

# DIVERSITY AND INCLUSION EFFORTS IN STEM EDUCATION



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# Engineering @ Illinois

- Serves approximately 7,500 students across 12 top-ranked departments
  - Will welcome approximately 1,600 freshmen this upcoming fall
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- Maintains over a 90% retention rate (compared to the 64% national average)
  - Welcomes incoming classes of freshmen with over 25% women

	University Enrollment by Demographic	College of Engineering Enrollment by Demographic
F	43.90%	17.40%
M	56.10%	82.60%
URM	15.60%	8.20%
1st Gen	20.40%	12.70%
Total Number	32,604	7,325

Table 1: UIUC Undergraduate Demographics – data from 2016

State of Illinois 30% URM



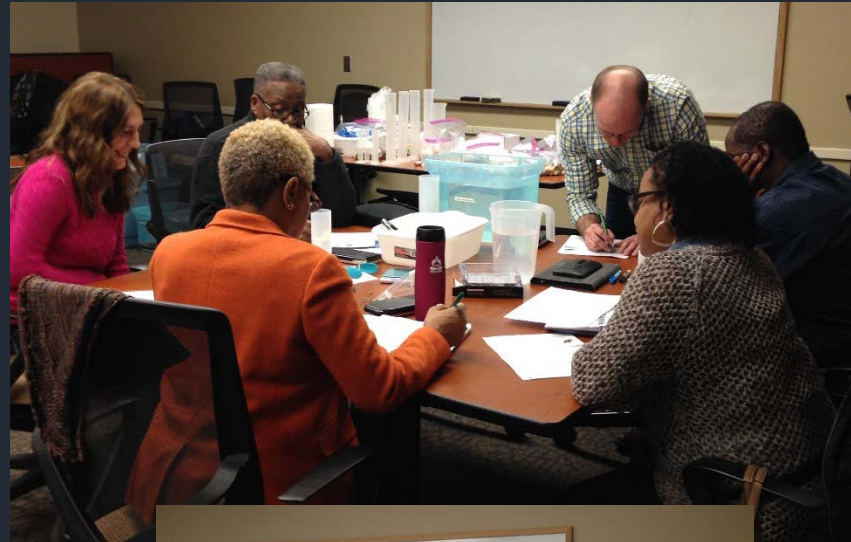
# ICANEXSEL Outreach Program

Illinois-ChiS&E Alliance for Nurturing Excellence in STEM Education and Leadership

## 1. Hands-on, STEM-based curriculum



## 2. Trained CPS teachers



## 3. Undergraduate Student Mentors





# ICANEXSEL Outreach Program

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## 4. High involvement from parents



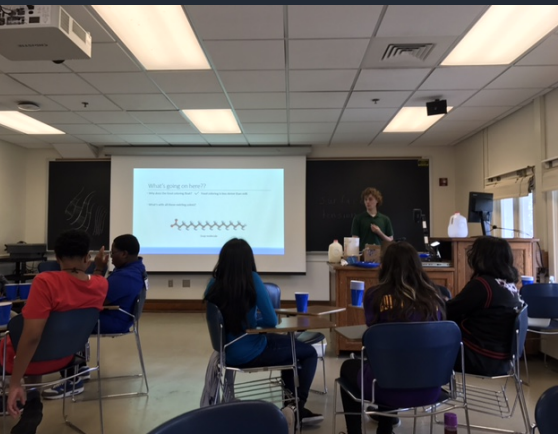
## 5. Campus visits and field trips to labs and industry



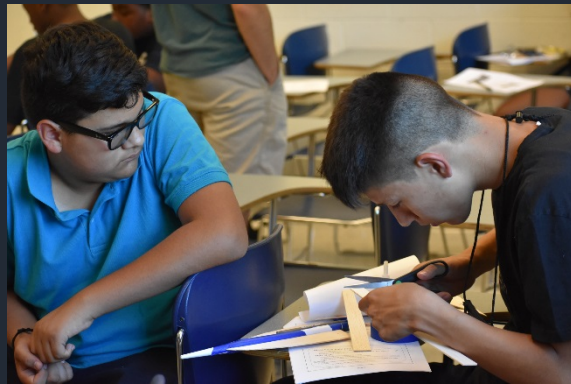
# ICANEXSEL Outreach Program

Illinois-ChiS&E Alliance for Nurturing Excellence in STEM Education and Leadership

## Materials Science & Engineering



## Aerospace Engineering



## Physics



## Electrical Engineering



# Engineering for Social Justice (ESJ) Scholars Program

Course for college students

Important skills learned in class:

- Leadership
- Teamwork
- Planning
- Communication
- Empathy and ethics
- Critical systems thinking
- Program management
- Creativity and innovation



# ESJ Scholars Program

*ENG 398: Special Topics Courses (4 credits)*

## Social Justice and STEM Education (Fall Semester)

### Service-Learning Components:

1. ICANEXSEL Program  
(Chicago)
2. STEMposium (art as social action event)

## Leadership in Engineering for Social Justice (Spring Semester)

### Service-Learning Components:

1. Local STEM Education Outreach (C-U):
  - DREAM House
  - Don Moyer Boys & Girls Club
  - St. Elmo Brady STEM Academy
2. ESJ Projects



# ESJ Scholars Program

*Spring Semester: Local STEM Education Outreach*



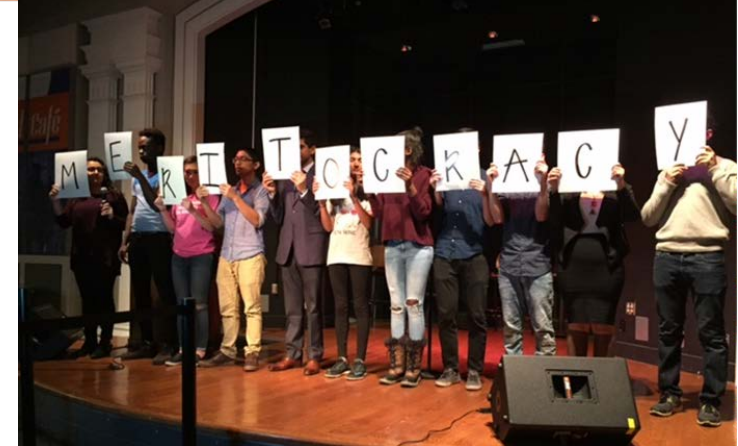
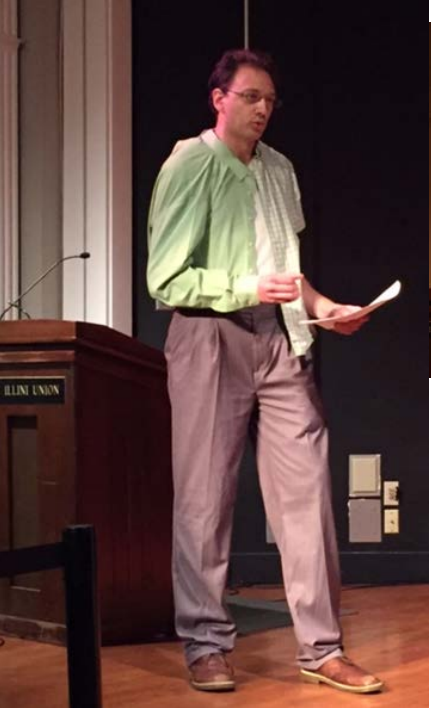
ST. ELMO BRADY STEM ACADEMY



STEMposium  
SCIENCE-TECHNOLOGY-ENGINEERING-MATH

Creative performances shining a spotlight  
on the intersections of STEM and issues of  
IDENTITY • POWER • EDUCATION • ETHICS  
ENGAGEMENT • SOCIAL JUSTICE

Tuesday, December 6  
4:00 p.m. Courtyard Café



# ARISE Scholars Program

*Academic Redshirt in Science and Engineering*

STEM program for low  
socioeconomic college students

## Why?

### Financial need:

Chicago Public Schools:	86%
All college students	33%
UIUC science/engineering	12%

## Redshirt idea

Identify strong students with financial need

Likely did not have access to best high school resources. (advanced placement, ACT prep, etc.)

Give them scholarship support, strong mentoring, cohort

Put them in a 5 year program (“redshirt”)



# ARISE Scholars Program

Academic Redshirt in Science and Engineering

6 institutions (Illinois, Washington, Washington State, Colorado, Boise State, UC San Diego)

NSF funding to initiate  
Hope to spread nationally

Need to raise lots of scholarship money to maintain the program.



# Closing comments

Improving diversity in STEM requires

1. a multi-pronged approach
2. a long-range plan

Without addressing inclusivity/attitudes, gains will be minimal

If all of your interventions target the minority group, you are doing it wrong.

Tremendous opportunities to make a difference in K-12

Students (undergrad, grad) are positioned to make an enormous difference



# ICANEXSEL Outreach Program

Illinois-ChiS&E Alliance for Nurturing Excellence in STEM Education and Leadership

Partnership between UIUC, UIC, and ChiS&E (non-profit) that provides hands-on, STEM-based, out-of-school activities to middle and high school students from the Chicago Public School (CPS) district

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## How it Started:

- By 2015, ChiS&E had already built a K-5 program in Chicago with approximately 100 students (mostly URM).
- UIUC's College of Engineering & College of Education joined forces in spring 2015 to develop curriculum modules for teachers and students.
- UIUC and UIC launched the 6<sup>th</sup> and 7<sup>th</sup> grade programs in fall 2015, and have been able to launch a grade every year since then.

# ESJ Scholars Program

## *Course Topics*

### Social Justice and STEM Education (Fall Semester)

- Conceptualizations of Engineering
- Reflections on Social Justice
- Social Justice and Engineering Mindsets
- Paradigms of Civic Engagement, Social Action, and Critical Service-learning
- Diversity, Cultural Oppression, Privilege, and Critical Race Theory
- Racial and Ethnic Identity Development
- Inequalities and the Context of Schooling
- Identity, Stereotype Threat, and Performance

### Leadership in Engineering for Social Justice (Spring Semester)

- Teamwork, Ethics of Care, and Engagement
- Engineering and Social Justice History/Foundations
- Social Justice in Engineering Education
- Artifacts, Place, and Politics in Engineering
- Human-Centered Design
- Appropriate Technology
- Engineering & Sustainable Community Development
- Social Justice and NAE Grand Challenges
- Cultural Context and Engineering
- Social & Environmental Justice in Engineering Practice
- Peace, Ethics, and Social Justice



# ESJ Scholars Program

*Assignments and Activities*

## Social Justice and STEM Education (Fall Semester)

### STEM Education Outreach Activities

- ICANEXSEL Curriculum Reviews
- Applied Concepts Journal (Readings)
- Fieldwork/Reflection Journals
- Research Article Summary

### STEMposium Project

## Leadership in Engineering for Social Justice (Spring Semester)

### STEM Education Outreach Activities

- Curriculum Development Assignment
- Applied Concepts Journal (Readings)
- Fieldwork/Reflection Journals
- Leadership and Teamwork Assessments

### Engineering for Social Justice Project



P E C H A

K U C H A



## Engineering for Social Justice

### Final Presentations of Social Action Projects

Listen, be inspired, and engage with students enrolled in *ENG 398: Leadership in Engineering for Social Justice*. This event is free and open to the public. All are welcome!

20x20  
SLIDES SECONDS

Monday, May 8

8:30-11:00 a.m.

John Deere Pavilion

MEL 2005

