

## 2018-19 Strategic Instructional Innovations Program

### College of Engineering, 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.

#### *Implementation & Exploration Track*

##### **Nurturing Design Thinking in Engineering Courses**

This team is developing multidisciplinary activities that engage students from Mechanical Engineering, Computer Science, and Art & Design in design thinking and the studio critique method.

*Sam Tawfick (PI, MechSE), Brian Bailey (CS), Eric Benson (Art & Design). Liaison: Tim Stelzer*

##### **Growing the PrairieLearn Community**

PrairieLearn is a framework for online learning that was 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), Jenny Amos (BioE), Geoffrey Herman, Mariana Silva, Craig Zilles (CS), Tim Stelzer (Physics), Dallas Trinkle (MatSE), Dave Mussulman (EngrIT), Matt West (MechSE). Liaison: Jeff Roesler*

##### **Engineers SPEAK: Just-in-Time Delivery of Presentation Instruction**

Graduate students in the Communications department run clinics for senior design students in Electrical and Computer Engineering and Agricultural and Biological Engineering.

*Blake Johnson (PI, MechSE), Jacob Bryan (ECE), Grace Giorgio, Ann Bryan, Katie Bruner (Communications), Steve Zahos (ABE), Liaison: Craig Zilles*

##### **Developing Instruction in Technical Writing for Freshman Engineering Students**

This team is developing and evaluating a co-taught writing-in-the-disciplines course for first-year engineering students and relevant training modules for graduate assistants.

*Karin Jensen (PI), Marcia Pool, Mohammad Zahid, Yanfen Li (BioE), Dallas Trinkle (MatSE), James Hutchinson (ECE), Patricia Watts (Linguistics), Evin Groundwater, Amanda Bales (English). Liaison: Craig Zilles*

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

This team's objectives are to i) build interdisciplinary faculty learning communities around writing in engineering, ii) integrate writing instruction and practice within existing technical courses across all four years of undergraduate engineering curricula, iii) assess the effectiveness of the vertical integration, and iv) advance understanding of effective development of engineering students' writing skills.

*Julie Zilles (PI) and John Popovics (CEE), Lance Cooper, Celia Elliott, and John Yoritomo (Physics), John Gallagher, Paul Prior, and Nicole Turnipseed (English and Center for Writing Studies). Liaison: Elif Ertekin*

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

This team is developing and evaluating a course to prepare teaching assistants in the College of Engineering for their instructional and leadership responsibilities.

*Yuting Chen (PI, ECE), Matthew Goodman (MatSE), Blake Johnson (MechSE), Mattox Beckman (CS), Lucas Anderson and Hannah Choi (CITL). Liaison: Tim Stelzer*

##### **Developing Intelligent Online Tools to Improve Visuospatial Skills of Engineering Students**

The objective of this project is to develop computerized training modules that enhance students' visuospatial skills, and implement them in three large engineering design courses.

*Wai-Tat Fu (PI), Geoffrey Herman, Ziang Xiao, Sanorita Dey (CS), Jim Leake (ISE), Brian Woodard (AeroE), Angie Wolters (Women in Engineering); Mike Philpott (MechSE). Liaison: Marcia Pool*

### **Redesigning Introductory Thermal and Quantum Physics**

The objective 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), Bryce Gadway, Gary Gladding, Taylor Hughes, Paul Kwiat, Michael Weissman (Physics). Liaison: Chris Schmitz*

### **Play in Learning: Cognition, Emotion, and Playful Pedagogy**

This SIIP project is an exploration into the relationship between cognition, emotion, and playful pedagogy through the implementation of playful methodologies that encourage deep learning.

*Leon Liebenberg (PI), Emad Jassim, Blake Johnson, Alex Pagano (MechSE), Robert Baird, Ava Wolf (CITL), Geoffrey Challen (CS), H. Chad Lane (EdPsych), Shelly Schmidt (FSHN). Liaison: Elif Ertekin*

### **iDesign: Integrated MechSE Design Curriculum\***

This project aims to integrate MechSE design courses for freshmen through seniors. The 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-Weckler (PI), Alison Dunn, Bruce Flachsbart, Emad Jassim, Blake Johnson, Seok Kim, Leon Liebenberg, Ralf Moller, Hae-Won Park, Michael Philpott, Sam Tawfick, Aimy Wissa, Arend van der Zande (MechSE)*

### **TAM 210/211/212/251\***

This project focuses on the gateway theoretical and applied mechanics classes, which serve approximately 2500 student-enrollments per year. It has applied 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-Weckler, Gabe Juarez, Mariana Kersh, Elif Ertekin, Katie Matlack, Brian Mercer, Vasu Salapaka (MechSE)*

## **Start-Up Track**

### **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 project will train instructors in the use of POGIL.

*Mattox Beckman (PI), Eric Shaffer, Mariana Silva (CS), Jenny Amos (BioE). Liaison: Marcia Pool*

### **Teaching proofs and computation: Automating problem grading and feedback for scale**

This team is creating a platform that supports automatic checking, feedback, and grading of formal computations and proofs in CS classes.

*Madhu Parthasarathy, Elsa Gunter (PIs), Mattox Beckman, Margaret Fleck, Sasa Misailovi (CS). Liaison: Tim Bretl*

### **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 utilization, impact, and new features of the queue.

*Wade Fagen-Ulmschneider (PI, CS), Karle Flanigan (Statistics), Karin Jensen (BioE), Dave Mussulman (EngRIT), Lawrence Angrave (CS). Liaison: Chris Schmitz*

## **Adaptation Track**

### **Aerospace Engineering Communication Skills**

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*

\*Implementation & Exploration teams choosing to stay in SIIP community after completing standard three years of funding.