2019 NSF STC Virtual Site Visit
February 8, 2019

Education and Diversity

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Director for Diversity

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Education and Diversity Goals

- Professional and Leadership Development

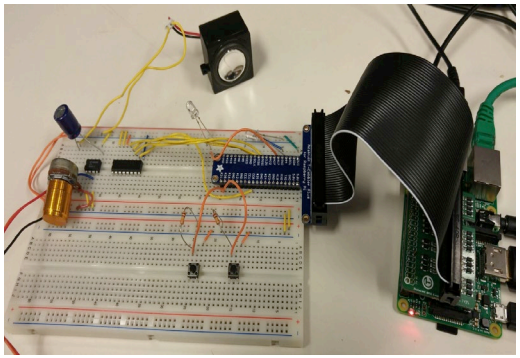
- Community College/ Undergraduates/ Graduates/ Postdocs

- Broadening Participation

General Public and High School Education and Diversity Efforts

MIT Online Science, Technology, and Engineering Community

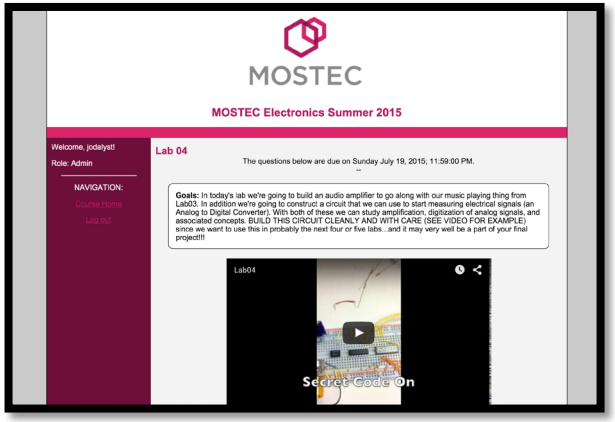
48% of pre-college program alumni in STEM bachelor programs



Online Project

MOSTEC

MIT ONLINE SCIENCE, TECHNOLOGY, & ENGINEERING COMMUNITY



Online Seminars

College Prep Conference

Electronics Design Workshop

2018 Cohort:

- 93% (51) from underrepresented groups

Clean Room Tours

Undergraduate Education and Diversity Efforts

Leveraging Our Partners

Awards
ECCS 0939514
EEC 1157089
EEC 1405547
EEC 1461157

Academic Partners

synberc
Building the Future with Biology.

TAP TRANSFER ALLIANCE PROJECT
BERKELEY

MSRP
MIT Summer Research Program

LSAMP

ENGINEERING ESS STUDENT SERVICES

Berkeley UNIVERSITY OF CALIFORNIA | Resource Center for Online Education

Berkeley School of Public Health

MOSTEC
MIT ONLINE SCIENCE, TECHNOLOGY, & ENGINEERING COMMUNITY

NNIN@STANFORD
National Nanotechnology Infrastructure Network

UNIVERSITY of CALIFORNIA
OFFICE OF THE PRESIDENT

Berkeley University of California
Center for Teaching and Learning
Vice Provost for Teaching, Learning, Academic Planning and Facilities

TRUST
Team for Research in Ubiquitous Secure Technology

Community Partners

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

PROGRAM your Future

MESA Mathematics Engineering Science Achievement

CALIFORNIA COMMUNITY COLLEGES
CHANCELLOR'S OFFICE

Industry Partners

Lam RESEARCH

IBM

Transfer-to-Excellence Program

Created a National Model of Student Transfer Success

California transfer rate: 40%

Nationwide transfer rate: 67%

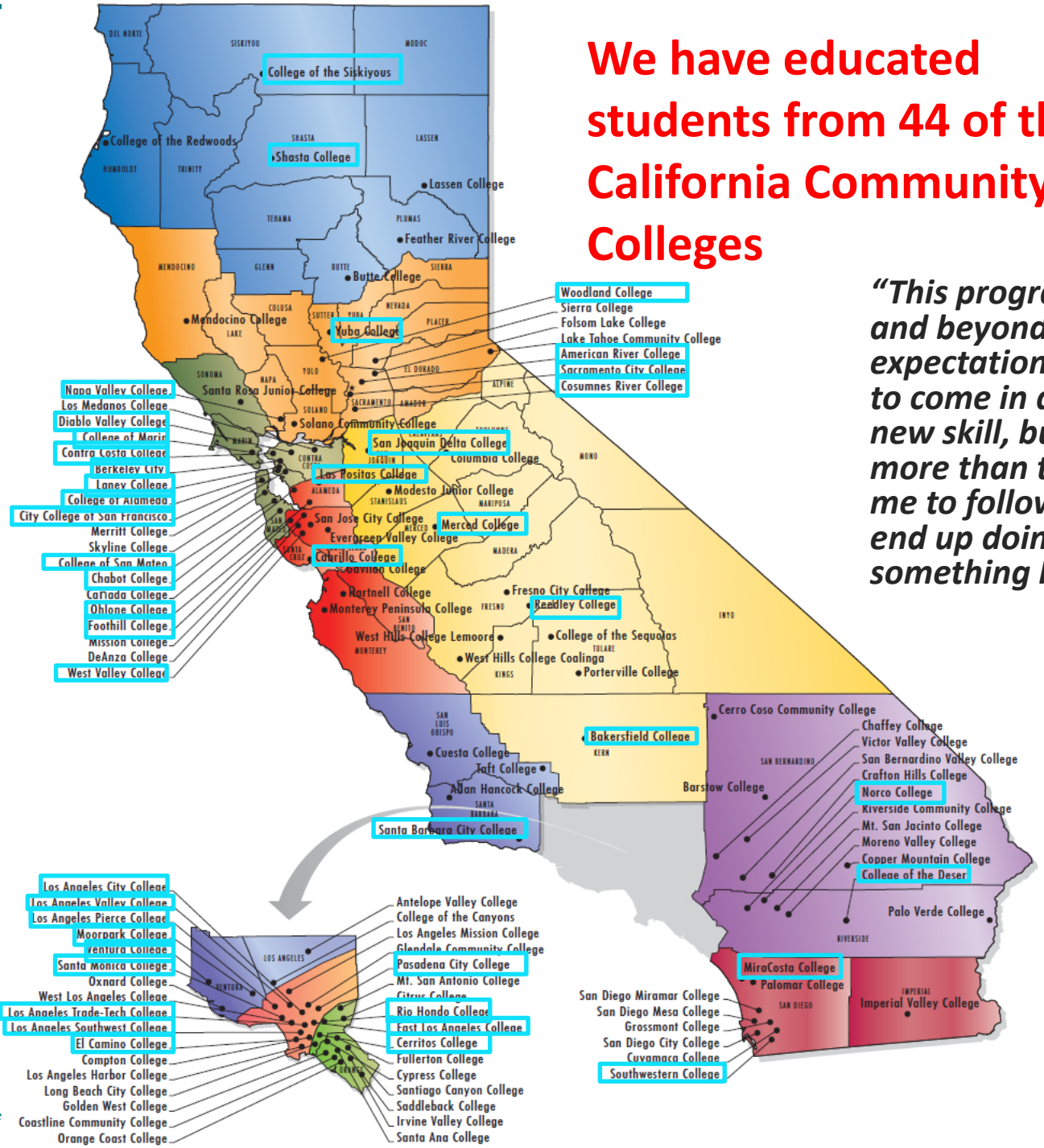
TTE transfer rate: 93% (80) of eligible students, E^{3}S students- 94% (34)

- 90% (72) enrolled at a UC campus, E^{3}S students- 91% (31)
  - 61% (49)enrolled at Berkeley, E^{3}S students- 74% (25)
- 92% (91) from underrepresented groups, E^{3}S students- 90% (38)

External NSF Site Grants: EEC 1157089, EEC 1461157

American Association of Community Colleges (AACC). (2012a, April)., Reclaiming the American Dream: A report from the 21st-Century Commission on the Future of Community Colleges., Washington, DC: Author. http://datamart.cccco.edu

We have educated students from 44 of the 113 California Community Colleges



"This program went above and beyond my expectations. I had expected to come in and learn some new skill, but it was so much more than that, it inspired me to follow my passions to end up doing research in something I love."

Empowering Community College Faculty

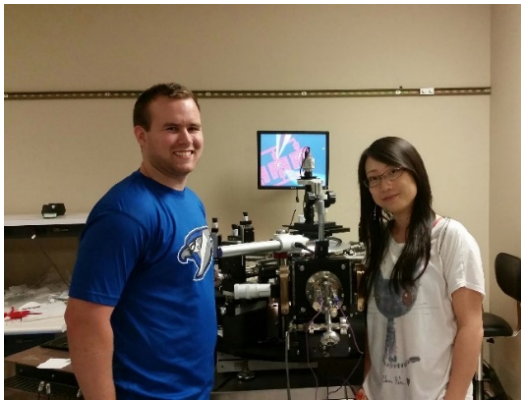
External NSF Funding: EEC-1405547

Success Stories

- **Len Filane**
  - **RET 2016**
  - **Curriculum Development 2017 and 2018**
  - **Created a course with the goal that it will be accredited for students transferring credits**

Research Experience for Undergraduates (E^3S REU)

- 9-week summer residential program that offers undergraduates (engineering or physical science majors) the opportunity to conduct research in the laboratories of E^3S faculty



E³S REU

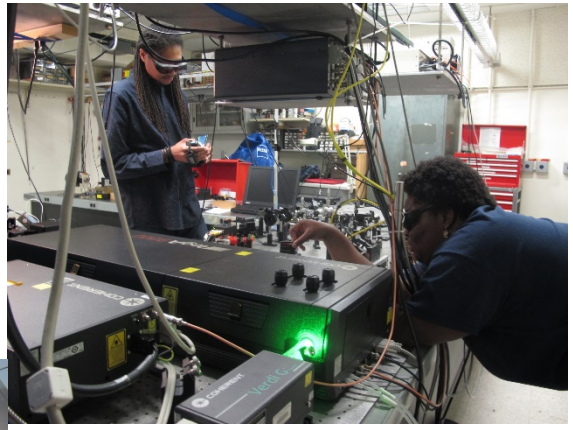
- ~75% of our graduates are in STEM graduate programs
- 63% of our graduates are underrepresented

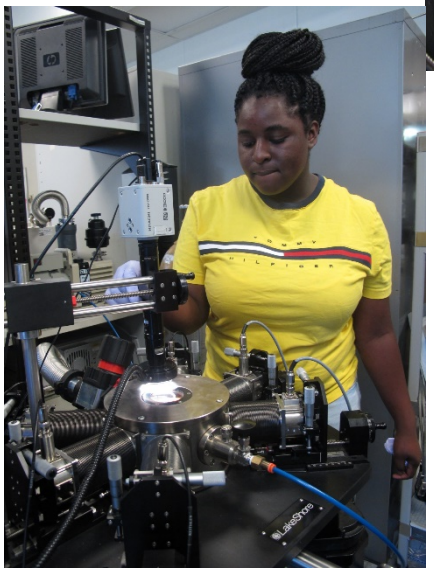
Success Stories

- Gabriele Colon Reyes
- E3S REU @ MIT
- Graduated from University of Puerto Rico, Mayaguez
- Goal : pursue a PhD in EE and return to Puerto Rico as a professor and educate future generations of engineers
- Accepted to UC Berkeley

UC Berkeley – Historically Black Colleges and Universities Research Experiences for Undergraduates

- Geared for sophomore students
- Continued research projects at their home institutions
- Eligible for second summer with E^{3}S REU
- Funded through UC-Office of the President





Bridge to Berkeley

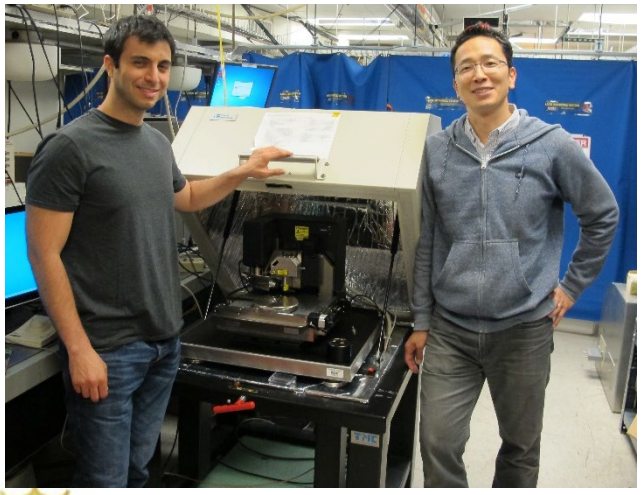
- Designed to ease participants personal and academic transition to UC Berkeley

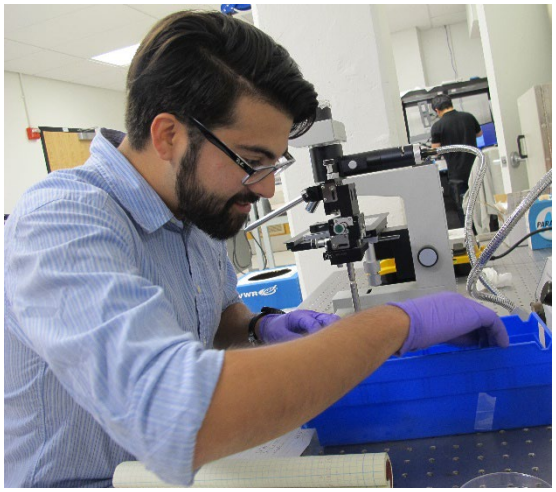
- Topics covered include: Intro to town & gown, time management, professional etiquette, staff intro, technical writing, wellness, tours

Graduate Student and Postdoc Education and Diversity Efforts

Graduate and Postdoc Education

- Leadership Certificate Program
  - Mentoring, Leadership, Teaching, Science Communication, Outreach, Proposal Writing and Entrepreneurship– 4 training areas needed
  - 24 certificates awarded, 57% have started training in at least one area
- Graduate Students and Postdocs are helping to create the E³S legacy
- Rotation Program
- Postdoc Program





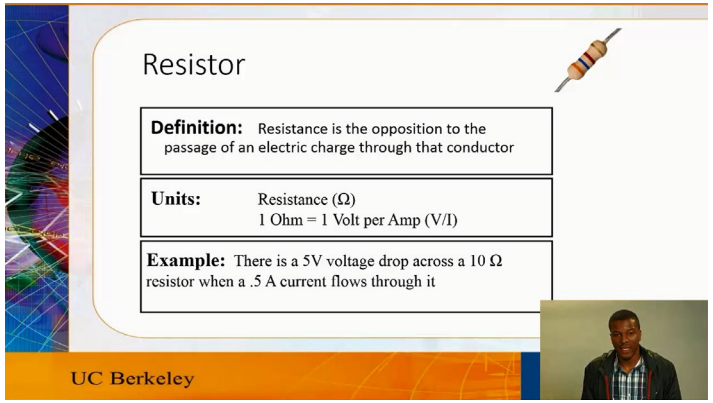
Education Legacy

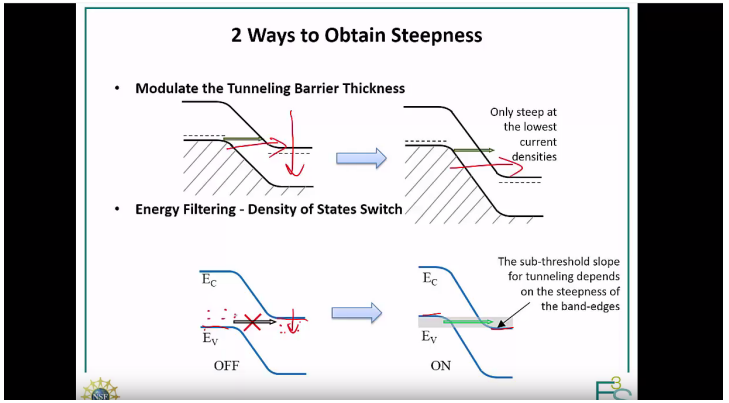
Education Legacy in 2020

- **E^3S is creating resources that will live on, past the center**
  - **Online Videos**
  - **Nanohub**
  - **E-Book**

Education Videos

- High School Level
- Community College Level
- Graduate Level
  - Created 48 videos thus far, currently under review





E^{3}S Legacy – An Electronic Book

OBJECTIVE

Develop a comprehensive educational resource on energy efficient electronics including **nanoelectronics, nanomechanics, nanophotonics, nanomagnetics** to motivate **high school students** to pursue academic studies and careers in the **STEM fields**

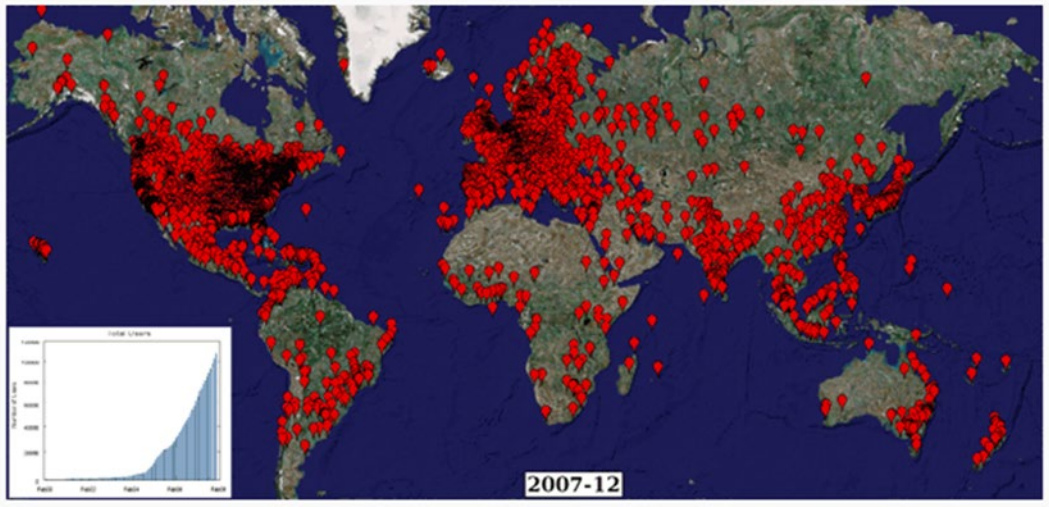
Theme II – Nanomechanics Outline

Chapter	Title	Assigned Authors
0	Energy-Efficiency Limit of Digital Computing	T. King Liu
1	Introduction to MEMS/NEMS	J. Lang
2	Fabrication of Micro/Nano Systems	M. Sara., J. Patil, F. Niroui
3	Electromechanical Actuators	J. Han, A. Ye
4	Logic Relay Design	U. Sikder, S. Almeida
5	Reliability Limits of N/MEM Relays	B. Osoba, T. King Liu
6	Adhesion in NEM Switch	B. Saha, J. Wu
7	Tunneling NEM Switches – Squitches	F. Niroui
8	The STRITCH-Switch Device	A. Almeida, D. Zubia
9	Relay-based Integrated Circuits	R. Naous, V. Stojanovic
10	Conclusions and Outlook	

Platforms for eBook - NanoHUB

Online Portal for Nanotechnology Education
Created by Purdue University and NSF

Our mission is to support and grow the nanotechnology community and to generate new modes of discovery, innovation, learning, and enagement in the field.



nanoHUB

Ongoing Diversity Plans

Targeted Recruitment

- Closer connections to organizations that promote graduate education
- Conferences and graduate fairs

TRIO
RONALD E. MCNAIR POST-BACCALAUREATE ACHIEVEMENT PROGRAM

GEM
THE NATIONAL GEM CONSORTIUM

MESA Mathematics Engineering Science Achievement

SHPE

NSBE NATIONAL SOCIETY OF BLACK ENGINEERS

swe Society of Women Engineers

SACNAS
Advancing Chicanos/Hispanics & Native Americans in Science

oSTEM

AMERICAN INDIAN SCIENCE AND ENGINEERING SOCIETY

Annual Retreat 2018

GENDER

- Sex vs Gender
- Patriarchy
- Sexism
- Discrimination
- Harassment
- Societal Constructions

Education & Diversity Aims… 2018-2019

- Continue high level engagement between staff and students
- Continue to advocate for diversity within the faculty ranks
- Funding opportunities to continue programs
- Building education legacy

Evaluation

Evaluation Approach

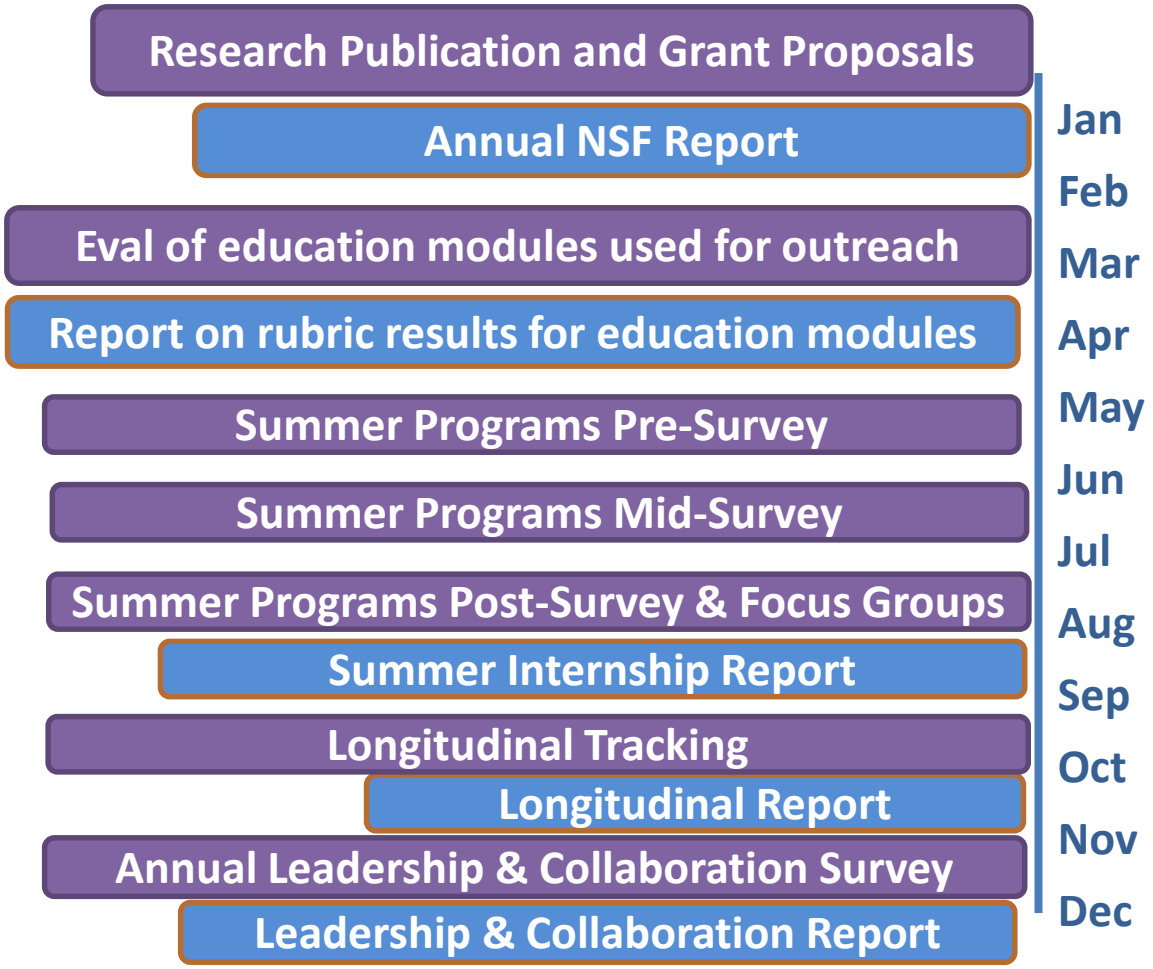
- **Evaluation of Strategic Goals:**
  - **Examine inputs and outputs for strategic areas (Research, Knowledge Transfer, Education, Diversity, Center Leadership)**
- **Mixed methods approach and indirect/direct methods of assessment**
- **Center faculty, post docs, graduate students, current and past REU participants engage in evaluation using annual surveys, pre/post surveys, interviews, rubrics**
- **Outcomes such as Center publications, proposals, programs and educational modules are also evaluated**

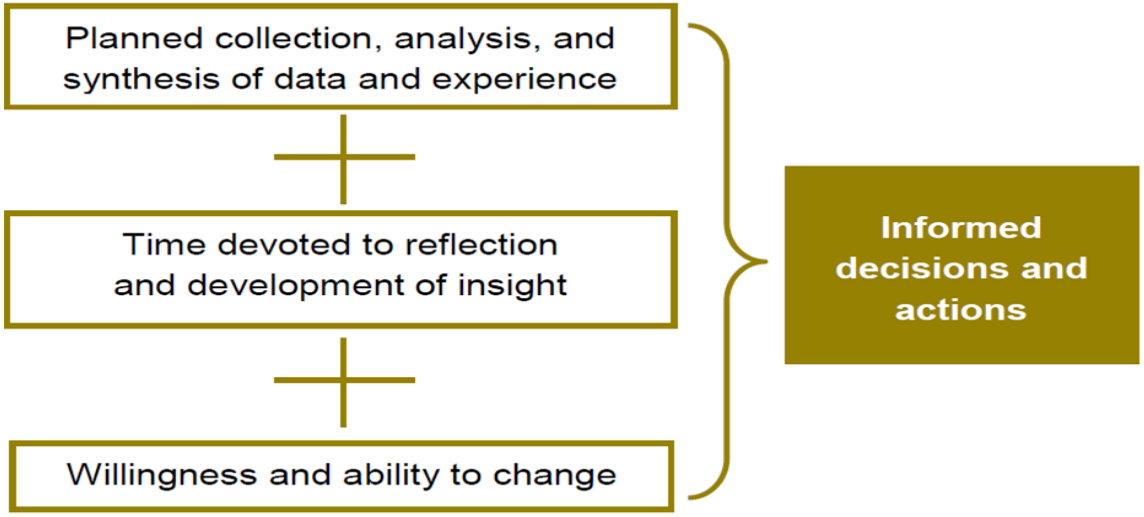
EVALUATING E3S

Focus

1. Measuring progress towards goals
2. Use metrics to define data collection tools
3. Providing regular feedback for ongoing program improvement
4. *Publication opportunities such as ASEE

Timeline of Evaluation Activities



Actionable Measurement: Communication and Reporting

- Executive Director, Dr. Michael Bartl & Center Director, Dr. Eli Yablonovitch; Dr. Kedrick Perry and Lea Marlor
- Attendance at NSF Site Visit and annual retreat; monthly meetings and weekly communication in the summer months
- Contributions to annual report, strategic plan development, and individual program reports, weekly reports in the summer