Cohort-building and near-peer mentoring as integral parts of the undergraduate research experience in coastal ecosystem science

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CREST CAChE brings together experts from *biology, chemistry, hydrology, computer sciences, ecotoxicology, public health & architecture* to tackle complex issues of environmental contamination, and introduce students to scientific research, while training them for careers in STEM fields.

CREST CAChE addresses the *sources, transport, transformation and ecosystem responses* to contaminants, pollutants and other natural stressors under changing land-use & environmental conditions

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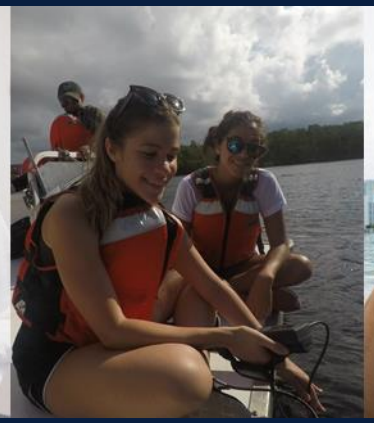
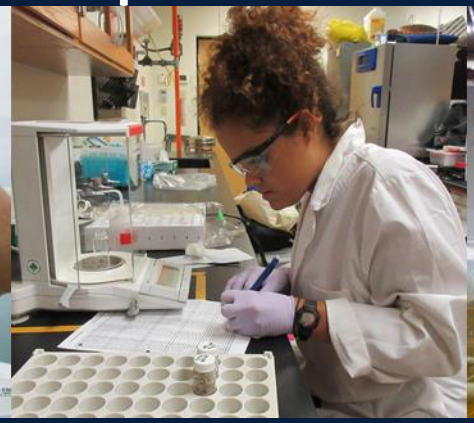
Research Focus Areas

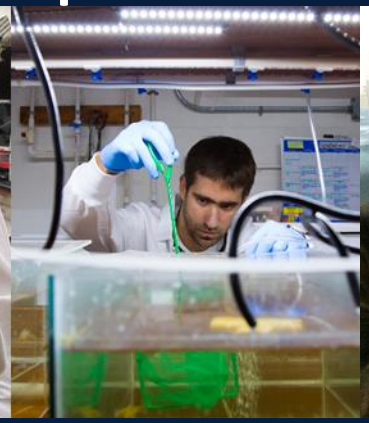
Detection & Identification



Fate & Transport



Impacts & Visualization



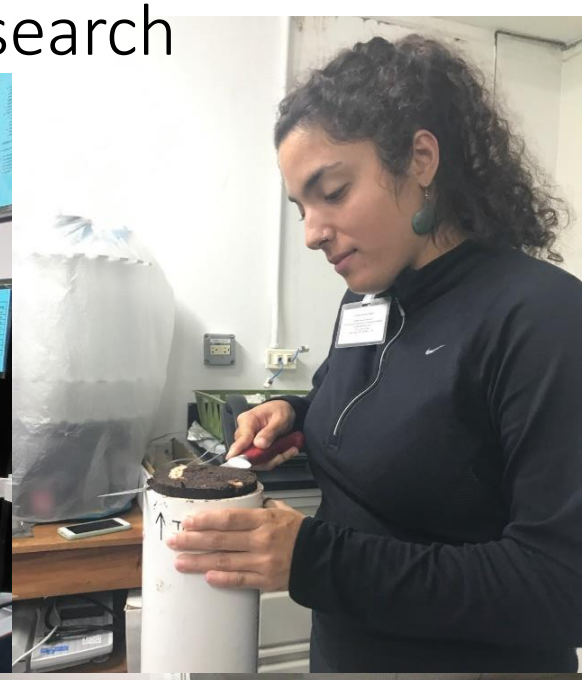
Discovery-based Education

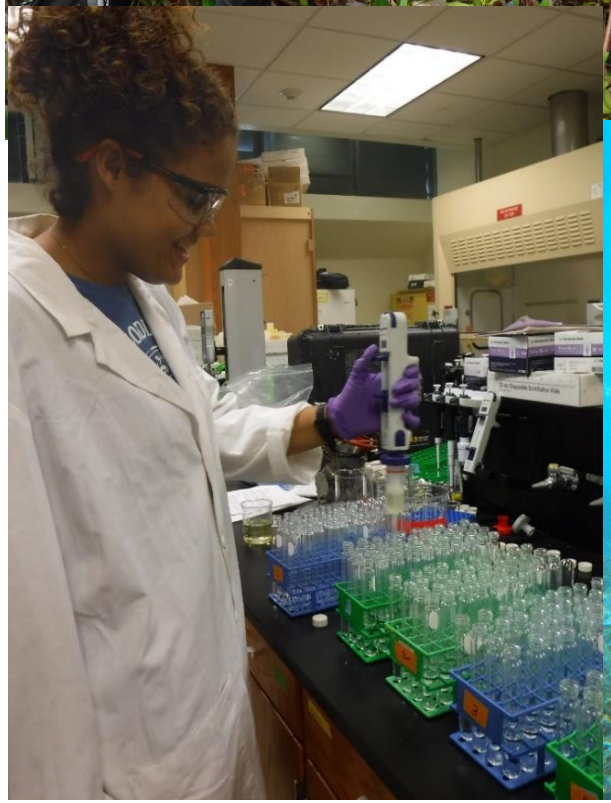
2017 & 2018 Summer Undergraduate Fellowships at CREST CAChE
10 weeks (May 21 – July 27)

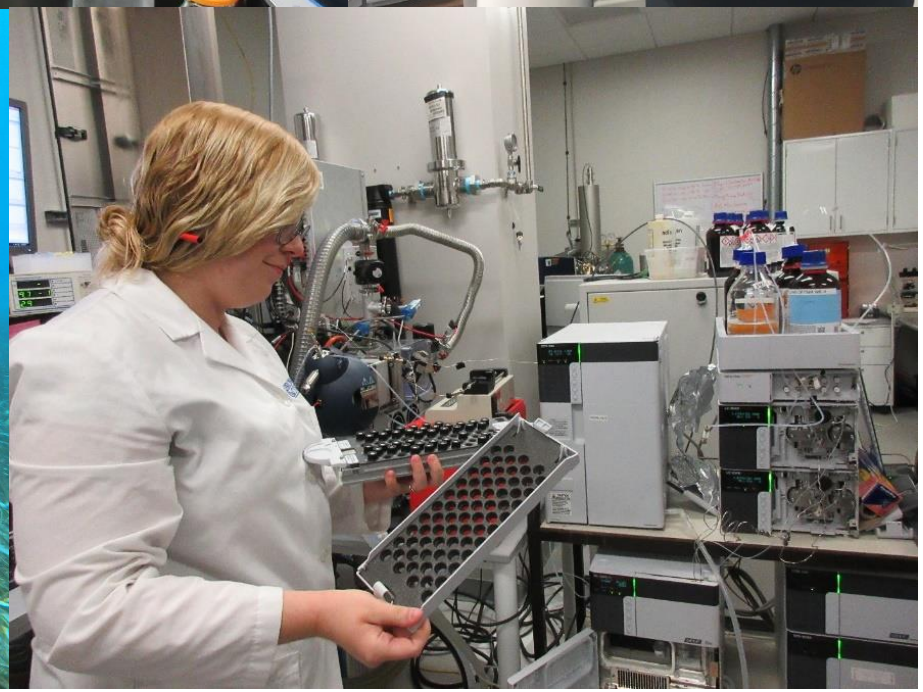
- Objectives:
  - Build an annual cohort of students from diverse backgrounds
  - Provide high-quality near-peer and team mentoring
  - Promote multiple STEM career pathways in ecology and water quality of coastal ecosystems

- Description:
  - Students co-develop independent research projects with mentors and present results in a symposium at the end of the 10 weeks
  - Professional development activities are provided to enrich student experience
  - Regular group field experiences foster collegiality

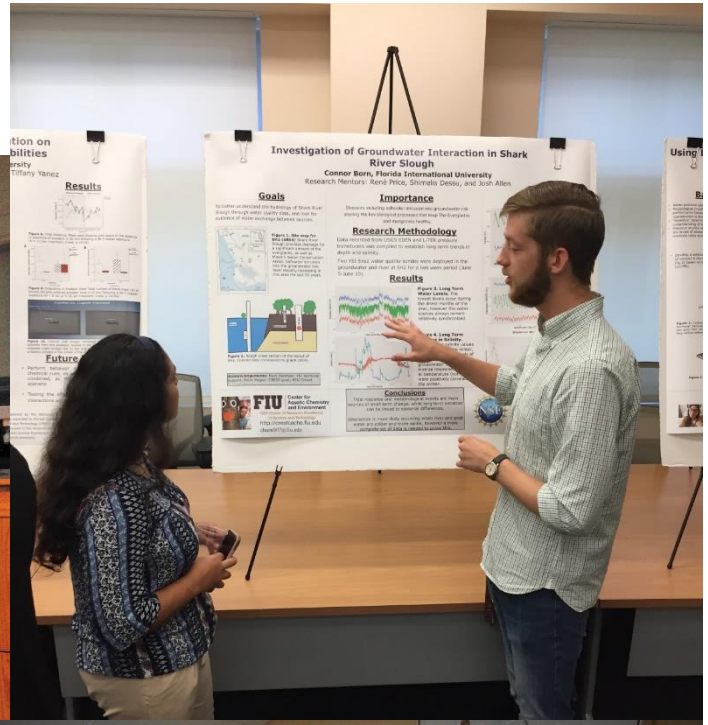
Undergraduate Student Research







Student Research Symposium – Week 10



Professional Development: Workshops, Facility Visits, and Outreach

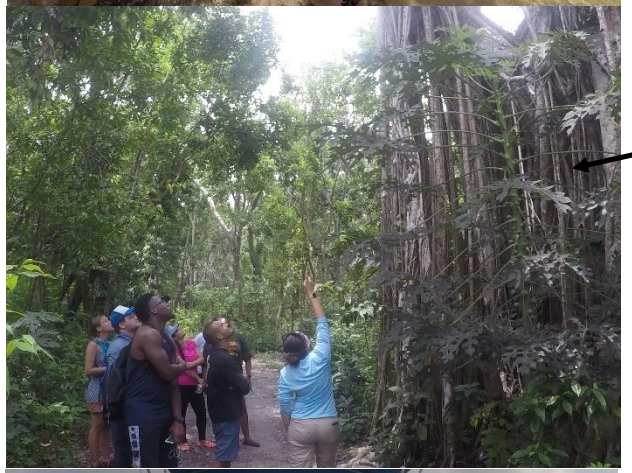
Week	2 Hour Activities/Meetings
1	REU Orientation
2	Research design and data analysis
3	How to write a scientific paper
4	Preparing an effective PowerPoint presentation
5	Communicating Science / Visit to iCAVE
6	Integration of Art & Science at Pinecrest Gardens
7	Mass Spec and Applied Research Lab visits
8	Career Pathways Panel
9	Oral presentations practice and critique
10	Research Symposium / EcoAcademy

Artist-in-residence, Xavier Cortada, discusses the confluence of science and art

Students ask scientists questions at the Career Pathways Panel

Rookery Bay
Everglades
Deering Estate
Seagrass Beds
Coral Reefs
Biscayne Bay Mangroves
Miami River
Oleta River, Biscayne Bay
Loxahatchee
Biscayne Bay Campus
Rookery Bay National Estuarine Research Reserve
FIU
Aquarius Reef Base
Fort Myers
Cape Coral
Naples
Marco Island
Fort Lauderdale
Hollywood
Hialeah
Miami
Homestead
Key Largo
Marathon
West Palm Beach
Boca Raton
Everglades National Park
Biscayne National Park
Big Cypress National Preserve

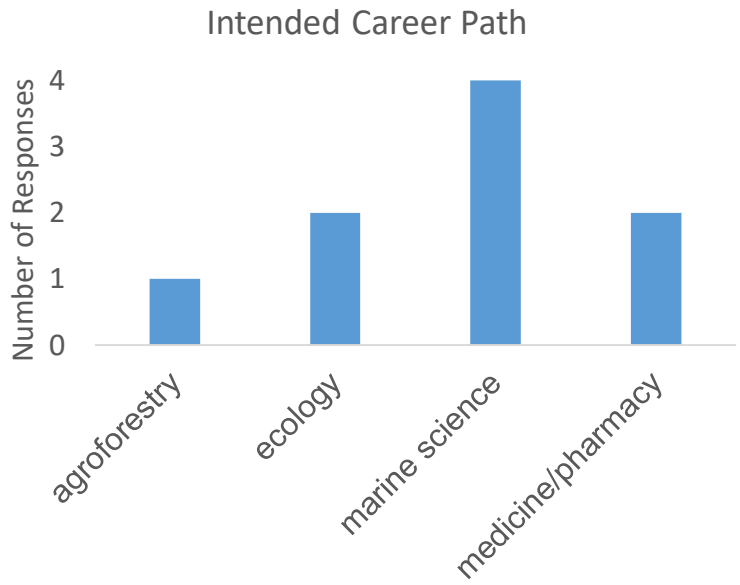
Cohort Building Field Experiences



Week	Location	Topics Covered
2	Biscayne Bay boat trawl and beach seining	Mangrove habitat vulnerability to extreme events, fish and invertebrate ID
3	Loxahatchee walking tour & marsh canoe trip	Role of large-scale physical models in testing environmental restoration strategies
4	Deering Estate bay kayak and walking tour	Seagrass/sea turtle species described, hurricane disturbance to south Florida, archaeological sites
5	Everglades airboat tour	Wetlands benefits, Everglades restoration, non-native and invasive species impacts
6	Biscayne Bay mangrove hike	Exploring environmental gradients, ecosystem succession
7	Rookery Bay NERR boat tour and trawl	National Estuarine Research Reserve System, NOAA System-Wide Monitoring, species adaptation
8	Florida Keys coral reef and seagrass bed tour	Coral and seagrass ecosystem services

Measures of Program Success

(9 of 14 answered survey questions)



- Continued engagement in STEM research? 90%
- Scholarly Productivity?
  - Presentation of research at meetings/conferences
- Plans to attend graduate school? 100%
- Career field of interest after completing program?
- What did students most appreciate about the experience?

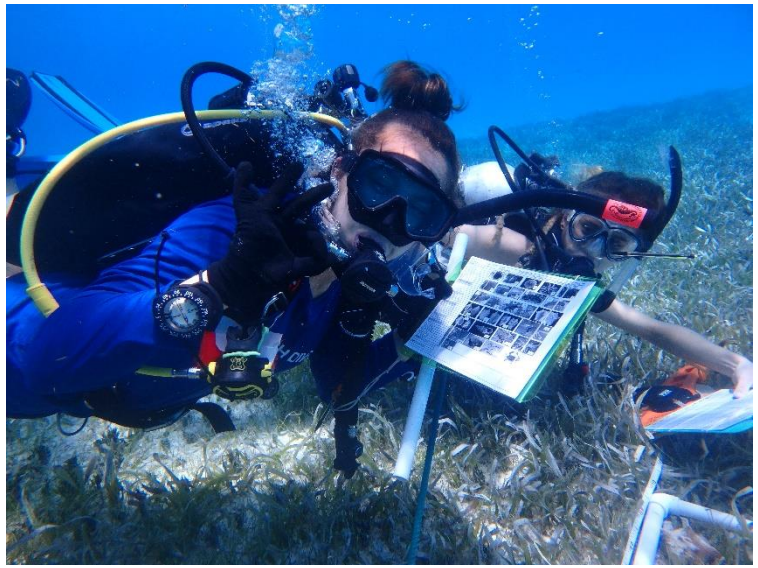
  - Opportunity for independent hands-on research experience
  - Field trips / field experience
  - Connections made with other students and mentors

Motivation, Gains, and Challenges for Near-Peer Mentors

- Motivation
  - Part of academic training / improve mentoring skills
  - CV building
  - Enjoy the interaction/desire to help
  - Extra pair of hands

- Gains
  - Experience as a supervisor / mentor
  - Satisfaction from helping students discover science
  - Learn skills and learn about own strengths/weaknesses
  - Improved research result

- Challenges
  - Managing time in lab vs. time with cohort activities
  - Time commitment and availability
  - Logistical constraints
  - Gauging student knowledge-base

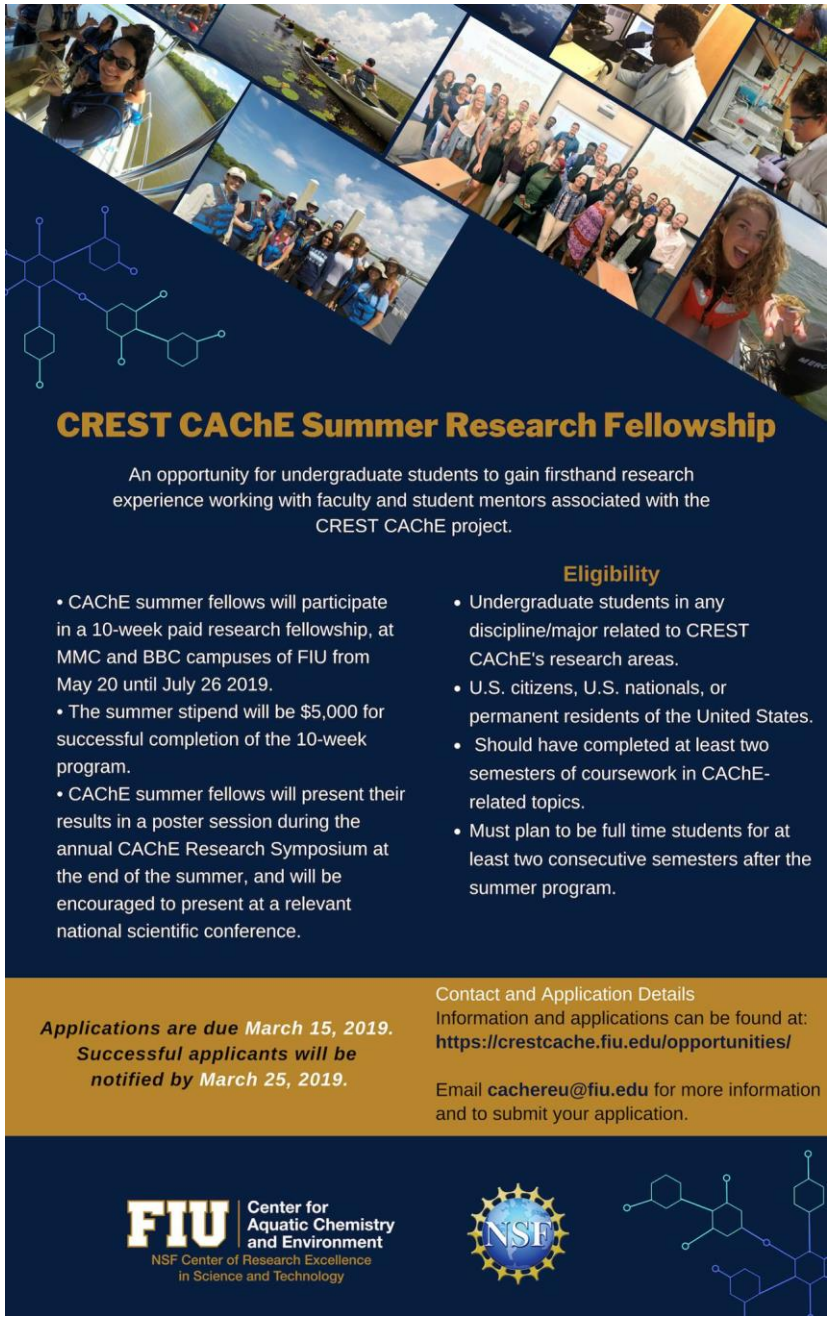


Recommendations

- from Students:
  - More workshops
  - Increased number of activities between research groups
  - Assign at least 2 students to a lab
  - Progress reports for the participants

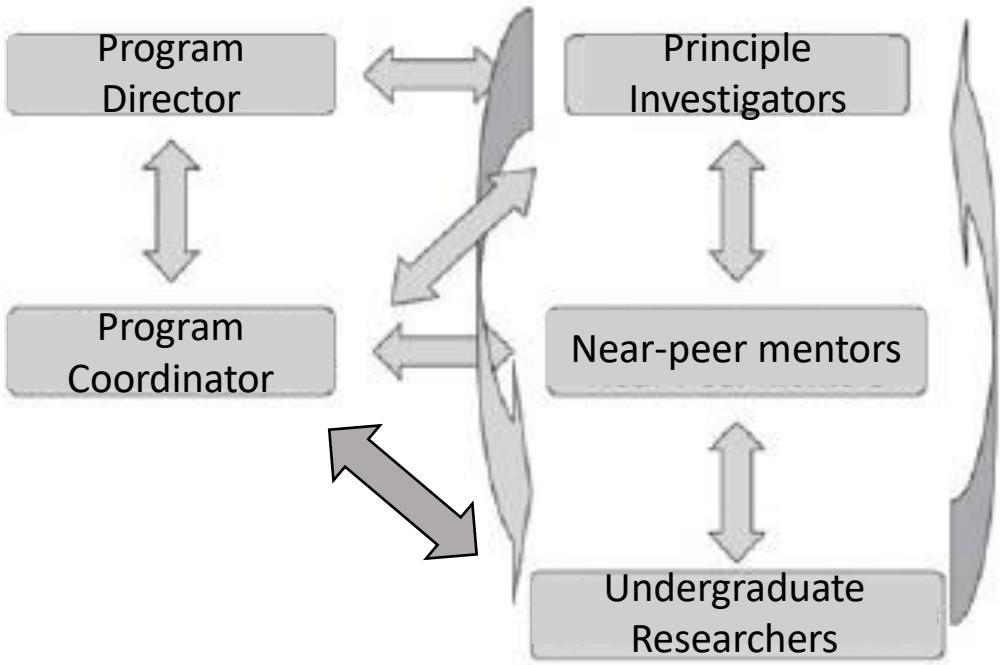
- from Near-Peer Mentors:
  - Schedule professional development activities and field trips at end or beginning of each week or weekend
  - Eliminate cohort sessions during certain weeks
  - Additional workshops in data management and analysis, literature review

https://crestcache.fiu.edu/opportunities



Takeaways and Future Directions

- Socialization into the scientific community fostered through the combined team-mentoring and cohort approach
- Gains have outweighed the challenges
  - Near-peer mentors and mentees were overwhelmingly positive about their experiences
  - Mentors either continue to currently mentor students and/or would like to mentor more students
  - Mentees are planning for STEM careers
- Scheduling of 2019 Summer URE



Conceptual diagram of relationships within team mentoring approach (adapted from Edgcomb et al. 2010).

Acknowledgments

- Thank you to mentors, mentees, lab PIs and managers, Institute for Water and Environment staff
- CREST CAChE is supported by the National Science Foundation under Grant No. HRD-1547798
- External partners: National Park Service, U.S. Environmental Protection Agency, Miccosukee Tribe of Indians, & South Florida Water Management District

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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.