Engineering @ Illinois

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

Table 1: UIUC Undergraduate Demographics – data from 2016

<table>
<thead>
<tr>
<th>Demographic</th>
<th>University Enrollment by Demographic</th>
<th>College of Engineering Enrollment by Demographic</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>43.90%</td>
<td>17.40%</td>
</tr>
<tr>
<td>M</td>
<td>56.10%</td>
<td>82.60%</td>
</tr>
<tr>
<td>URM</td>
<td>15.60%</td>
<td>8.20%</td>
</tr>
<tr>
<td>1st Gen</td>
<td>20.40%</td>
<td>12.70%</td>
</tr>
<tr>
<td>Total Number</td>
<td>32,604</td>
<td>7,325</td>
</tr>
</tbody>
</table>

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

K-12 STEM outreach in Chicago
ICANEXSEL Outreach Program
Illinois-ChiS&E Alliance for Nurturing Excellence in STEM Education and Leadership

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

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):
   - DREAAM House
   - Don Moyer Boys & Girls Club
   - St. Elmo Brady STEM Academy
2. ESJ Projects
ESJ Scholars Program

Spring Semester: Local STEM Education Outreach
### ARISE Scholars Program

**Academic Redshirt in Science and Engineering**

#### Why?

<table>
<thead>
<tr>
<th>Financial need:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago Public Schools:</td>
<td>86%</td>
</tr>
<tr>
<td>All college students</td>
<td>33%</td>
</tr>
<tr>
<td>UIUC science/engineering</td>
<td>12%</td>
</tr>
</tbody>
</table>

#### 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")

STEM program for low socioeconomic college students
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.
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

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 6th and 7th 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
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!

Monday, May 8
8:30-11:00 a.m.
John Deere Pavilion
MEL 2005