Implementation & Exploration Track

Designing Early Interventions to Facilitate Student Study Skills in Introductory Problem-Solving Classes (Year 3)

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), Juan Alvarez (ECE) Ben Cosman (CS) Jenny Amos (BioE) Liaison: S. Lance Cooper

Redesigning Design: Incorporating HCD and the 3 C's in Capstone Design Courses (Year 3)*

This team plans to incorporate an entrepreneurial mindset (EM) framework in the design process by incorporating HumanCentered Design (HCD) elements into capstone projects to to complement the core competency learners have developed over their early course of study. Through a growing community of practice, the team will support the department to create a vision and framework for incorporating EM and HCD into future lower-level courses.

Matthew Goodman (MatSE), Blake Johnson (MechSE) Jessica A. Krogstad (MatSE), JC Stinville (MatSE), Saadeddine Shehab (SCD), Taylor Parks (SCD) Liaison: Paul Davidson

Developing Open Educational Resources for Fundamental Engineering Mechanics Courses (Year 3)*

This team will further develop open educational resources motivated by contemporary engineering applications that will enhance student and faculty engagement in both the development and delivery of foundational content, provide greater access to the education innovation from GCOE across the higher education community, and improve the readiness of transfer students from the GCOE Pathways Program.

Mariana Kersh (MechSE), Wayne Chang (Aero), Tom Golecki (MechSE) Shelby Hutchens (MechSE), Brian Mercer (MechSE), Nikhil Admal (MechSE), Callan Luetkemeyer (MechSE) Liaison: Abdu Alawini

Redesigning CEE courses to Teach Computational Thinking and Engineering in Societal Context (Year 3)

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

Sotiria Koloutsou-Vakakis (CEE), Mani Golparvar Fard (CEE), Jacob Henschen (CEE), Hannah Horowitz (CEE), Eleftheria Kontou (CEE), Helen Nguyen (CEE), Megan Matthews (CEE), Hadi Meidani (CEE), John S. Popovics (CEE), Ashlynn Stillwell (CEE), Chris Tessum (CEE) Liaison: Chandrasekhar Radhakrishnan

Developing Collaborative Online International Learning (COIL) and COIL+ Projects in Engineering Education (Year 3)

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), (Abdussalam Alawini (CS), Meredith Blumthal (IPENG), Zuofu Cheng (ECE), Hannah Dougherty (IPENG), Ivan Favila (UPO), Gretchen Forman (Student Success and Engagement), Molly Goldstein (ISE), E.J. Ignacio (CEE), Marcia Pool (Cancer Center), Luis Rodriguez (ABE) Kate Abney (IPENG), Kimberly Powers (UPO), Jim Stubbins (NPRE), Joan Brown (UPO) Liaison: Olga Mironenko

Response to Failure and Success in ECE Circuits Courses (Year 2)*

This team seeks to better understand students' ability to navigate and respond to failure as an opportunity for growth and learning through the scientific enterprise. With little engineering education research on how students respond to failure, the team will try to better understand the range of student responses to failure before considering any future work that could help build resilience to failure and ways in which we can help students learn from failure.

Juan Alvarez (ECE), Jessica Gladstone (EPSY), Jennifer Cromley (EPSY) Liaison: Mattox Beckman

Using a Human-Centered Engineering Design Framework to Co-Design Aerospace Engineering Courses (Year 2)*

This team will utilize the HCD framework to a) build a curriculum map to identify possible HCD activities and learning progressions for aerospace students to develop human-centered engineering design knowledge, skills, and mindsets, b) collaborate with additional faculty members to evaluate existing courses and co-design changes, and c) identify connections between course learning objectives and activities and students' learning outcomes that are defined in the ABET and KEEN frameworks.

Tim Bretl (AE), Saad Shehab (SCD), Taylor Tucker (SCD), Elle Wroblewski (AE) Liaison: Matt Goodman

Game for Community Resilience-Based Decision-Making Education and Entrepreneurially Minded Learning (Year 2)*

This team will develop and implement an engineering decision-making game as an introductory course module on societal impact-based structural engineering risk management. The project builds on an existing pilot version of the game and the results of an initial pilot test. It addresses several key objectives, including: (1) developing a dissemination plan for the project outcomes, such as the board game, computer game, instruction module, and the development/deployment process; (2) advancing the game design to improve its effectiveness and engagement; and (3) developing and implementing the instruction module. With strong alignment to the 3C's of the KEEN Network's Entrepreneurial Mindset—Curiosity, Connections, and Creating Value—the proposed project promotes entrepreneurially minded learning.

Eun Cha (CEE), Eric Shaffer (ECE), Luc Paquette (Edu) Liaison: Paul Davidson

Enhancing Project Management Skills in Engineering Curricula and Beyond (Year 2)*

This team will better understand the current level of project management knowledge and skills of engineering students (ABE and SE) and non-engineering students (ETMAS and FSHN) both early and late in their programs of study. The project also aims to assess the current satisfaction of alumni and potential employers with project management skills of our graduates. This effort will be expanded to other majors at UIUC as well as peer institutions.

Paul Davidson (ABE), Travis Johnson (ABE), Molly Goldstein (ISE) Liaison: Ashlynn Stillwell

TheorieLearn: Autograded Resources for Theoretical Computer Science (Year 2)

This team will develop resources on the PrairieLearn platform to support the teaching of algorithms, data structures, and other theoretical aspects of computer science, at several different levels of the computer science curriculum. The project extends an existing effort to develop PrairieLearn resources for CS374 and expands this effort to include CS 225 in the first year, and to include CS277, CS401, and CS 403 in future years.

Jeff Erickson (CS), Carl Evans (CS), Yael Gertner (CS), Brad Solomon (CS) Liaison: Mattox Beckman

Expanding a Near-Peer Mentoring Framework to Develop Entrepreneurial Mindset Learning Across a Curriculum (Year 2)*

This team will focus on two CEE courses to integrate the Entrepreneurial Mindset (EM) in students' course projects. Students in the upper-level course will serve as near-peer mentors for the students in the introductory course. Through the inclusion of a denser network of community and University partners in this new project work, the team will advance a framework for assessing students' EM over multiple learning experiences.

Jacob Henschen (CEE), Arthur Schmidt (CEE), Jeffrey Roesler (CEE) Ramez Hajj (CEE) Ann Sychterz (CEE), E. J. Ignacio (CEE), Jeremy Guest (CEE) Liaison: Matt Goodman

Computational Tools for Dynamics and Control (Year 2)

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), Timothy Bretl (AE), Siegfried Eggl (AE/Astronomy), Prashant Mehta (MechSE), Melkior Ornik (AE), Srinivasa Salapaka (MechSE), Wayne Chang (AE) Matthew West (MechSE) Liaison: Yael Gertner

Test Anxiety and the CBTF (Year 2)

This team will explore the state of testing anxiety experienced by students who take their midterm and final exams in the Computer-based Testing Facility (CBTF). The Project will serve multiple objectives: (1) establish baseline data concerning the extent of testing anxiety related to CBTF exams and factors contributing to that test anxiety; (2) inform the development of policies and procedures aimed at mitigating testing anxiety related to CBTF exams; and (3) facilitate the development of educational and training materials for faculty and students that are aimed at reducing testing anxiety in the CBTF.

Mariana Silva (CS), Julie Baker (ATLAS), Geoffrey Herman (CS), Dave Mussulman (iSchool), Jim Sosnowski (CBTF), Matthew West (MechSE), Craig Zilles (CS) Liaison: Yael Gertner

Exploring the Impact and Potential of Generative AI in Engineering Education (Year 1)*

This project aims to explore the impact and potential of generative AI in engineering education. In particular, the team seeks to integrate generative AI into STEM higher education curricula to cultivate the entrepreneurial mindset advocated by the KEEN 3 C's: curiosity, connections, and creating value.

Abdu Alawini (CS), Volodymyr Kindratenko (NCSA), Sotiria Koloutsou-Vakakis (CEE), Tomasz Kozlowski (NPRE), Christopher Tessum (CEE), Meredith Blumthal (ACE), Maryalice Wu (CITL) Liaison: S. Lance Cooper

Enabling the Learning and Practice of Effective Teamwork Behaviors Using Cross-Tool Log Data (Year 1)

This project will ensure every graduate of the Grainger College of Engineering learns the necessary skills to become a successful team player in industry. Teamwork is important in engineering classrooms to satisfy industry demand for proficient team players and harness the pedagogical benefits of collaborative learning, and the team plans to leverage log data captured by digital collaborative tools to enable students to view, compare, and reflect on their teamwork behaviors using visual evidence and support instructors to diagnose and provide evidence-based feedback for improved teamwork at scale.

Brian Bailey (CS), Darko Marinov (CS), Emma Mercier (Curriculum and Instruction), Hari Sundaram (CS), Wendy Shi (CS), Yifan Song (CS) Liaison: Ashlynn Stillwell

Designing a New CS1 Course for Engineering Students (Year 1)

This project will launch a comprehensive redesign of CS 101, focusing on re-establishing basic programming fundamentals (CS1) during lectures while integrating diverse engineering applications into lab sections and bi-weekly mini-projects to improve the rigor and relevance of the course for all students.
Mattox Beckman (CS), Mariana Silva (CS), Sotiria Koloutsou-Vakakis (CEE), Haidi Meidani (CEE), Wayne Change (AE), Brian Mercer (MechSE), Ke Tang (MechSE) Liaison: Rebecca Reck

SIIP and Share: Podcasts to Connect to Engineers to Grainger COE (Year 1)

This team will convene a faculty community of practice to advance excellence in teaching methods through a podcasting (digital storytelling) medium. The team plans to establish a Grainger COE-based podcast that engages Grainger community members (faculty, staff and students) to share best practices.
Holly Golecki (BioE), Ashleigh WRight (IDEA Institute), Saadeddine Shehab (Siebel Center for Design), Wayne Chang (AE), Blake Johnson (MechSE), Ramez Hajj (CEE), Colleen King (Journalism, College of Media) Liaison: Chris Migotsky

Incorporating Entrepreneurial Mindset into Circuits Curriculum(Year 1)

This project will incorporate Entrepreneurial Mindset (EM) based methodology across the curriculum that uses circuit concepts both in the Department of Electrical and Computer Engineering as well as the Department of Mechanical Engineering. The project goal is to enable students to go beyond problem solving, and develop a creative mindset. This project will bring instructors together to create modules, activities, demonstrations, and reflection exercises that will make students curious, help them connect knowledge gathered from different courses, and create an aspiration for lifelong learning.
Chandrasekhar Radhakrishnan (ECE), Chris Schmitz (ECE), Arjit Banerjee (ECE), Jonathon Schuh (ECE), Olga Mironenko (ECE), Nenad Milijkovic (MechSE) Liaison: Rebecca Reck)

Automatic Short Answer Grading at Scale Using Large Language Models (Year 1)

This project supports the development and integration of a scalable ASAG system into the PrairieLearn platform, initially targeting a diverse array of disciplines. The team hopes to enable instructors, irrespective of their familiarity with LLM technology, to utilize our ASAG system for grading free-form textual short answers. The system will leverage pretrained models such as OpenAI's GPT variants, as well as specialized locally trained models, to provide accurate, fair, and timely feedback on student submissions.
Mariana Silva (CS), Matthew West (MechSE), Jeff Erickson (CS), Yael Gertner (CS), Seth Poulsen (USU), Firas Moosvi (UBC) Liaison: Chandrasekhar Radhakrishnan

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

This team will develop a set of VR immersive experiences within structural systems and reinforced concrete modules with design options and consequences. This proposal builds on three years of work by the PIs on VR to now better support students' curiosity and ability to make connections and create value through learning experiences in VR modules.
Ann Sychterz (CEE), Marci Uihlein (Architecture), Jacob Henschen (CEE), Eric Shaffer (CS), Mohamad Alipour (CEE) Liaison: Olga Mironenko

Startup Track

Highlighting Connections Between Undergraduate Engineering Courses for Interdisciplinary Education

This team's goal is to improve students' interdisciplinary problem solving skills by highlighting the dense web of connections between courses across Grainger, noting that courses across disciplines rely on very similar concepts, tools, applications, methods, learning objectives, etc. The project will make these or connections across the engineering curriculum more widely known, discussed, and highlighted by faculty.
Ke Tang (MechSE), Tom Golecki (MechSE), Molly Goldstein (ISE), Jenny Amos (BioE), Jacob Henschen (CEE), Matthew Goodman (MatSE), Jason Merret (AE), Ashley Hallock (Grainger UPO) Liaison: Abdu Alawini

*Funded by a grant from the Kern Family Foundation