Research Experiences for Undergraduates – Program Impact

REU–PATHWAYS: NSF #2150417

This Research Experiences for Undergraduates (REU) program supported active research participation by community college students with a focus on Smart Engineering, including: Artificial Intelligence/Machine Learning, Smart Health, Smart Materials, and Smart Infrastructure

- Offered a 10-week non-residential summer research experience for local community college students
- Featured high-quality interactions of students with faculty and/or other research mentors and access to appropriate facilities and professional development opportunities
- Provided an opportunity to tap the nation's diverse student talent pool and broaden participation in science and engineering

REU-PATHWAYS

2022 - 2024

Pathways for community college students to enrich their education and careers

Demographics

Ethnicity:
Asian: 7 (24%)
Black: 4 (14%)
Hispanic: 4 (14%)
White: 14 (48%)

Gender:
Male: 12 (41%)
Female: 16 (55%)
Non-Binary: 1 (4%)

"Despite the fact that we all came from such diverse backgrounds, all the students were united in their commitment, maturity, and sincerity. I had a fantastic time, and I hope the Center for STEM will be able to offer this opportunity for more years to come." – 2024 REU Participant

Participants came from (8) Schools:

- Bunker Hill Community College (8)
- Cape Cod Community College (1)
- Framingham State University (1)
- MassBay Community College (8)
- Middlesex Community College (4)
- Northern Essex Community College (2)
- North Shore Community College (4)
- Roxbury Community College (1)

Recent (2024) Projects

Human Trust in Automation/Human Robot Interaction
Victoria Leone and Bismillah Mohammadi with Professor Yingzi Lin

Natural Language Processing in Environmental Health Research
Muskan Kumar and Mouad Tiahi with Professor David Kaeli

Decoding Neuronal Signals Affected by Terahertz Radiation Using Spike-Sorting Techniques
Owen Motherway and Paulittle Nganga with Professor Josep Jornet

Impact of Referral Source on Treatment Completion Rates Among Patients Suffering from OUD in Substance Abuse Programs
Ivan Fedorov and Jonathan Kayumba and Professor Muhammad Noor E. Alam

Complex Fluid Flows
Monyuddam Chheang and Annabelle McGregor with Professor Sara Hashmi

Characterizing Urban Environmental Systems through Field Studies and Data Analytics
Jessica Reyes with Professor Amy Mueller

Multiscale Thermofluids and Advanced Microsystems
Lila Ablimit and Deirdre Kearney with Professor Hongwei Sun

WORKSHOPS & PRESENTATIONS

SparkFun / Arduino Workshops & Projects
Faculty Research Presentations
Assorted Information Sessions
Skill-Building Seminars
Professional Development
Resumes & LinkedIn Profiles
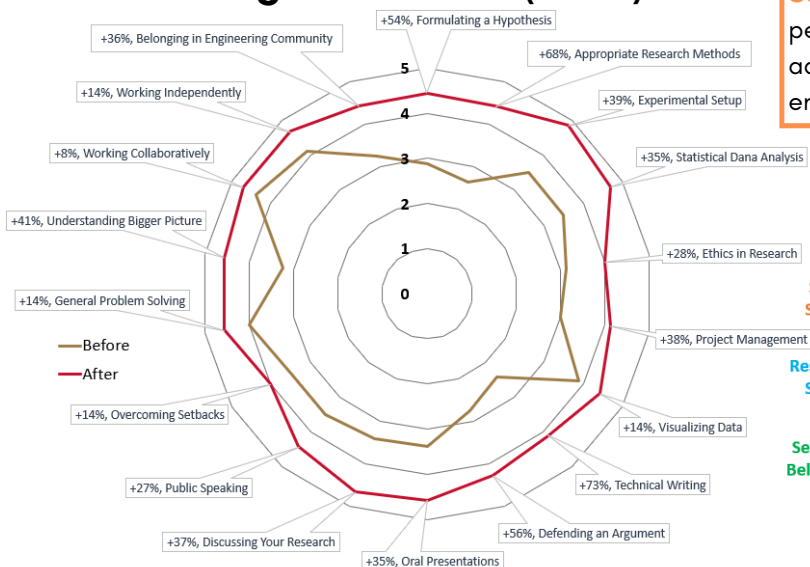*Cover Letters & References*
Poster Training Session
Interviews & Elevator Pitches
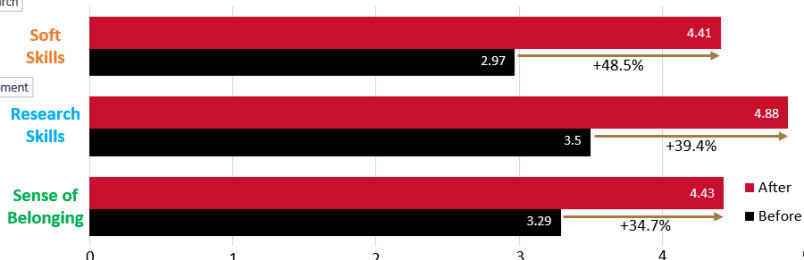*Networking & Mentoring*

Posters & Presentations can be viewed at
https://stem.northeastern.edu/summer/reu/pathways/students/

Program Results (2024)

Radar chart — Before / After:
- +54%, Formulating a Hypothesis
- +68%, Appropriate Research Methods
- +39%, Experimental Setup
- +35%, Statistical Dana Analysis
- +28%, Ethics in Research
- +38%, Project Management
- +14%, Visualizing Data
- +73%, Technical Writing
- +56%, Defending an Argument
- +35%, Oral Presentations
- +37%, Discussing Your Research
- +27%, Public Speaking
- +14%, Overcoming Setbacks
- +14%, General Problem Solving
- +41%, Understanding Bigger Picture
- +8%, Working Collaboratively
- +14%, Working Independently
- +36%, Belonging in Engineering Community

Legend: Before, After

Soft Skills are students' personal qualities required to adapt and improve in the work environment.

Research Skills are technical abilities that students develop and utilize when exploring and researching scientific questions.

Sense of Belonging is the students' attitude towards their scientific identity.

Bar chart (Before/After):
- Soft Skills: 2.97 → 4.41 (+48.5%)
- Research Skills: 3.5 → 4.88 (+39.4%)
- Sense of Belonging: 3.29 → 4.43 (+34.7%)

Legend: After, Before

"Through my participation in the REU, I gained a deeper understanding of advanced research methodologies and practical experience in data science. I enhanced my skills in causal inference and data analysis, and built a valuable professional network within the field. Additionally, I developed my problem-solving abilities and improved my communication skills through presentations and collaborative projects."

– 2024 REU Participant

Key Improvements (2024)

(+143.8%) I know about career options in research
(+71.4%) Understanding the theory and concepts guiding a research project
(+68.7%) Identifying appropriate research methods and designs
(+59.0%) I am confident presenting my research
(+47.6%) I have come to think of myself as a "scientist"/"engineer"
(+42.9%) I can collect data
(+35.4%) I can prepare and deliver an oral presentation to mentors, or others