

2021-22 Strategic Instructional Innovations Program

The Grainger College of Engineering at the University of Illinois at Urbana-Champaign

Competitively awarded grants enable faculty teams to accelerate best practices for teaching, develop new best practices, and reimagine what it means to educate our students.

Faculty communities • Amplifying student learning • Curriculum • Technology • Teaching at Scale • Innovation

Implementation & Exploration Track

Early Instruction in Linear Algebra and Computational Tools in the Curricula of CS, MechSE and the College of Engineering (Year 3)

This team will continue the redesign of instruction in concepts of linear algebra and linear structures to provide undergraduates in MechSE, CS, and other departments with substantive, practical knowledge in these essential fields early in the curriculum.

Sascha Hilgenfeldt (MechSE), Jer-Chin (Luke) Chuang (Mathematics), Mariana Silva (CS), Matthew West (MechSE). Liaison: Marcia Pool (Cancer Center at Illinois)

Excellence in Computer Engineering Education (EXCEED): Incorporating Parallel Programming Thinking in ECE Curriculum (Year 3)

This team will advance its development, pilot, and assessment of learning modules on parallel and distributed computing in key courses across ECE.

Ujjal Bhowmik (ECE), Zuofu Cheng (ECE), Levchenko Kirill (ECE), Thomas Moon (ECE). Liaison: Matt West (MechSE)

Learning by Immersion: Creating Virtual Reality Labs for Electromagnetism (Year 3)

This team will continue to support students who struggle with their understanding of electromagnetism theory by developing 3D visualizations of abstract physics in an immersive, exploratory, and engaging environment.

Raluca Ilie (ECE), Eric Shaffer (CS), Dan Cermak (Informatics), Erhan Kudeki (ECE), Christopher Ball (Journalism), Jacob Fisher (Advertising). Liaison: Tim Stelzer (Phys)

PrairieLearn and Course Redesign for Core CEE Intro Sequence (Year 3)

This team will continue to integrate the PrairieLearn platform in two core CEE courses— facilitating new approaches in content and in best pedagogical practices.

Sotiria Koloutsou-Vakakis (CEE), Hadi Meidani (CEE), Eleftheria Kontou (CEE), Lei Zhao (CEE), Chris Tessum (CEE). Liaison: Matt West (MechSE)

Collaborative Learning (Year 2)

This team will further develop and improve existing computer-based tools to facilitate collaborative and active learning work inside and outside of the classroom.

Mariana Silva (CS), Abdussalam Alawini (CS), Geoffrey Herman (CS). Liaison: Molly Goldstein (ISE)

Expanding PrairieLearn (Year 2)

This team plans to add new functionality to PrairieLearn to focus on the return to campus. In particular, they will integrate PrairieLearn with Canvas to enable a unified online learning experience for students and add instructor features to better support hybrid courses with a mix of on-campus and remote students.

Tim Bretl (AE), Geoffrey Herman (CS), Craig Zilles (CS), Mariana Silva (CS), Dave Mussulman (Engr IT), Matt West (MechSE). Liaison: John Popovics (CEE)

Improving Undergraduate Writing Instruction and Feedback through Professional Development of STEM Graduate-Student Teaching Assistants (Year 2)

This team will continue to advance a graduate-level course to introduce pedagogical tools for teaching writing in STEM and to assist graduate students in understanding STEM writing and improving as writers themselves and will further assess the impacts of the course.

S. Lance Cooper (Phys), Celia Elliot (Phys), John Gallagher (English), Blake Johnson (MechSE), Megan Mericle (Phys & English),

John Popovics (CEE), Paul Prior (English), Julie Zilles (ABE). Liaison: Mariana Silva (CS)

Introducing Peer Mentorship via Undergraduate Learning Assistants in PHYS 100 Discussion Sections (Year 2)

This team will continue to develop a program for undergraduate learning assistants as a core component of the Physics 100 student experience and will assess the impact of this addition on student learning, sense of social belonging, and motivation.

Eric Kuo (Phys), Gary Gladding (Phys), Morten Lundsgaard (Phys) Liaison: Molly Goldstein (ISE)

Revising the CS Introductory Programming Sequence (Year 2)

This team will further enhance its web-based application that serves course content to CS 128 students on-demand, using a daily lesson format similar to CS 125 course that offers new material through a combination of text, video, and interactive walkthroughs.

Geoffrey Challen (CS), G. Carl Evans (CS), Margaret Fleck (CS), Michael Nowak (CS), Michael Woodley (CS), Craig Zilles (CS). Liaison: Yuting Chen (ECE)

Cross-Course Assessment Model for TAM 251: Introductory Solid Mechanics, ME 330: Engineering Materials, and ME 371: Mechanical Design II (Year 1)

This team will establish a strategy for assessing the retention rate of key concepts taught in fundamental introductory engineering courses and identify how this information can be used by instructional staff in their course design and implementation.

Wayne Chang (MechSE), Randy Ewoldt (MechSE), Brian Mercer (MechSE). Liaison: Mariana Silva (CS)

Interactive Code Walkthroughs (Year 1)

This team will refine and expand the usage of interactive code walkthroughs, as previously developed for CS 125, to expand the use of this new technology to several other courses and perform data collection to better understand and improve how students utilize these walkthroughs.

Geoffrey Challen (CS), Michael Nowak (CS), Tiffani Williams (CS). Liaison: Tim Stelzer (Phys)

Perpetuating the Computational Research Course (Year 1)

This team will continue the development of a course covering computational research skills for researchers across many disciplines and consider sustainability of the course as a long-term collaboration of multiple departments and colleges.

Neal Davis (CS), Jake Bowers (Political Science), Andre Schleife (MatSE), Rich Sowers (ISE), Elizabeth Wickes (Information Sciences). Liaison: Marcia Pool (Cancer Center at Illinois)

Python Working Group (Year 1)

This team will enhance and modernize key undergraduate courses serving students in the Grainger College of Engineering by incorporating meaningful elements of computational tools and exercises.

Sascha Hilgenfeldt (MechSE), Jared Bronski (Mathematics), Wayne Chang (MechSE), Neal Davis (CS), Mariana Silva (CS), Matthew West (MechSE). Liaison: Blake Johnson (MechSE)

UDL Based Best Practices Including Utilizing Canvas for the Needs of Students (Year 1)

This team will identify potential course improvement opportunities to help students with disabilities. Inspired by the Universal Design for Learning (UDL), they will seek to understand how students interact with course components and how they perceive the value of multiple representations of course materials and multiple ways of communication.

Hongye Liu (CS), Jenny Amos (BioE), Lawrence Angrave (CS), Rebecca Reck (BioE), Chrysafis Vogiatzis (ISE), David Dalpiaz (Statistics), Yun Huang (Information Sciences). Liaison: Yuting Chen (ECE)

Startup Track

A Community of Practice for Rethinking Best Practices in Post-COVID Experiential Learning (Startup)

This team will create a Community of Practice (CoP) of Grainger Engineering laboratory and design instructors to develop strategies and best practices across the college for these hands-on undergraduate courses as a new era of teaching and learning is introduced post-COVID.

Rebecca Reck (BioE), Holly Golecki (BioE), Christopher Schmitz (ECE), Katie Ansell (Phys), Chandra Radhakrishnan (ECE), Jessica TerBush (MatSE). Liaison: John Popovics (CEE)

Designing Early Interventions to Facilitate Student Study Skills in Introductory Problem-Solving Classes (Startup)

This team will devise and implement early intervention methods to help students improve their study skills with the underlying goal of improving retention and inclusion in engineering courses for undergraduates.

Yael Gertner (CS), Jenny Amos (BioE), Ben Cosman (CS). Liaison: Molly Goldstein (ISE)

Developing Collaborative Online International Learning (COIL) Projects in Engineering Education (Startup)

This team plans to develop assessment tools for courses with Collaborative Online International Learning (COIL) projects and to use them for a series of pilot studies to test the effectiveness of improving global competencies of engineering students.

Brian Woodard (AE), Meredith Blumthal (Engr Admin), Hannah Dougherty (Engr Admin), Gretchen Forman (GFX), Molly Goldstein (ISE), EJ Ignacio (CEE), Luis Rodriguez (ABE), Jim Stubbins (NPRE), Ann-Perry Witmer (Applied Research Institute). Liaison: Blake Johnson (MechSE)

Multi-Disciplinary Service-Learning Ecosystem (Startup)

This team will launch a multidisciplinary ecosystem that connects experts from Grainger Engineering with multiple campus units to assist engineering faculty members in producing high-quality multimedia service-learning content for use by Kindergarten through 12th grade educators throughout the State of Illinois.

Blake Johnson (MechSE), Yuting Chen (ECE), Brian Johnson (Journalism), Kimberlie Kranich (IPM Administration), Marcia Pool (Cancer Center at Illinois), Saadeddine Shehab (Siebel Center for Design). Liaison: Jay Mann (AE3)

Virtual Reality as a Vehicle for Education in the Domains of Building Systems and Construction Materials (Year 1)

This team will work to improve student understanding and excitement for highly 3-dimensional problems in structural systems and construction materials using VR technologies.

Ann Sychterz (CEE), Marci S. Uihlein (Architecture), Jacob Henschen (CEE), Nishant Garg (CEE). Liaison: Andre Schleife (MatSE)