

# Ph.D. in Engineering Education Systems and Design (EESD)

Arizona State University



We are risk takers, entrepreneurs, makers, and scholars: **join our ecosystem of innovation.**

[engineering.asu.edu/eesd](http://engineering.asu.edu/eesd)

## Institute for STEM and Diversity Initiatives

- Advocating for and nurturing underrepresented student and faculty success inside and beyond the classroom
- Conducting and catalyzing STEM educational research

## IDoTeach

- Incorporating engineering in a pre-service STEM teacher education program
- Developing a streamlined engineering degree pathway to facilitate undergraduate engineering majors teaching in the K-12 classroom

## Multi-disciplinary B.S. Engineering Degree (new)

## NSF Funded STEM Education Projects

- WIDER, REUs, RETs, S-STEMs, IUSe:RED Site – Computer Science Professionals Hatchery



# Engineering and Science Education PhD and Certificate programs



- The Clemson Department of Engineering and Science Education offers a unique experience with engineering education research and science education research in one program.
- Our learning community provides strong mentoring, colleagues passionate about their research, and engagement with projects encompassing social capital, motivation, mathematical success, retention, self-efficacy, international experiences, and sustainability education.

Contact [ESEGradinquiries@Clemson.edu](mailto:ESEGradinquiries@Clemson.edu) or  
[LC@Clemson.edu](mailto:LC@Clemson.edu)





## A new approach to engineering education scholarship – UGA's innovation-research ecosystem

- **Cross-cutting** – 50 members from 3 schools and 15 degree programs
- **Community and shared capacity** – leverages core ENED research strengths
- **Focus on people and impact** – collaboration of practitioners, innovators, and researchers
- **Interdisciplinary** – Cutting edge interdisciplinary and interprofessional approaches

### EETI Leadership Team



Jo Walther



Nicki Sochacka

### EETI New Faculty hires



Nathaniel Hunsu



Dominik May

The home of...



Coming soon...

- PhD in “**Engineering Studies and Transformative Practice**” offered through EETI



Discovery Research K-12  
Award #0822241, 2009-2014



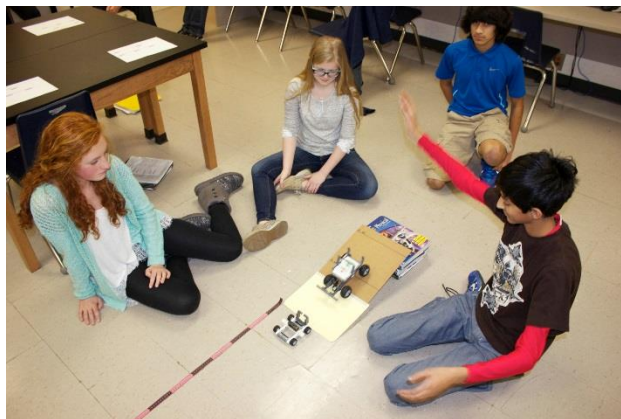
## Georgia Tech's Center for Education Integrating Science, Mathematics & Computing (CEISMC)

*PI: Dr. Marion Usselman*

**SLIDER integrates project-based inquiry  
learning and robotics into two middle  
school physical science unit:**

*The Accident Challenge: Energy*

*The Braking Challenge: Force & Motion*



Aligns with NGSS  
Disciplinary Core Ideas &  
Practices



Uses engineering challenges  
to engage and support  
student learning



Emphasizes evidence-based  
decision-making and  
argumentation



Features LEGO robotic kits to  
drive design and engagement

**[www.slider.gatech.edu](http://www.slider.gatech.edu)**

Research & Curriculum  
Available at Our Site



## PH.D. ENGINEERING - ENGINEERING EDUCATION CONCENTRATION

## PH.D. COMPUTATIONAL ANALYSIS AND MODELING

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### **Director:**

Katie Evans – Mathematics and Statistics

### **Associate Directors:**

Marisa Orr – Mechanical Engineering

Galen Turner – Mathematics and Statistics

### **Engineering Education Concentration Director:**

Kelly Crittenden – Mechanical Engineering

### **ISERC Members:**

Mitzi Desselles – Psychology and Behavioral Sciences

Jean Gourd – Computer Science, Cyber Engineering

David Hall – Mechanical Engineering

Kathleen Johnston – Physics

Patrick O'Neal – Biomedical Engineering

Michael Swanbom – Mechanical Engineering

Heath Tims – Mechanical Engineering



**Katie Evans**



**Marisa Orr**



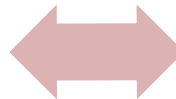
**Michael  
Swanbom**

UNIVERSITY OF  
**LOUISVILLE**

# J.B. Speed School of Engineering @ University of Louisville



**Center for Teaching  
and Learning  
Engineering**



**Engineering  
Education Research  
Group**



## Centre for Engineering Education (CEE) Universiti Teknologi Malaysia (UTM)

### Activities of CEE

- Rigorous research in engineering education – grants, collaborations, publications, & PhD program
- Training on innovative T&L, and conducting research in engineering education → mentoring champions
- Host conferences, workshops, and Innovative Practices in Higher Education Expo (IPHEX)

*Transforming engineering education through innovative evidence-based practices*

- Focus on training and research in Engineering Education
- PhD in Engineering Education program
  - Started in 2008
  - Up till now, 13 students completed PhD
  - Current enrolment: 40 students
- Also: Joint PhD in Engineering Education with Aalborg University, Denmark
- Post-doctoral and faculty position available



### Contact:

[khairiyah@cheme.utm.my](mailto:khairiyah@cheme.utm.my)

<http://tree.utm.my>





# CREATE for STEM Institute

[create4stem.msu.edu](http://create4stem.msu.edu)

Mark Urban-Lurain

Associate Director, Engineering Education

[urban@msu.edu](mailto:urban@msu.edu)

- **C**ollaborative **R**esearch in **E**ducation, **A**ssessment and **T**eaching **E**nvironments for the fields of **S**cience, **T**echnology, **E**ngineering and **M**athematics
- Goal: improve STEM teaching and learning from grades K-16 through interdisciplinary research and development
- Research Areas:
  - Creating and Investigating Change in K-16 STEM Education
  - Educational Policy in STEM fields
  - Discipline-Based Undergraduate STEM Education
  - Developing Innovative and Digital Materials
  - International Engagement with the Global STEM Education Community



## Ph.D. and M.S. in Engineering Education Research just approved at University of Michigan!

College-wide programs  
in UM's graduate school

B.S. and M.S. in engineering  
required for admissions

Applications accepted  
starting Fall 2017

First students enroll  
in Fall 2018

**Multiple openings for postdocs, teaching fellows, and research assistants - email us**



**Shanna Daly**

Mechanical  
Engineering



**Cindy Finelli**

Electrical Engineering &  
Computer Science; Education



**Aileen Huang-Saad**

Biomedical  
Engineering



**Lisa Lattuca**

Education; Integrative  
Systems & Design



**Joi Mondisa**

Industrial & Operations  
Engineering

### Research interests

Design & creativity

Idea generation

Returning  
students

Teaching & learning

Classroom design

Innovative technology  
in the classroom

Engineering  
entrepreneurship  
education

Instructional change in  
biomedical engineering

Teaching & learning

Curriculum design  
& assessment

Interdisciplinarity

Mentoring &  
underrepresented  
populations

Resilience, grit, &  
persistence



# Department of Engineering Education



## Faculty News

- 2016 Hires: Assistant Professors David Delaine & Rachel Kajfez
- 2017 Hires: Assistant Professor Emily Dringenberg, Assistant Professors of Practice Xiaofeng Tang & Krista Kecskemety, Professor Jeff Froyd

## Graduate Education

- Anticipated approval of Engineering Education PhD Program, 2017

Contact: Dr. Ann Christy, Graduate Chair, Professor [christy.14@osu.edu](mailto:christy.14@osu.edu)

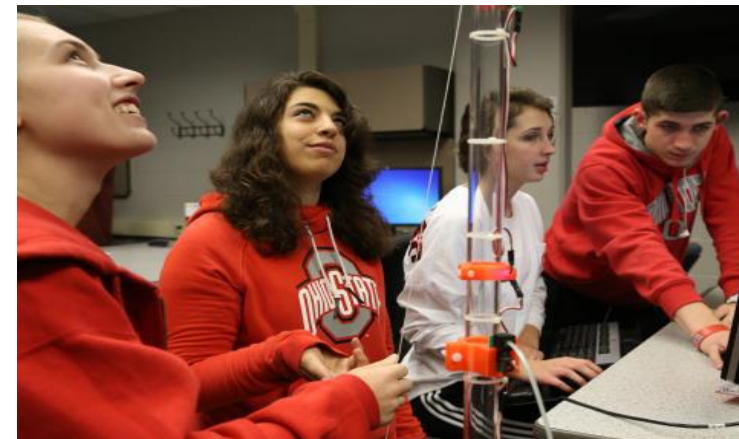
Dr. Monica F. Cox, Department Chair, Professor [cox.1192@osu.edu](mailto:cox.1192@osu.edu)

## Undergraduate

- First-Year Engineering Program (2300 students)
- Multidisciplinary Capstone
- Engineering Technical Communication
- Integrated Business and Engineering 4-year program
- Engineering Sciences Minor

Contact: Dr. Lisa Abrams, Associate Chair

[abrams.34@osu.edu](mailto:abrams.34@osu.edu)



Find us at <https://eed.osu.edu/>  
Twitter & Instagram: @OhioStU\_EED



# The Leonhard Center for the Enhancement of Engineering Education

*25 years of Excellence in Engineering Education*

## Mission

- Catalyze and support innovative teaching, learning, and assessment to ensure that Penn State delivers world-class engineering education
- Develop and disseminate innovative approaches to address challenges faced by engineering undergraduates, graduate students, staff, and faculty

## Current strategic focus areas

1. Enhancing ethics education for graduate and undergraduate students
2. Evidence-based strategies to increase engagement
3. Assessment of learning environment
4. Elevating writing and presenting skills of graduate and undergraduate students



**For more information:**

Contact Tom Litzinger at [tal2@psu.edu](mailto:tal2@psu.edu) or visit [www.engr.psu.edu/leonhardcenter](http://www.engr.psu.edu/leonhardcenter)



Tom Litzinger  
*Center Director*



Michael Alley  
*Director, Engineering Communications*



Sarah Zappe  
*Director, Assessment & Instructional Support*



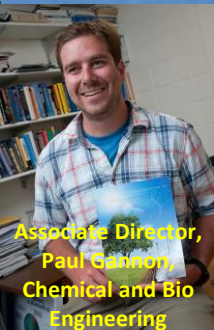
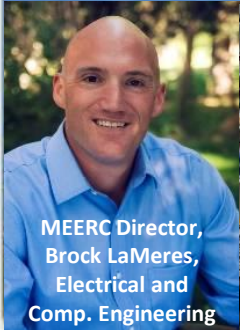
Stephanie Cutler  
*Assessment & Instructional Support Specialist*



**PennState**  
College of Engineering

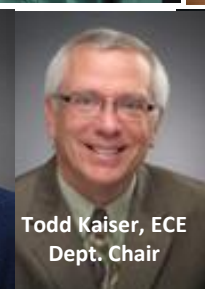
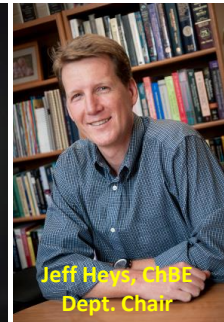
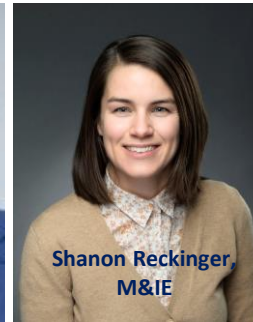
# Welcome to Montana State University

Bozeman, Montana



[www.montana.edu/meerc](http://www.montana.edu/meerc) – [meerc@montana.edu](mailto:meerc@montana.edu)

## 2017 Montana Engineering Education Research Center Affiliates:







# ENGINEERING EDUCATION RESEARCH CENTER

*A Center of the Swanson School of Engineering*

PROFESSIONAL DEVELOPMENT  
ENGINEERING ED COMMUNITY

[WHO WE ARE](#)[WHAT WE DO](#)[RESEARCH](#)[CONNECTIONS](#)[EVENTS/NEWS](#)

## Advance Engineering Education through Research

The Engineering Education Research Center was established in 2011 to expand engineering education research and produce new approaches to learning that engage students.

### Upcoming Events

[+ VIEW DETAILS](#)  
[+ REGISTER NOW](#)

#### Workshop: How to Engineer Engineering Education (July 13, 2016)

07-13-2016 | 8:30 AM | TBD

A little overview of Mike Prince and the workshop... Mike is a professor of Chemical Engineering at ... [Learn more](#)

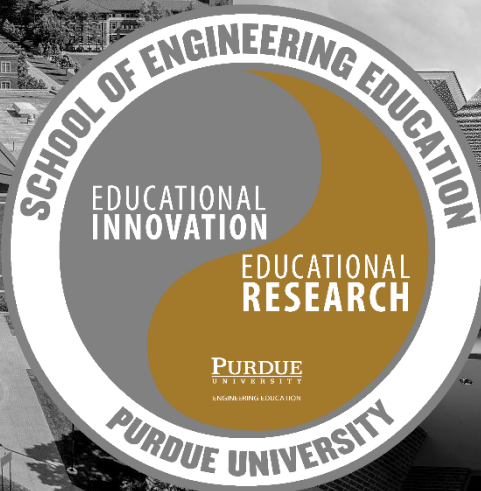
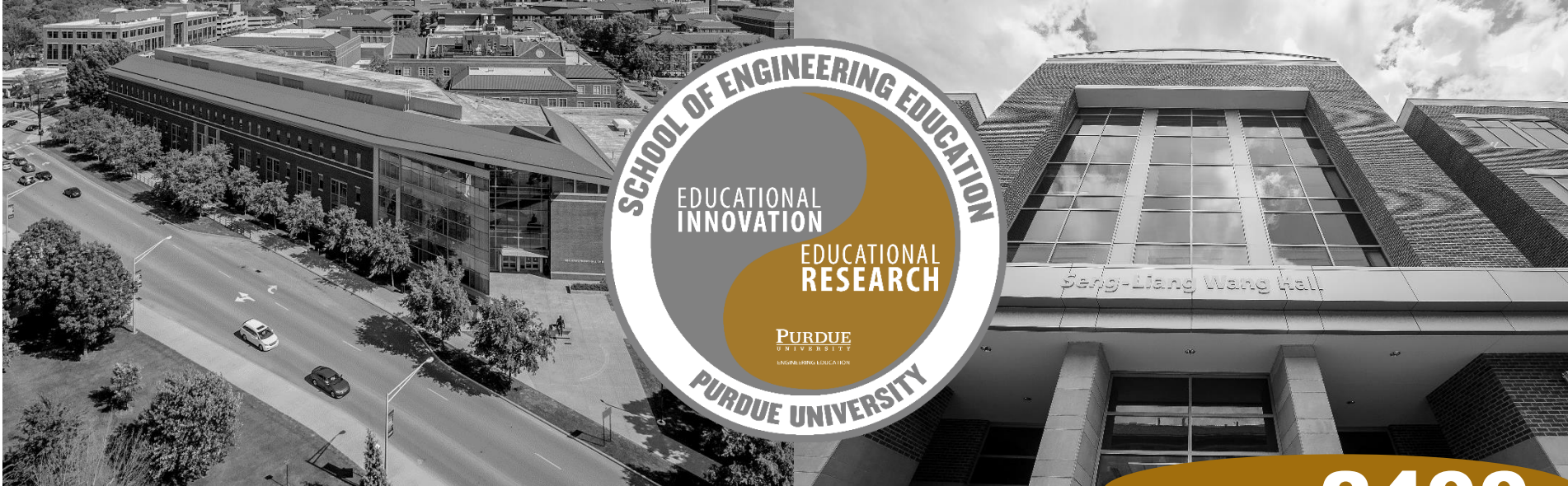
[+ VIEW DETAILS](#)  
[+ REGISTER NOW](#)

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**PROGRAMS and OPERATIONS**

- First-Year Engineering Program
- Graduate Program (MS & PhD)
- Multidisciplinary Engineering Degree Program
- INSPIRE Pre-College Engineering Research
- Student Advising
- Graduate Certificate (New 2016)
- Integrated Research Labs
- Ideas To Innovation Learning Labs

**COLLABORATIONS**

- Chemical Engineering
- Electrical and Computer Engineering
- Environmental and Ecological Engineering
- Materials Engineering
- Mechanical Engineering
- College of Education

**INTEGRATING RESEARCH AND PRACTICE**



**~2400**

**20** A/P STAFF

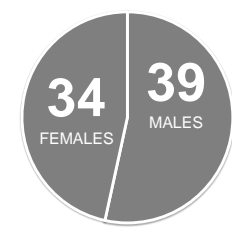
**2** ADMIN ASSISTANTS

**4** SECRETARIES

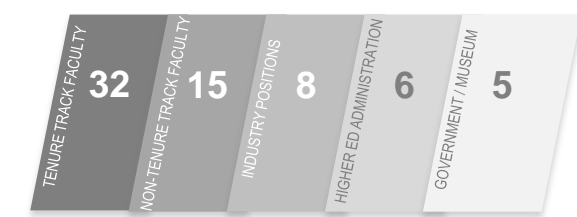
**71** FIRST-YEAR ENGINEERING STUDENTS

**71** MULTIDISCIPLINARY ENGINEERING STUDENTS

**73** PHD STUDENTS



**82** PHD ALUMNI



2017-2018 AY



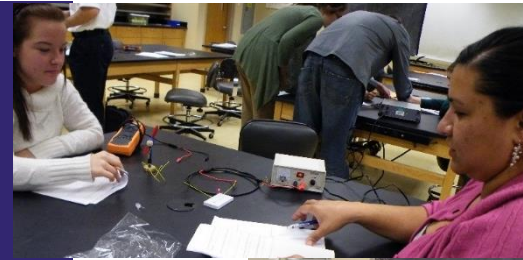
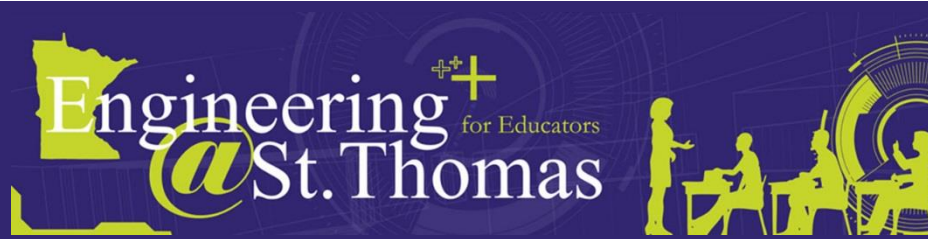
# Center for the Practice and Scholarship of Education

**Improving engineering education by:**

- ✓ **supporting faculty working to improve student learning and enhance instructional effectiveness**
- ✓ **assisting faculty engaged in educational scholarship and assessment**
- ✓ **facilitating the sharing of ideas and practices within the Institute and the larger educational community,**
- ✓ **promoting faculty development nationwide through the Making Academic Change Happen workshop (MACH)**







The Center for Engineering Education (CEE) is a partnership between the **University of St. Thomas' Schools of Engineering and Education**

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The **UST Center for Engineering Education** offers:

- a **graduate certificate** in Engineering Education
  - an **undergraduate minor** in Engineering Education
  - professional development **workshops**
- 

The mission of CEE is to prepare future and current P-12 educators to teach **integrated STEM education with an engineering focus.**



<http://www.stthomas.edu/cee/>

Director: Dr. AnnMarie Thomas [aphomas@stthomas.edu](mailto:aphomas@stthomas.edu)



# The LBJ Institute for STEM Education & Research



LBJ INSTITUTE FOR  
STEM EDUCATION AND RESEARCH

## Leadership Team



Araceli Martinez Ortiz, Ph.D.  
Executive Director



V. Sriraman, D.E.  
Associate Director



Leslie Huling, Ed.D.  
Senior Advisor



John Beck, Ph.D.  
Senior Advisor



Laura Rodriguez Amaya, Ph.D.  
Research Faculty



Stacey Bennett  
Research Coordinator



Karen Fabac  
Grant Specialist



Edgar Gomez  
System Support Analyst



Sara Torres  
Ed Research Consultant

## Senior Research Fellows



Eleanor Close, Ed.D.  
Research Co-Director



Kimberly Talley, Ph.D., P.E.  
Maker Space Co-Director



Debra Feakes, Ph.D.



Mina Guirguis, Ph.D.



Clara Novoa, Ph.D.



Susan Morey, Ph.D.



M. Alejandra Sorto, Ph.D.



Austin Talley, Ph.D.



Bahram Aslambanpour, Ph.D.

## Over \$22M in Research Grant Funds awarded 2014-2019



\$15M for 5 Years/2015-2020

PI: A. Martinez Ortiz

Co-I's: L. Huling,  
Aslambanpour, Bos, Close, Jensen, Lee, Sorto, Sriraman

### Partners:

California State University- Northridge  
Norfolk State University,  
North Carolina Central University,  
Penn State University-Center for Online  
Innovation in Learning, Salish-Kootenai College,  
University of South Florida, & U.S. Satellite.

- A national, diversity-focused professional development system that leverages NASA assets and resources to support Educator excellence in STEM Education.

- EPDC provides a multitude of face-to-face and online professional development opportunities and NASA resources for educators in K-12, university, and community settings.

- The key PD experts who deliver this training are 10 Educator Specialists located at 10 NASA Space Research Centers.

### The STEM Teacher Excellence Project (STEP) [NASA MEI]

\$2.9M for 3 Years/2015-2018

PI: L. Huling/ Co-I: A. Martinez Ortiz

### Partners:

10 NASA Centers/ 10 Educator Specialists

- Program will offer one-week Institutes to pre-service and alternate route STEM teachers at each of the 10 NASA Centers beginning in 2016 to serve a minimum of 50 participants who will be recruited from Minority Service Institutions (MSIs) from around the country.

- Collectively over the 3 years of the project, the 30 NASA STEP Institutes will provide a minimum of 1500 STEM educators with a series of content-rich NASA professional learning experiences and will impact all 10 NASA Centers across the U.S. Research Efforts will follow.

### Future Aerospace-Engineers and Mathematicians Academy (FAMA) [NASA MAA]

- (FAMA) program offers early space-based STEM learning experiences for upper elementary and middle school students [ summer pre-engineering camps], family outreach [ with bilingual resources] , and professional development for pre-service teachers.



An Aerospace Education Laboratory (AEL) will be established at Centro and equipped with computers, laptops, cellular-based devices and educational robotics kits to enhance the technological literacy development of program students.

\$400k for 3 Years/2015-2018

PI: A. Martinez Ortiz

Co-I: L. Rodriguez, H. Warshawer & A. Sorto

### Partners:

San Marcos Consolidated Independent School District (SMCISD);  
Centro Cultural Hispano de San Marcos (Centro).



### NSF STEM Rising Stars

\$1.5M for 4 Years/2015-2019

PI: A. Martinez Ortiz

### Co-Principal Investigators:

Kimberley Talley, Clara Novoa; Mina Guirguis; Eleanor Close; Senior Personnel: Leslie Huling; Vedaraman Sriraman; Debra Feakes; Alejandra Sorto, Susan Morey

- The team will design, develop and implement a set of effective STEM learning and teaching practices aimed at producing significant improvements in freshman and sophomore major retention rates and graduation rates in chemistry, computer science, engineering, engineering technology, mathematics and physics.

### The Engineering Education Maker Identity Project

\$300k for 4 Years/2015-2019; PI: A. Martinez Ortiz

Co-Principal Investigators: Kimberly Talley, Shaunna Smith, & Vedaraman Sriraman

- Engineering Education Research regarding the impact of Maker Spaces , STEM learning and teaching practices.

Collaborative Research: University  
Maker Spaces: Discovery, Optimization  
and Measurement of Impacts  
\$75k for 4 Year/2014-2018; PI: K. Talley

## Select Research Focus Areas

### K-12 Students

- Parental involvement and impact upon student career readiness and decisions
- Impact of early integrated STEM educational experiences (cognitive and affective)
- Engineering Education based K-12 curricula

### University Students

- Strategies to support STEM student retention
- Creativity and Innovation
- Makerspaces' impact upon student learning
- STEM professional identity development
- Gender issues in STEM studies
- Alternative Instructional Models

### Teachers

- Best practices in STEM education for Diverse Audiences
- Effective models for STEM professional development
- Empowerment by Learning to use instructional technologies
- Culturally Responsive Teaching in STEM
- Digital Badging and Online learning

### Teacher Educators

- Research in course redesign and Instructional approaches in physics, chemistry, mathematics, computer science, engineering and engineering technology
- Scholarship of Teaching and Learning

### Educational Systems

- Collective Impact case studies
- Longitudinal assessment methodologies
- Engineering, Ethics and Social Justice
- Global research and education in STEM

# STEM Education

Master's & PhD Programs (97 students total)

## Past and Current Research

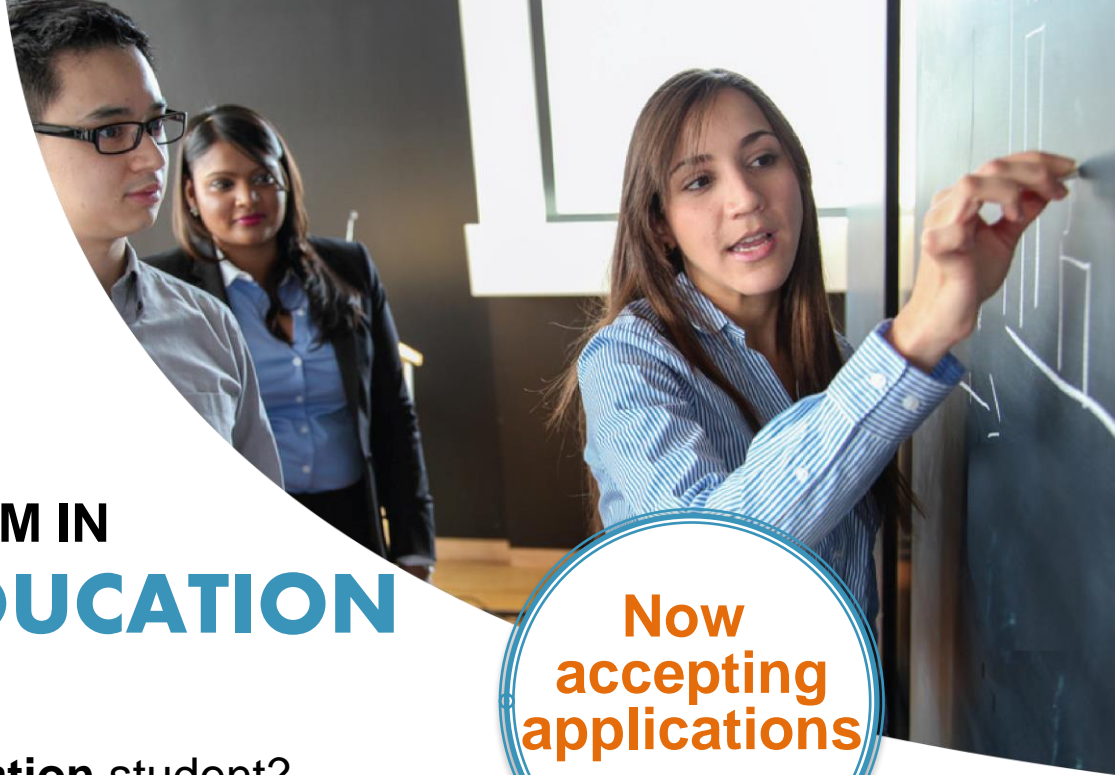
UTeach Engineering (NSF-MSP)  
Beyond Blackboards (NSF-ITEST)  
VaNTH (NSF-ERC)  
Teacher Training for Engineering  
IPRO - Programming Standing Up  
Adaptive Expertise in Engineering  
K-12 LEGO Robotics  
Discourse in K-12 engineering teams  
National HS Curriculum Project

## Faculty

David Allen (Chem Eng)  
Leema Berland (STEM-Ed)  
Richard Crawford (Mech Eng)  
Ken Diller (BioEng)  
Jill Marshall (STEM-Ed)  
Anthony Petrosino (STEM-Ed)  
Catherine Riegler-Crumb (STEM-Ed)



UNIVERSITY OF TORONTO  
FACULTY OF APPLIED SCIENCE & ENGINEERING



## COLLABORATIVE PROGRAM IN **ENGINEERING EDUCATION**

Are you an **engineering** or **education** student?

Want to enrich your degree with research and training in **engineering education**?

Now  
accepting  
applications



Offered at the **Master's and Ph.D. levels** through the ***Faculty of Applied Science & Engineering*** and the ***Ontario Institute for Studies in Education***.

Contact:

**Natalie Leung**, [natalieyl.leung@utoronto.ca](mailto:natalieyl.leung@utoronto.ca) | [www.gradstudies.engineering.utoronto.ca](http://www.gradstudies.engineering.utoronto.ca)





## Mission: Improving Education through Engineering

- An interdisciplinary center that includes faculty in engineering, education, child development and computer science.
- Ongoing research in engineering teaching and learning, outreach, and educational technology development.
- Highlighted projects:
  - Novel Engineering: Integrating Engineering and Literacy*
  - Interactive Learning and Collaboration Environment (InterLACE)*
  - OKEE - Online K-12 Engineering Education program*
- *Ph.D. and M.S. in Engineering Education (in cooperation with Tufts Department of Education)*

Education  
Research

Engineering  
Research

Outreach

# Engineering Education



## Graduate Program

Graduate students in this vital and emerging field, have the opportunity to become involved in cutting-edge engineering education research, such as:

- Teaching and learning strategies
- Cognition and metacognition in engineering education
- Problem solving and framing
- K-12 engineering education

## About the Program

- Ph.D. Program started in 2008
- 8 Engineering Education Faculty
- 15 Ph.D. Graduate Students



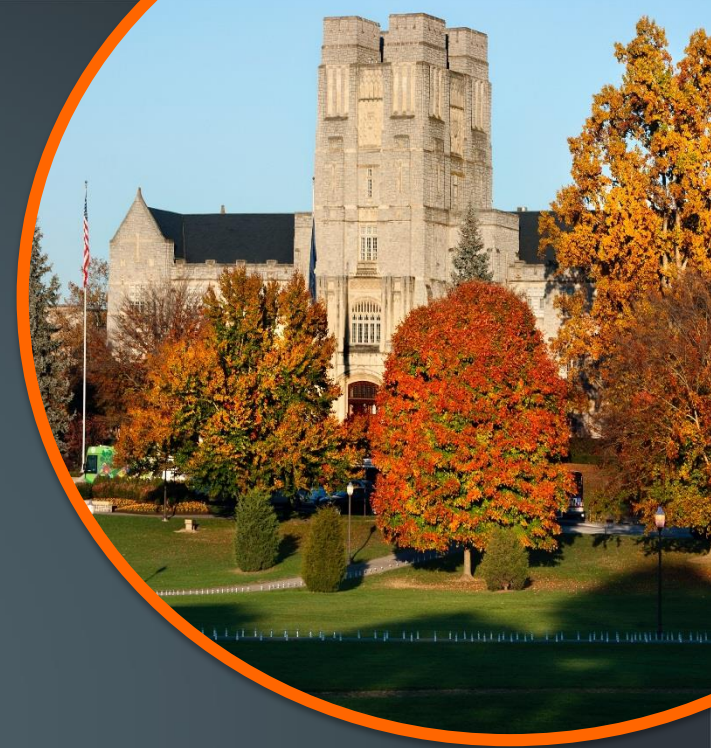
For more information: [www.eed.usu.edu](http://www.eed.usu.edu)

## Why Virginia Tech?

- Funding – We offer a competitive funding package for incoming students. Throughout the duration of the program, students easily find funding through fellowships or assistantships within or outside our Department.
- Diversity – We value diversity in backgrounds, experiences, talents, knowledge and creativity. We promote a culture of inclusivity.
- Community – The structure of our program enables direct and frequent interactions with faculty through small research groups. We encourage ideas across research groups and areas.
- Career Outlook – The character and size of our program enables optimal support to our students as they seek employment in today's job market. We have a 100 percent employment rate among all graduates.



Learn more about what a PhD in  
Engineering Education  
can do for you!



Find and follow us on social media!



#VTEngE

[www.enge.vt.edu](http://www.enge.vt.edu)

Come to Booth 938 and talk with us about earning your PhD at Virginia Tech!





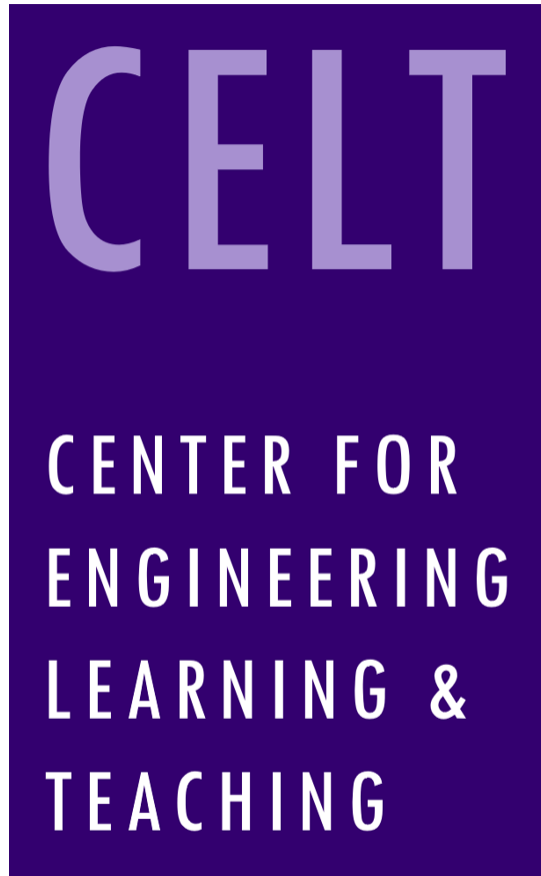
## OFFICE FOR THE ADVANCEMENT OF ENGINEERING TEACHING & LEARNING

We are dedicated to the concept that the engineering education endeavor is far more successful when faculty and students are equipped and motivated to become active partners in achieving educational goals.

Our services include...

- One-to-one consultations
- Formative course assessments
- Faculty workshops
- In-class presentations
- Learning communities
- Education resources and expertise

Jim Borgford-Parnell, Director & Instructional Consultant  
Ken Yasuhara, Assistant Director & Instructional Consultant



# Center for Engineering Learning & Teaching

## Main goals

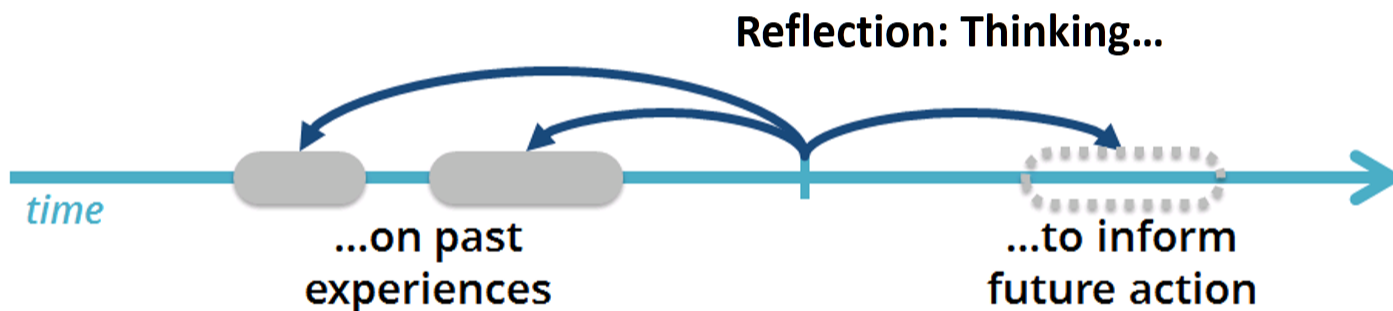
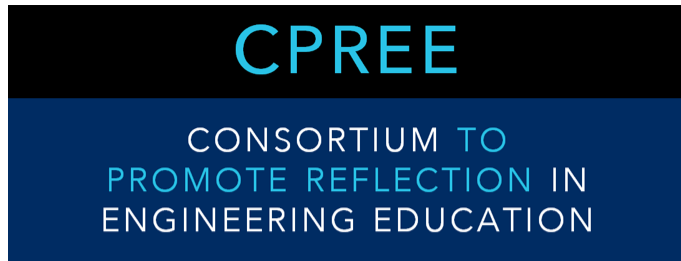
- Conduct internationally recognized research in engineering learning
- Connect research-and-practice to effect change in engineering education

## Significant recent accomplishments

- The UW College of Engineering institutionalized the CELT faculty development model (see ET&L<sup>1</sup>).
- A consortium of 12 schools across the country (CPREE) advanced the use of reflection in engineering learning contexts.
- Over forty engineering education pioneers' stories provide compelling narratives to energize future generations of scholars.



<sup>1</sup>The Office for the Advancement of Engineering Teaching & Learning



### Goals:

1. Cataloguing 120 examples of reflection activities in engineering education across 12 campuses
2. Promoting more reflection in engineering education—to date, 81,000+ student reflection experiences and 1,100+ educator experiences



**131**

centers &  
groups

**57**

graduate  
programs

**79**

conferences &  
workshops

**63**

journals

*...and more*

# **engineering education community resource**

<http://bit.ly/engredu>