2020-21 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

Remote testing with PrairieLearn
This team is adding new functionality to PrairieLearn to better support remote learning (instructor and student support, security, provision of resources), to scale to more courses, and to support large course staff and instructor communities.

Tim Bretl (AE), Geoffrey Herman (CS), Craig Zilles (CS), Mariana Silva (CS), Dave Musselman (Eng IT), Matt West (MechSE)

Revising the CS Introductory Programming Sequence
This team will propose curricular changes, including the addition of two newly restructured courses, to improve the CS introductory programming sequence.

Geoffrey Challen (CS), G. Carl Evans (CS), Margaret Fleck (CS), Michael Nowak (CS), Michael Woodley (CS), Craig Zilles (CS)

Cross-Engineering Course Assessment Model for Engineering Mechanics Courses
This team aims to improve engineering student learning experience and academic performance by developing tools that foster continuity between engineering courses in the engineering mechanics series.

Wayne Chang (MechSE), Randy Ewoldt (MechSE), Brian Mercer (MechSE)

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.

Yuting Chen (ECE), Zuafu Cheng (ECE), Kirill Levchenko (ECE), Ujjal Bhowmik (ECE)

Improving Undergraduate Writing Instruction and Feedback through Professional Development of STEM Graduate-Student Teaching Assistants
This team will develop 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. The team will also assess the impacts of the course.

S. Lance Cooper (Phys), Celia Elliott (Phys), John Gallagher (English), Blake Johnson (MechSE), John Popovics CEE), Paul Prior (English), Julie Zilles (Crop Sciences)

Interdisciplinary Methods for Research Computing: A Course for New Researchers
This team will create a pilot course covering computational research skills for researchers across many disciplines.

Neal Davis (CS), Jake Bowers (PS/Statistics), André Schleife (MatSE), Rich Sowers (ISE), Elizabeth Wickes (Information Sciences)

Early Instruction in Linear Algebra and Computational Tools in the Curricula of CS, MechSE, and the College of 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 (MechSE), Philipp Hieronymi (Mathematics), Luke Olson (CS), Mariana Silva (CS), Matthew West (MechSE)

Learning by Immersion: Creating Virtual Reality Labs for Electromagnetism Courses
This team will 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), Erhan Kudeki (ECE), Cynthia D'Angelo (Educational Psychology)

PrairieLearn and Course Redesign for Core CEE Intro Sequence
This team will 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)

Peer Mentorship via Undergraduate Learning Assistants in PHYS100 Discussion Sections
This team will introduce 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)
ENGaGement In eNgineering Education (or 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), Cheelan Bo-Linn (CITL), Justin Aronoff (Speech & Hearing Sci), Robert Baird (CITL), Tim Hale (Kinesiology & Community Health), Katherine LaBore (Library), H. Chad Lane (Educational Psych), Brian Mercer (MechSE), Alex Pagana (MechSE), Shelly J. Schmidt (FSHN), Saad Shehab (ScD), Ava Wolf (CITL), Taylor Tucker

Understanding the Needs and Learning Pathways of Students with Disabilities
This team will identify potential course improvement opportunities to help students with disabilities. Inspired by the Universal Design for Learning 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 communications.
*Hongye Liu (CS), Jenny Amos (BioE), Lawrence Angrave (CS)

Facilitating Adoption of Collaborative Activities using Computer-Based Tools
This team will 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), Mattox Beckman (CS), David Mussulman (EngIT), Jenny Amos (BioE), Geoffrey Herman (CS), Karin Jensen (BioE), Eric Shaffer (CS), Andre Schleife (MatSE)

Developing Intervention Methods that Improve Visuospatial Skills of Engineering Students
This team is developing computerized training modules to enhance students’ visuospatial skills to be implemented in three large engineering design courses.
*Brian Woodard (AE), Gretchen Forman (GFX), Molly Goldstein (ISE), Julia Loystrom-Woodard (AE), Tiffany Li (CS), Michael Philpott (MechSE), Angie Wolters (WIE), Ziang Xiao (CS)

Improving the Writing Skills of Undergraduate Engineering Students: Empowering Engineering Faculty and Teaching Assistants*
This team has built 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 (CEE), John Gallagher (English), Bruce Kovanen (English), Megan Mericle (English), Paul Prior (English), Nicole Turnipseed (English), Ryan Ware (English), S. Lance Cooper (Phys), Celia Elliott (Phys), Julie Zilles (Crop Sciences), Patrick Coleman (Phys)

iELITE TA Training SIIP Final Report*
This team continues to teach a course to prepare graduate students in Grainger Engineering for their instructional and leadership responsibilities.
*Mattox Beckman (CS), Yuting Chen (ECE), Blake Johnson (MechSE)

*Teams in SIIP community after completing standard funding.

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2019-20 Strategic Instructional Innovations Program
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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.
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.

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.

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.

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 courses, 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.

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.

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.

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.

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.

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.

Designing: Integrated MechSE 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 Flachsbart, 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.

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
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 curriculum 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-Weckslers (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-Weckslers, 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.

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**2017–18 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**

**A Project-Based Introduction to Aerospace Engineering**
This project is the beginning of an effort to implement project-based learning and student portfolios across the curriculum. Initial changes are in AE100 (Introduction to Aerospace Engineering).

Brian Woodard (PI), Tim Bretl, Phillip Ansell, Laura Gerhold. Liaison: Jeff Erickson

**Improving Student Learning Experiences through Algorithmic Methods of Team Formation in Large Engineering Courses**
The vision of this project is to integrate, study, sustain, and champion the use of a criterion-based algorithmic method for organizing students into effective teams in large project-based engineering courses. The CATME software tool will provide the team formation testbed.

Brian Bailey (PI), Darko Marinov, Ranjitha Kumar, Wai-Tat Fu, Karrie Karahalios (CS). Liaison: Elif Ertekin

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

Tim Bretl (AeroE) (PI), Jenny Amos (BioE), Geoffrey Herman, Mariana Silva, Craig Zilles (CS), Dave Mussulman (Engr IT), Tim Stelzer (Physics), Dallas Trinkle (MatSE), Matt West (MechSE). Liaison: Jeff Roesler

**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 Towfick (MechSE) (PI), Brian Bailey (CS), Eric Benson (Art & Design). Liaison: Elif Ertekin

**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.

Jonathan Makela (ECE), Grace Giorgio, Ann Bryan, Katie Bruner (Communications), Steve Zahos (ABE), Kelly Cross (BioE), Blake Johnson (MechSE). Liaison: Jeff Erickson

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This project aims to encompass and 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-Weckslers (PI), Alison Dunn, Bruce Flachsbart, Emad Jassim, Blake Johnson, Seok Kim, Ralf Moller, Hae-Won Park, Michael Philpott, Sam Towfick, Almy Wissa. Liaison: Geoffrey Herman

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**Developing Instruction in Technical Writing for Freshman Engineering Students through ILEE**
This team is developing a co-taught writing-in-the-discipline course for first-year engineering students and relevant
**Improving the Writing Skills of Undergraduate Engineering Students: Empowering Engineering Faculty and Teaching Assistants**

This team is developing and implementing a writing-across-the-curriculum program for Engineering faculty, and preparing an NSF proposal on integrating writing across the engineering curricula. 

*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: Jenny Amos*

**Teaching Assistant Training: Engineering Leadership Initiative for Teaching Enhancement (ELITE)**

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

*Yuting Chen (ECE), Matthew Goodman (MatSE), Blake Johnson (MechSE), Mattox Beckman (CS) (co-PIs), Lucas Anderson and Hannah Choi (Center for Innovation in Teaching and Learning, Chris Migotsky (AE3). Liaison: Brian Bailey*

**Developing Intervention Methods that 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, Yuqi Yao, Xu Zhe (CS), Jim Leake (ISE), Brian Woodard (AeroE), Angie Wolters (Women in Engineering); Mike Philpott (MechSE). Liaison: Jeff Erickson*

**TAM 210/211/212/251**

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

**Creativity, Innovation, and Vision: Online Course Development**

This team is creating modules and materials for an online course on creativity. 

*Bruce Elliott-Litchfield (ABE and TEC) (PI), Esteban Gast, Keilin Deahl, Marianne Alleyne, Arif Nelson. Liaison: Brian Bailey*

**Start-Up Track**

**Physics 213 and 214 Data Gathering and Improvement**

The objective of this proposal is to focus PHYS 213 (Thermal Physics) and 214 (Quantum Physics) on core concepts to better prepare engineers for classes that depend on them. 

*Lucas Wagner (PI), Bryce Gadway, Taylor Hughes, Paul Kwiat (Physics). Liaison: Jonathan Makela*

**Open-Source Curriculum Development**

The purpose of this project is to explore the possibility that curriculum development for university courses can operate as well as open-source software development does. Faculty will develop and share materials on GitHub. 

*Katy Huff (NPRE) (PI), Neal Davis (CS), colleagues across the country. Liaison: Jenny Amos*

**Adaptation Track**

**Providing Bi-weekly Assessments with Retake Utilizing the Computer-Based Testing Facility in Physics 100**

This project aims to improve the performance of students taking physics 100 by providing them with more frequent exams, including the opportunity to retake an exam to improve their score, and to evaluate the impact of these changes. 

*Tim Stelzer (PI), Morten Lundsgaard, Gary Gladding, Brianne Guttmann (Physics. Collaborator: Matt West*

*Implementation & Exploration teams choosing to stay in SIIP community after completing standard three years of funding.*
2015-16 SIIP Teams

Reforming ISE’s Stochastics Sequence: IE300, IE400, IE410, IE413
This project focuses on integrating a computational component and challenging, data-driven case studies to advance the critical and creative thinking of students in these courses.
Alexandra Chronopoulou, Runhuan Feng, Doug King, Justin Sirignano, Richard Sowers. Consultant: Dallas Trinkle

A Project-Based Introduction to Aerospace Engineering
This project is the beginning of an effort to implement project-based learning and student portfolios across the curriculum. Initial changes are in AE100 (Introduction to Aerospace Engineering).
Brian Woodard, Tim Bretl, Phillip Ansell, Vicki Coverstone, Steve D’Urso, Laura Gerhold. Consultant: Jenny Amos

Creativity, Innovation, and Vision: Online course development
This team is creating modules and materials for an online course on creativity.
Bruce Elliott-Litchfield, Esteban Gast, Keilin Deahl, Marianne Alleyne. Consultant: Jose Mestre

Optimizing Collaborative Team Formation and Learning of Team Skills in Project-Based Engineering Courses
The vision of this project is to integrate, study, sustain, and champion the use of a criterion-based algorithmic method for organizing students into effective teams in large project-based engineering courses. The CATME software tool will provide the team formation testbed.
Brian Bailey, Darko Marinov, Tao Xie, Ranjitha Kumar, Wai-Tat Fu, Karrie Karahalios. Consultant: Luke Olson

Adaptive Learning (PrairieLearn)
This project aims to project an Algorithmic Adaptive Learning (AAL) system. This in a computer-mediated learning environment that adapts to a student’s performance, giving weaker students the support they need while challenging stronger students with engaging material at an appropriate level.

CEE398PBL: Project-Based Learning in CEE
This project continues the development of CEE 398, a project-based learning course that develops critical thinking and engineering problem solving skills by identifying and proposing solutions to current civil and/or environmental engineering problems facing the University of Illinois campus community.
Jeffery Roesler (CEE), Bill Cope (EPOL), Arthur Schmidt (CEE), Lance Schideman (ABE), Morgan Johnston (F&S). Consultant: Jenny Amos

Computer-based Testing Facility (CS)
This project is focused on designing and implementing a computerized testing facility to improve the quality of assessment in large courses. Infrastructure includes web-based exam sign-up, random student seat assignment, icard scanning proctor station, PrairieLearn compatibility, and automatic grading.
Craig Zilles, Brian Bailey, Wade Fagen, Bill Chapman. Consultant: Dallas Trinkle
Improving Students’ Learning and Experience in ECE 110 and ECE 120
This project focuses on re-designing methods and materials for a large, introductory ECE class. The team will execute research-based instructional strategies to develop a community of instructors who agree on the metrics and goals of the course. Through this course revision, the project aims to excite students about the breadth and scope of ECE. Geoffrey Herman, Chris Schmitz, David Varodayan, Serge Minin, Lynford Goddard, Michael Loui, Erhan Kudeki, Patricia Franke, Hyungsoo Choi. Consultant: Cinda Heeren

MatSE Curriculum Reform
This project aims to reform the Material Science and Engineering undergraduate curriculum by integrating computational materials modeling in sophomore and junior-level core courses, by developing a capstone senior materials modeling elective, and by recording and disseminating course content online. Dallas R. Trinkle, Andrew Ferguson, Cecilia Leal, André Schleife, Kris Kilian, Shen Dillon. Consultant: Matt West

iDesign: Integrated MechSE Design Curriculum
This project aims to encompass and 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-Wecksler, Steven Downing, Alison Dunn, Bruce Flachsbart, Emad Jassim, Blake Johnson, Seok Kim, Michael Philpott, Sameh Tawfick, Aimy Wissa. Consultant: Scott Carney

Physics 211-212: Improving Test Performance for Struggling Students
This project studies the best methods for providing students with an accurate assessment of their understanding, as well as appropriate materials to improve their understanding. This project includes data analysis from previous years’ work, the development of mastery exercises for Physics 100, and the development of an assessment question database for Physics 211 and 212. Gary Gladding, Jose Mestre, Mats Selen, and Tim Stelzer. Consultant: Jose Mestre

(BioE Cancer Scholars) Challenge-inspired Learning: A Flipped Apprenticeship Model for Education In this project, cohorts of undergraduate student scholars complete activities centered on cancer research to stimulate purpose-inspired learning. The scholars’ activities include taking classes, meeting with a faculty mentor, conducting research, and participating in clinical immersion. Rohit Bhargava, P. Scott Carney, Andrew Smith, Dipanjan Pan, Marcia Pool. Consultant: Brian Bailey

TAM 210/211/212/251
This project focuses on the gateway TAM mechanics classes, which serve approximately 2500
student-enrollments per year. This project has applied state-of-the-art pedagogical and technology solutions to improve student engagement and enthusiasm. The current work is focused on ensuring the sustainability of the implemented changes.

Matt West, Geir Dullerud, Elif Ertekin, Randy Ewoldt, Blake Johnson, Mariana Kersh, Mariana Silva Sohn, Dan Tortorelli. Consultant: Brian Bailey

2014-2015 College of Engineering SIIP Projects

First-year recipients

This project will conduct a pilot study on the use of a computerized testing facility to improve the quality of assessment in large computer science courses.

This project focuses on re-designing methods and materials for a large, introductory ECE class. The team will execute research-based instructional strategies to develop a community of instructors who agree on the metrics and goals of the course. Through this course revision, the project aims to excite students about the breadth and scope of ECE.

This project aims to reform the Material Science and Engineering (MatSE) undergraduate curriculum by integrating computational materials modeling in sophomore and junior-level core courses, by developing a capstone senior materials modeling elective, and by recording and disseminating course content online.

This project will create a scholars program within the Bioengineering Department. The undergraduate student scholars will complete activities centered on cancer research to stimulate purpose-inspired learning. The scholars’ activities include taking classes, meeting with a faculty mentor, conducting research, and participating in clinical immersion.

This project aims to create a minor and certificate program with the goal of providing experiential learning in global technology development in order to create global citizens with strong technical skills.

Second-year recipients

ADAPTIVE LEARNING: Matt West, Geir Dullerud, Sewoong Oh, Craig Zilles. Consultant: Geoffrey Herman
This project is creating a computer-mediated learning environment that adapts to student performance, giving weaker students the support they need while challenge stronger students with engaging material at an appropriate level.

This project continues the development of CEE 398, a project-based learning course that develops critical thinking and engineering problem solving skills by identifying and proposing solutions to current civil and/or environmental engineering problems facing the University of Illinois campus community.

EXTENDING THE CURRICULUM CONTENT OF AN EXISTING SKETCH RECOGNITION TUTORING SYSTEM WITH IMMEDIATE FEEDBACK TO ENGAGE CROSS-DISCIPLINARILY: Joshua Peschel, Cassandra Rutherford, Megan Konar. Consultant: Geoffrey Herman.
This project will expand the curriculum content of an existing sketch recognition tutoring system to engage cross-disciplinary instructors in the areas of fluid and soil mechanics. The work includes building a corpus of sketch-based content and developing a set of effective-use and best practices recommendations for instructors.

This project brings hands-on design experience to undergraduate mechanical design classes. It aims to make the hands-on student experience a sustainable course change by creating a separate website of resources for instructors.

Third-year recipients

This project studies the best methods for providing students with an accurate assessment of their understanding, as well as appropriate materials to improve their understanding. This project includes data analysis from previous years’ work, the development of mastery exercises for Physics 100, and the development of an assessment question database for Physics 211 and 212.

TAM 210/211/212/251: Matt West, Geir Dullerud, Elif Ertekin, Randy Ewoldt, Blake Johnson, Mariana Silva Sohn, Dan Tortorelli. Consultant: Luke Olson. This project focuses on the gateway TAM mechanics classes, which serve approximately 2500 student-enrollments per year. This project has applied state-of-the-art pedagogical and technology solutions to improve student engagement and enthusiasm. The current work is focused on ensuring the sustainability of the implemented changes.