

2019-20 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

Early Instruction in Linear Algebra and Computational Tools in the Curriculum of CS, MechSE, and Grainger Engineering

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

Sascha Hilgenfeldt (PI, MechSE), Philipp Hieronymi (Mathematics), Luke Olson, Mariana Silva (CS), Matt West (MechSE). Education Innovation Fellow liaison: Chris Schmitz

Growing the PrairieLearn Community

PrairieLearn is a framework for online learning built at Illinois. This team is growing the community of instructors who use and think critically about PrairieLearn, in order to extend its positive impact across the College.

Tim Bretl (PI, AeroE), Geoffrey Herman, Mariana Silva, Craig Zilles (CS), Dave Mussulman (Engr-IT), Matt West (MechSE). Education Innovation Fellow liaison: Tim Stelzer

Learning by Immersion: Creating Virtual Reality Labs for Electromagnetism Courses

Targeting students who struggle with their understanding of electromagnetism theory, this team is developing 3D visualizations of abstract physics in an immersive, exploratory and engaging environment.

Raluca Ilie (PI, ECE), Eric Shaffer (CS), Erhan Kudeki (ECE), Cynthia D'Angelo (Educational Psychology), Olivia Coiado (Carle College of Medicine), Lucas Wagner (Physics). Education Innovation Fellow liaison: Marcia Pool

PrairieLearn and Course Redesign for Core CEE Intro Sequence

Two core CEE courses will integrate the PrairieLearn platform for course assessments – facilitating new approaches in content and in best pedagogical practices.

Sotiria Koloutsou-Vakakis (PI), Hadi Meidani, Lei Zhao, Yanfeng Ouyang (CEE). Education Innovation Fellow liaison: Craig Zilles

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

This team is developing and piloting learning modules on parallel and distributed computing in key courses across ECE.

Ujjal Bhowmik (PI), Yuting Chen, DS Choi, Zuofu Chen (ECE). Education Innovation Fellow liaison: Jeff Erickson

Broadening and Evaluating Support for Effective Office Hours in Large Courses Using a Digital Queue system

The Illinois Open-Source Queue allows students to add themselves to a waiting list via a web page and access this page using any computing device. The team will explore and evaluate the impact, and new features of the queue.

Wade Fagen-Ulmschneider (PI, CS), Karle Flanigan (Statistics), Karin Jensen (BioE), Dave Mussulman (EngrIT), Lawrence Angrave (CS). Education Innovation Fellow liaison: Chris Schmitz

ENgagement In eNginneering Education (ENGINE)

This interdisciplinary team is exploring non-traditional teaching methods and learning assignments, such as playful and community-building techniques, for developing student motivation and professional mindsets.

Leon Liebenberg (MechSE, PI), Blake Johnson, Alex Pagano, Brian Mercer (MechSE), Molly Goldstein (ISE), Chad Lane (Educational Psychology), Candace Martinez (Business Administration), Shelly Schmidt (Food Science & Human Nutrition), Robert Baird, Ava Wolf (CITL). Education Innovation Fellow Liaison: John Popovics

Improving the Writing Skills of Undergraduate Engineering Students: Empowering Engineering Faculty and Teaching Assistants

The focus of this project is on building interdisciplinary faculty learning communities around writing in engineering, integrating writing instruction and practice within existing technical courses across all four undergraduate years, assessing the effectiveness of the vertical integration, and advancing understanding of effective development of engineering students' writing skills.

John Popovics (PI, CEE), Julie Zilles (Crop Sciences), Lance Cooper, Celia Elliott (Physics), John Gallagher (English), Paul Prior, Bruce Kovanen, Nicole Turnipseed, Robert Ware (Center for Writing Studies). Education Innovation Fellow liaison: Elif Ertekin

Teaching Assistant Training: Integrative Engineering Leadership Initiative for Teaching Enhancement (iELITE)

This team teaches a course to prepare graduate students in Grainger Engineering for their instructional and leadership responsibilities. *Yuting Chen (PI, ECE), Blake Johnson (MechSE), Mattox Beckman (CS), Lucas Anderson and Hannah Choi (CITL). Education Innovation Fellow liaison: Jeff Erickson*

Developing Intelligent Online Tools to Improve Visuospatial Skills of Engineering

Computerized training modules to enhance students' visuospatial skills are implemented in three large engineering design courses. *Brian Woodard (PI, AeroE), Molly Goldstein (ISE), Julia Laystrom-Woodard (AeroE), Mike Philpott (MechSE), Angela Wolters (Women in Engineering), Ziang Xiao (CS). Education Innovation Fellow liaison: Marcia Pool*

Redesigning Introductory Thermal and Quantum Physics

The goal of this project is to focus PHYS 213 (Thermal Physics) and 214 (Quantum Physics) on core concepts to better prepare engineers for classes that depend on them, and to incorporate best practices in instruction.

Lucas Wagner (PI), Paul Kwiat, Jeffrey Filippini, Bryce Gadway, Michael B. Weissman, Gary Gladding, Jon Thaler (Physics). Education Innovation Fellow liaison: John Popovics

Identifying Leadership Qualities in Students for Improved Capstone Design Project Group Performance

This team is investigating how successful student leadership contributes to design team performance.

Blake Johnson (PI, MechSE), Bruce Flachsbarth (MechSE), Joe Bradley (Bioengineering and Grainger First-Year Experience), Fritz Drasgow (Psychology), Molly Goldstein (ISE). Education Innovation Fellow liaison: Jeff Roesler

Aerospace Engineering Communication Skills (Adaptation Track)

This project aims to improve student communication skills by incorporating assignments across the curriculum based on MechSE's iDesign curriculum reform efforts.

Brian Woodard (PI), Philip Ansell, Timothy Bretl, Laura Gerhold, Kai James, Zachary Putnam (AeroE). Collaborator: Blake Johnson (MechSE)

Implementing Process-Oriented Guided Inquiry Learning*

POGIL is a student-centered learning strategy that uses team-based activities that enable students to construct their own understanding of key concepts and apply them. This user community welcomes new members.

Mattox Beckman (PI), Eric Shaffer, Mariana Silva, Lawrence Angrave, Neal Davis, Siwei Shen (CS), Jenny Amos, Karin Jensen, Gabriel Burks (BioE), Pratik Lahiri (ECE), Sotiria Koloutsou-Vakakis (CEE), Angela Barragan, Matteo Mitrano (Physics). Education Innovation Fellow Liaison: Jeff Roesler

iDesign: Integrated MechSE Design Curriculum*

This project is integrating MechSE design courses for freshmen through seniors. Objectives are to: (1) Produce engineers with competitive design skills, (2) Increase student/faculty interaction, (3) Increase student satisfaction with design courses, (4) Enlarge the pool of faculty willing and able to teach design, and (5) Facilitate ABET accreditation for design classes.

Elizabeth Hsiao-Wecksler (PI), Alison Dunn, Bruce Flachsbarth, Blake Johnson, Seok Kim, Leon Liebenberg, Brian Mercer, Ralf Moller, Michael Philpott, Joao Ramos, Sam Tawfick, Aimy Wissa, Arend van der Zande (MechSE)

TAM 210/211/212/251*

The gateway theoretical and applied mechanics classes serve approximately 2500 student-enrollments per year. This team applies state-of-the-art pedagogical and technology solutions to improve student engagement and enthusiasm.

Matt West (PI), Wayne Chang, Geir Dullerud, Blake Johnson, Leon Liebenberg, Liz Hsiao-Wecksler, Gabe Juarez, Mariana Kersh, Elif Ertekin, Katie Matlack, Brian Mercer, Vasu Salapaka (MechSE)

*Teams in SIIP community after completing standard funding.