

# NORTHWESTERN CENTER FOR ENGINEERING EDUCATION RESEARCH

The Northwestern Center for Engineering Education Research (NCEER) is the umbrella organization for engineering education research at Northwestern University. Its mission is to serve as a catalyst for the transformation of engineering education within Northwestern and beyond by facilitating connections among many partners and providing guidance and support for research projects.

## Vision

Engineering education must evolve because engineers must evolve. Engineers of the future will require highly flexible technical expertise combined with creativity and tempered by a sophisticated appreciation of human needs. We continue to work toward evidence-based engineering education.

### Educate adaptive experts

The engineer of tomorrow must be a flexible expert, adaptable to—and able to innovate within—a wide range of problem areas and scenarios.

### Learn within social and ethical contexts

Engineers must not only understand technology but also recognize the inherent social and ethical dimensions that any technical solution will confront.

## Research

Research in engineering education takes many partners. Unlike education research at precollege levels, engineering education research requires the domain expertise of engineers and the social science research skills of learning scientists. In NCEER we are fortunate to be able to bring together faculty from the McCormick School of Engineering, the School of Education and Social Policy (SESP), the Searle Center for Advancing Learning and Teaching and the Weinberg College of Arts and Sciences. Some of the other programs from which NCEER Scholars are drawn include the Segal Design Institute and several NSF-funded projects including the Center for the Integration of Research, Teaching and Learning (CIRTL), the National Center for Nanotechnology Learning and Teaching (NCLT), the Center for Connected Learning (CCL), and the Spatial Intelligence and Learning Center (SILC), each of which has a major component at Northwestern.

### Recent and ongoing projects have included NSF and NIH funded studies on

- building capacity in biomedical engineering programs in Africa
- the work experience of new engineering graduates
- computational adaptive expertise in engineering design
- teaching critical thinking in engineering



### Teach cross-disciplinary skills

Today's engineers are entering a field that is more globalized and team-based than ever before. Engineers must work across disciplines and cultures.

### Develop and evolve educational methods

Education itself must be a focus of scientific research to ensure that advancements in it are reliable and evidence-based.

# NCEER Scholars

NCEER Scholars pursue research on a wide range of topics in engineering education.

## **Bruce Ankenman**

*Director, Undergraduate Programs, Segal Design Institute;  
Professor, Industrial Engineering and Management Sciences*

Freshman engineering design curriculum and pedagogy;  
capstone design

## **Robert (RPH) Chang**

*Professor, Materials Science and Engineering;  
Director, NCLT Center*

Undergraduate nanotechnology education; Construct-Centered  
Design; K-12 nanotechnology outreach

## **Jennifer Cole**

*Assistant Chair, Chemical and Biological Engineering; Associate  
Director, NCEER*

Mathematical modeling, analytical and computational skills  
in capstone design

## **Steve Carr**

*Professor, Chemical and Biological Engineering;  
Professor, Materials Science and Engineering*

Evidence-based engineering education

## **Wei Chen**

*Wilson-Cook Professor in Engineering Design;  
Professor of Mechanical Engineering*

Engineering design, modeling and optimization instruction

## **Denise Drane**

*Associate Director of Research & Evaluation, Searle Center  
for Advancing Learning and Teaching*

## **Richard Freeman**

*Clinical Assistant Professor, Engineering; Undergraduate  
Freshman Adviser*

Engineering Education, Assessment, Curricular Development  
and Outreach Retention

## **Kenneth Forbus**

*Walter P. Murphy Professor of Computer Science;  
Professor, Education and Social Policy*

All educational software and activities; understanding how  
analogy and similarity work in cognitive science

## **David Gatchell**

*Clinical Associate Professor; Segal Design Institute;  
Director, MaDE Program*

Engineering design education and biomedical engineering  
curriculum

## **Elizabeth Gerber**

*Associate Professor, Mechanical Engineering*

Design and innovation education research; Design for America  
service learning

## **Robert Linsenmeier**

*Director, NCEER; Professor, Biomedical Engineering  
and Neurobiology*

Engineering education research; learning technology,  
biomedical engineering curriculum

## **Christopher Riesbeck**

*Associate Professor, Electrical Engineering and  
Computer Science*

Interactive learning environment authoring, student learning

## **Reed Stevens**

*Professor, School of Education and Social Policy*

Learning and activity in a range of contexts; design of  
learning tools, curriculum and activities

## **David Uttal**

*Professor, Psychology and Education and Social Policy;  
Researcher, SILC Center*

Cognitive Development; spatial cognition, symbolic  
development, mathematical thinking

## **Jill Hardin Wilson**

*Clinical Associate Professor, Industrial Engineering  
and Management Sciences*

## **Uri Wilensky**

*Professor, School of Education and Social Policy;  
Director, Center for Connected Learning*

Math and science education learning technologies,  
computer-based modeling and simulation