mixed methodologies to study arts-integrated approaches to make engineering accessible for all students. To date, her research has focused on increasing women, underrepresented minority, and first-generation populations in engineering in K-12. In addition, she works with the K-12 visually impaired population using complex models to make conceptually difficult topics accessible to this special population.

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Rick Freuler, Ph.D.

Professor of Practice

Dr. Freuler is the Director for the EED's Fundamentals of Engineering for Honors (FEH) Program. Dr. Freuler is an active researcher both in engineering education and at the Mechanical and Aerospace Engineering Department's Aerospace Research Center (ARC). Because applied engineering research requires engineers

who are skilled in problem solving and ready for the difficulties of the 21st century, there are natural areas of engineering education research related to how can we produce better educated and trained engineers that will be fully capable and well prepared to attack the grand challenges for engineering. His engineering education research has had particular focus on first-year engineering programs, engineering problem solving, use of graphical programming languages, and the incorporation of entrepreneurial-minded learning into the engineering curriculum. In aerospace engineering Dr. Freuler is active in the areas of wind tunnel and scale model testing, full scale testing, and particularly, specialized aerodynamic test facilities. The research focuses on scale model testing as related to the aerodynamics of large turbofan and turbojet engine test cells and to the aerodynamic performance of air intake and exhaust uptake duct systems for marine and industrial applications of gas turbine engines. Results from these research studies have been used to either verify new designs or define modifications for full scale installations now in use worldwide.

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Rachel Kajfez, Ph.D.

Assistant Professor

Dr. Kajfez's research interests focus on the intersection between motivation and identity of undergraduates, graduate students, and faculty, first-year engineering programs, mixed methods in research, and innovative approaches to teaching. She leads the RIME Collaborative and is a co-director of the Toy Adaptation Program. During her time at OSU she has contributed to a variety of multidisciplinary grants aimed at holistically enhancing engineering education through a deeper understanding of personal motivation and identity.

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Denver Tang, Ph.D.

Assistant Professor of Practice

Dr. Tang draws from history, sociology, and educational theory to study engineering education reforms across time and nations. He is interested in fostering ethical practice and entrepreneurial thinking among engineering students. His research also investigates the education of well-rounded and responsible engineers via the integration of engineering and the liberal arts.

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Krista Kecskemety, Ph.D.

Assistant Professor of Practice

Dr. Kecskemety's doctoral dissertation focused on computational modeling of wind turbine wake aerodynamics. She teaches in the EED's first-year engineering program. Dr. Kecskemety's engineering education scholarship interest interests include investigating first-year engineering student experiences, examining the impact of course activities on retention of knowledge of programming languages, and assessing training with Teaching Assistants. Many of her research activities have been sparked by questions from what was happening in the EED's first-year engineering courses. When student grades on computer-based multiple choice questions seemed low, she created a study to investigate the effects of computer-based vs paper-based exams in a first-year engineering course.

Other research activities have focused on students' perceptions of the inverted classroom, active learning techniques, and how and why students are selecting and staying in specific engineering majors. Currently, she is working on research projects related to how the EED teaches programming in first-year engineering courses and how that knowledge is retained as students move onto their majors.

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