MSC Educational Programs

Beth Austin-DeFares
Director of Education
Maritime Security Center

Annual Review Meeting - May 13, 2020

Educational Program Portfolio

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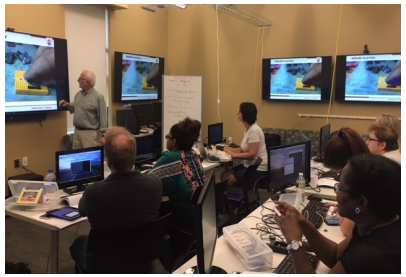

Image credit: B2B Defense

Professional Development Programs

- Maritime Cyber Security - Pilot Course
- MSI Educator's Workshops

Workforce Development - Research-based Experiential Learning Programs for Students

- Summer Research Institute
- Coordinated STEM Internships
- Research Assistantships

Professional Development Programs

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Maritime Cyber Security Professional Development Course

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UNITED STATES COAST GUARD
U.S. Department of Homeland Security
MARINE SAFETY ALERT
Inspections and Compliance Directorate
July 8, 2019
Washington, D.C.
Safety Alert 06-19
Cyber Incident Exposes Potential Vulnerabilities Onboard Commercial Vessels

Overview:

The two-day course is designed to provide marine safety personnel with foundational cyber security knowledge to enable cyber risk awareness as part of routine security inspections and cyber incident response.

Objectives:

- Create maritime cyber security education curriculum in support of the CG Cyber Strategy's workforce imperatives.
- Assist CG Sector Units in their cyber response and preventative measures.

Maritime Cyber Security Course
Stakeholder Engagement

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Stakeholders:

- **LCDR Michael DeVolld, Coast Guard Cyber Command**
- **LCDR Sarah Brennan, USCG Sector NY**
- **LT. Emily Miletello, USCG Sector NY**

Roles in project: Provide context, boots on the ground perspective and course content development.

Outcomes: Development of a Maritime Cyber Security pilot course tailored to Coast Guard Marine Safety Inspectors and Investigators.

Meetings: May 18, 2020, April 27, 2020, April 6, 2020, March 23, 2020, Feb. 28, 2020, Nov. 26, 2019, Sept. 25, 2019

Maritime Cyber Security Course Milestones

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No.	Milestone	Percentage completed	Completion Date	New Plans / Contingency
M1	Collaborate with USCG Cyber Command to identify maritime cyber education needs.	100%	11/2019	
M2	Adapt Stevens Maritime Cyber course into a professional development/short course format	100%	2/2020	
M3	Develop course modules in conjunction with USCG Cyber Command POC	100%	4/2020	
M4	Confirm course date and location with USCG POC	100%	10/2019	
M5	Deliver course.	75%	6/30/2020	Due to COVID19, the delivery of the course will be postponed to late summer/early fall 2020.
M6	Gather course feedback in the form of a post-program survey.			

Maritime Cyber Security Course
Activities and Accomplishments

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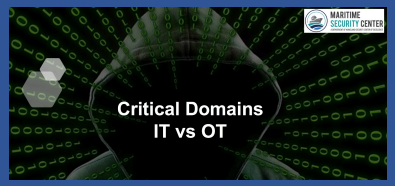
Course Content and Modules

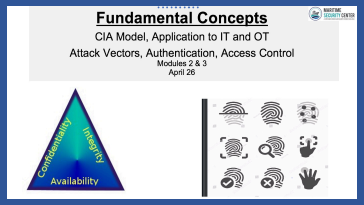
Fundamental Concepts

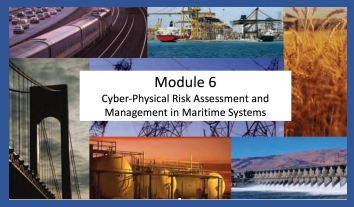
- MTS Overview
- USCG Cyber NVIC Guidelines
- Critical Attack Domains
- Recent Cyber Attacks
- Fundamentals of Cyber Security
- GPS, AIS – Spoofing & Jamming

Vulnerabilities & Risk Improvements

- Vulnerabilities & Risk Improvement in Information Technology and Operational Technology (IT /OT)
- Cyber-Physical Risk Assessment in Maritime Systems
- Cloud Computing-Risks and Benefits







Maritime Cyber Security Course
Project Impact, Transition and Sustainability

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- CG Marine Inspectors will gain the foundational knowledge needed to determine if cyber security is adequately addressed as documented in security plans.

- The MSC plans to transition the course curriculum materials into Coast Guard education portfolios and to continue to work with CG Cyber Command and Sector NY to identify opportunities for ongoing and future tailored offerings.

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Maritime Cyber Security Professional Development Course Questions?

Contact: bdefares@stevens.edu

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MSI Educator's Workshop

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MSI Educator's Workshop

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Overview:

MSC collaborates with educators from Minority Serving Institutions (MSI) to provide educational instruction and curriculum resources on topics related to maritime security.

Objectives:

- Provide resources to support MSI educational programs and enhanced opportunities for research collaborations with the MSC.

- Encourage the inclusion of USCG and homeland security examples in relevant lesson plans and classroom activities.

- Introduce students from diverse backgrounds to DHS missions and to careers within the maritime and homeland security domains.

MSI Educator's Workshop Milestones

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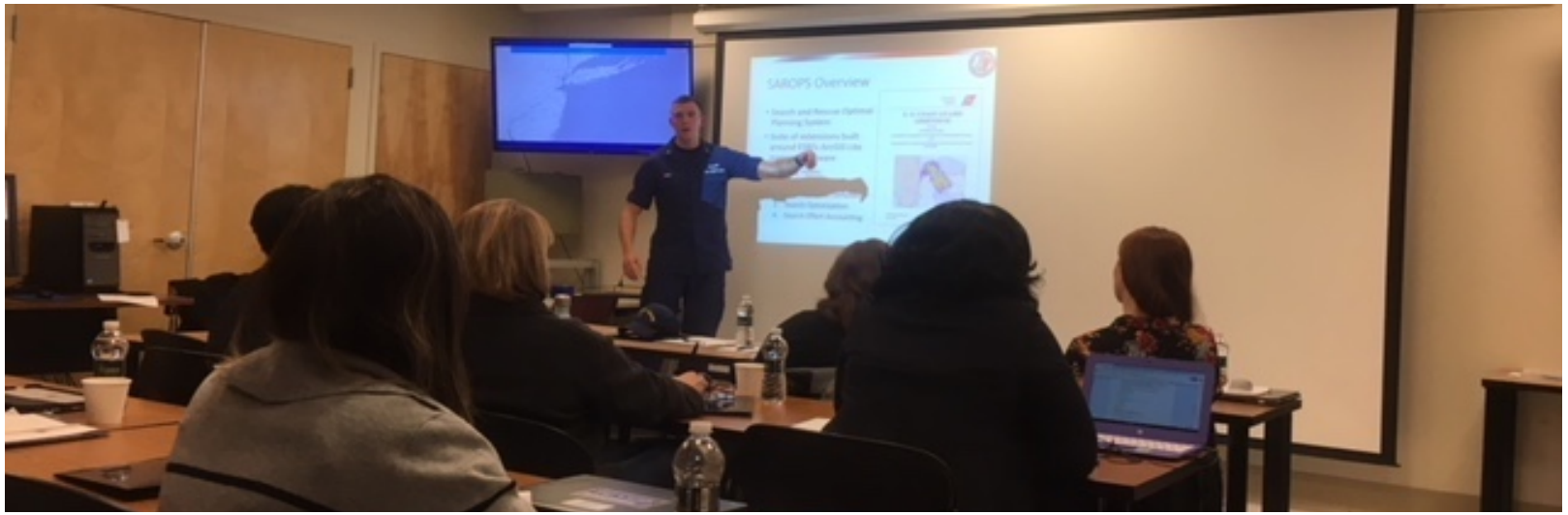
No.	Milestone	Percentage completed	Completion Date	New Plans / Contingency
M1	Development of Workshop	100%	12/2019	
M2	Workshop Held	75%	5/29/2020	Workshop will be held 30-days past the stated milestone due to participant availability. Workshop will be held remotely due to COVID 19.

MSI Educator's Workshop
Stakeholder Engagement



2020 **MTS Cyber Security – Curriculum and Workforce Needs**
Stakeholder: USCG Sector NY – LT Alexander Kloo

2019 **Fundamentals of Sensing Technologies**
Stakeholder: USCG Sector NY - LT Alexander Kloo

2018 **Environmental Data Collection and STEM Education**
Stakeholder: USCG Sector NY - Mr. John Hillin,
Safety & Security Division Chief

MSI Educator's Workshop
Activities and Accomplishments - 2019 Program

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Fundamentals of Sensing Technologies Workshop

Workshop Modules:

- Fundamentals of Sensor Technologies
- Sensor technologies used in maritime applications
- ***Discussion with USCG Personnel***
  - ***Search and Rescue, Vessel Traffic and Ocean Weather Forecast***
- Build a temperature sensor system – hands-on activity.

Resources: Educators received sensor kit materials, lesson plans and classroom activities.

MSI Educator's Workshop
Program Impact – 2019 Assessment

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Post-Workshop Survey:

*90% of the participants rated the workshop "**Excellent**" in the **Quality of Curriculum Materials** and **Program Facilitation.***

*90% reported that they were likely to incorporate all lesson plans pertaining to **maritime search and rescue, vessel traffic, and ocean weather forecast** into their existing program curricula.*

MSI Educator's Workshop
Upcoming events for 2020

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Maritime Transportation System (MTS)
Cyber Security Curriculum Workshop
May 29, 2020
Online via Zoom

NJCU
NEW JERSEY CITY UNIVERSITY

Workshop modules:

- The Maritime Transportation System (MTS)
- USCG Cyber Strategy and Maritime Cyber Workforce Needs
- Fundamentals of Physical Security
- Cybersecurity in the MTS

The City College of New York

TSU
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UTSA
The University of Texas at San Antonio™

MSI Educator's Workshop
Transition and Sustainability

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- Educator's from Stevens' **Accessing Careers in Engineering and Science (ACES)** and **Center for Innovation in Engineering and Science Education (CIESE)** programs routinely participate in MSC's workshops.

- ACES has incorporated lesson plans and classroom activities developed by the MSC into their respective programs with high school students and educators.

- Workshop lesson plans and curriculum materials are available for public download on the MSC website www.stevens.edu/MSC.

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MSI Educator's Workshop Questions?

Contact: bdefares@stevens.edu

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Grab some coffee.....
10 Minute Meeting Break

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Workforce Development

Student Research and Experiential Learning Programs

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Workforce Development - Student Research and Experiential Learning Programs

Summer Research Institute (SRI)

Coordinated STEM Internship

MSC Research Assistantships

Summer Research Institute (SRI)

Overview: The eight-week intensive program is designed to expose students to critical issues in the maritime security domain, while engaging them in research and field-based activities with DHS stakeholders.

Program Format:

- DHS-focused research projects.
- Guest speakers and field-visits.
- Faculty mentorship and student teamwork.
- Students complete project reports, presentations, and research posters.

Program Objectives:

- Engage students in rigorous research projects that produce innovative work and quality outcomes.
- Enhance student interest in pursuing advanced academic study and careers in the Homeland Security domain.

SRI 2019 & 2020
Program Milestones

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No.	Milestone	Percentage completed	Completion Date	New Plans / Contingency
M1	Featured lectures by MSC researchers & HS guests	100% (2020) / 100% (2019)	4/2020 6/2019	2020 – Online Webinars
M2	Field-visits and field-based activities.	0% / (2020) 100% (2019)	6/2020 6/2019	Due to COVID19, no field-based activities will occur in 2020.
M3	Diversity of student participants.	100% (2020) 100% (2019)	3/2020 3/2019	
M4	Research Reports, presentations and posters.	100& (2019)	7/2020 7/2019	
M5	Post-program Student Survey.	100% (2019)	7/2020 7/2019	

SRI 2019 & 2020
Stakeholder Engagement

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Date	Stakeholder	Engagement/Activity
2019	CBP Field Operations Port of New York / Newark	Field-visit, technology review, networking with CBP Officers
	USCG Sector NY	Briefing w/ COTP and Safety & Security Div. Chief, Visit to Command Center
	CBP NY Laboratory	Lab-visit and discussions with scientists
	Port Authority of NY/NJ, Bayonne Cruise Terminal	Full-scale Active Shooter Exercise – Students role played victims/observers
	Bert Macesker, Director and Grace Python, Sr. Operations Analyst, USCG RDC	Guest Lecture - USCG Research Portfolio and Perspectives from a program alumni in the workforce.
	USCG Sector NY, CBP, NUSTL, DHS S&T OUP, NJ State Police, Duro UAS	Stakeholders and program alumni attended final student research presentations. (July 26, 2019)
2020	CBP Field Operations, PANYNJ, RNT Foundation, Texas Military Dept., USCG Sector NY, Verisk Analytics	Confirmed Webinar Speakers for the SRI 2020 online program.

SRI 2019
Program Activities and Accomplishments

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Student Demographics:

25 Students

7 Universities/2 MSIs

11 Academic disciplines

Research Projects:

- AIS Anomaly Detection
- UAS Buoy System
- Sector NY Risk Mgt. Dashboard
- Red Team / Blue Team
  BlueROV- Enhanced Perception and Navigation
- WAMV- USV Simulator

Field-visits and Guest Speakers:

CBP Port of NY/Newark,
CBP NY Laboratory,
USCG Sector NY, USCG RDC

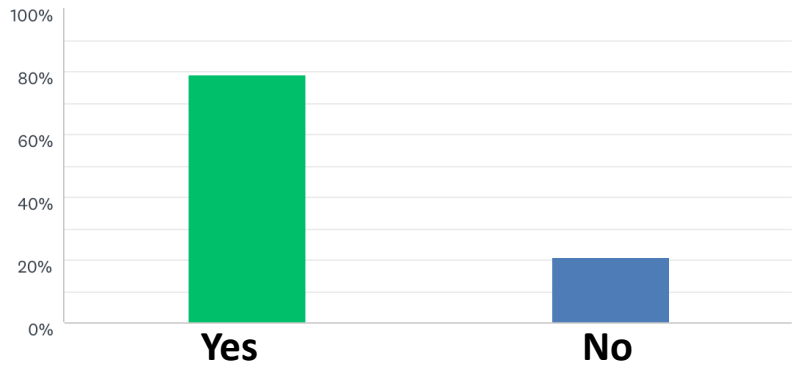
Outcomes: Project reports, presentations, research posters

Summer Research Institute (SRI)
Program Impacts

2019 SRI Post-Program Survey

Has the SRI enhanced your interest in pursuing a Career and/or further academic study in the field of maritime/homeland security?

Answered: 24 Skipped: 0



SRI Alumni Survey (2010 - 2019)

- A third of the alumni respondents reported that they are currently employed in an occupation related to homeland security.

SRI and Research Assistantship Alumni
Tyler Mackanin (l) and Blaise Linn (r)
National Urban Security Technology Lab

SRI 2020
Planned Activities
To be held virtually June 1 – July 24, 2020

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Student Demographics:

23 Students

5 Universities / 2 MSIs

12 Academic disciplines

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BOSTON UNIVERSITY

MONTCLAIR STATE UNIVERSITY

The City College of New York

TSU TEXAS SOUTHERN UNIVERSITY

Research Projects:

- Maritime Cyber Risk – IT/OT
- Sulfur Emission Detection
- Risk Management Dashboard
- Wave Glider- AI-enhanced design
- Off-Shore Windfarm
- BlueROV

Webinar Speakers

USCG Sector NY

CBP Port of NY/Newark

RNT Foundation

Verisk Analytics

Texas Military Dept.

Port Authority of NY/NJ

Summer Research Institute (SRI)
Sustainability / Institutionalization

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- The program format, project descriptions and lessons learned have been detailed in two peer reviewed publications for use by other COE's and Universities.

- Partnerships made through the SRI, will be extended to Stevens Institute of Technology's **Innovation & Entrepreneurship (I&E)** and **Clark and Pinnacle Scholars Programs** and into relevant academic programs for **Senior Design Projects.**

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Summer Research Institute (SRI)
2019 & 2020 Programs

www.stevens.edu/SummerResearchInstitute

Questions?

Contact: bdefares@stevens.edu

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Coordinated STEM Internship Program

Overview: Ten-week field-based internship program for homeland security career-focused STEM students.

Objectives:

- Provide practical internship experiences for MSC research students.
- Connect DHS stakeholders with STEM student talent.
- Create pathways for students to pursue opportunities and employment in the homeland security enterprise.

Coordinated STEM Internship Program Milestones

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No.	Milestone	Percentage completed	Completion Date	New Plans / Contingency
M1	Conduct outreach to DHS stakeholders to identify and confirm internship partners and student opportunities	100%	10/2019	
M2	Recruit and admit students into the HS STEM Coordinated Internship Program	100%	12/2019	
M3	Confirm internship projects, requirements and logistics	100%	4/2020 – Confirmation of internship logistics were delayed due to COVID	Project details are being updated to account for remote engagement.
M4	Convene ten-week field-based internship assignments	90%	6/2020	Internships will occur remotely due to COVID.

Coordinated STEM Internship
Stakeholder Engagement – Host Organizations

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NUSTL®
NATIONAL URBAN SECURITY TECHNOLOGY LABORATORY

Ms. Alice Hong, Director
Ms. Abby Hooper, Communications Lead
Ms. Gladys Klemic, Physicist/Scientist
Mr. Teddy Damour, Program Manager

RESEARCH & DEVELOPMENT CENTER
UNITED STATES COAST GUARD
FROM HERE...YOU CAN SEE TOMORROW

Mr. Bert Macesker, Director
Mr. Dave Cote, IT/Network Branch
Mr. Robert Riley, Branch Chief, IT/Network
Dr. Joseph DiRenzo, Dir. of Research Partnerships

DHS CUSTOMS AND BORDER PROTECTION
Laboratories and Scientific Services Directorate
NEW YORK LABORATORY

Dr. Adam Hutter, Director
Mr. Jason Bory, Assistant Laboratory Director
Dr. Jennifer Hayes, Forensic Scientist

Coordinated STEM Internship Activities and Accomplishments

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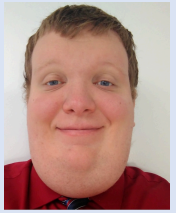
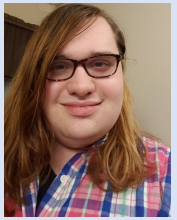
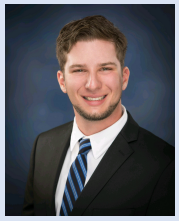


Jonathan Adamson, Chemistry/Nanotechnology
Placement: CBP New York Laboratory
Project: Improved Methods for Fentanyl Detection

Domenico Albarella, Mechanical Engineering
Placement: National Urban Security Technology Laboratory
Project: C-UAS Air Domain Awareness (ADA) program



Alice Huston, Computer Science/Software Engineering
Placement: USCG Research and Development Center
Project: IT and Networks - Maritime Operational Mobile Technology



Matthew Kirby, Mechanical Engineering/Systems Engineering
Placement: National Urban Security Technology Laboratory
Project: System Assessment and Validation for Emergency Responders (SAVER) – TechNote Development

Coordinated STEM Internship Anticipated Programs Impacts

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- Students will gain practical on-the-job experience within homeland security (HS) environments.
- The program will facilitate enhanced partnerships with DHS stakeholders and create pathways for future student opportunities and employment.
- DHS components will have the opportunity to contribute to the education and skills of homeland security -career focused students.

Coordinated STEM Internship
Sustainability / Institutionalization

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- Stakeholder relationships developed through the MSC will be extended to the greater Stevens Institute of Technology community, e.g. **Stevens Career Services** and **Co-Op Offices**, as well as to the **Center's Academic Partners,** for future student placements.

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Coordinated STEM Internship Program Questions?

Contact: bdefares@stevens.edu

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Research Assistantship Program

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Overview:

The Assistantship program engages graduate students in year-long homeland security focused research projects in conjunction with MSC researchers and DHS stakeholders.

Objectives:

- Facilitate opportunities for in-depth research experience.
- Connect students with stakeholders for collaboration.
- Produce quality student research outcomes.

Research Assistantship Program
Program Milestones

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No.	Milestone	Performance Metrics	% completed	Completion Date
M1	Research Assistantship-prospective student outreach and recruitment	Confer a minimum of 3 awards during the 2019/2020 academic year.	100%	08/26/2019
M2	Students complete requisite coursework.	Maintain GPA requirements and enroll full-time in coursework.	90%	5/31/2020
M3	Students present research at an MSC organized event or related DHS or stakeholder meeting	Assistants complete research reports, presentation slides and research posters	90%	5/31/2020

Research Assistantship Program
Student Projects 2019/2020 Academic Year

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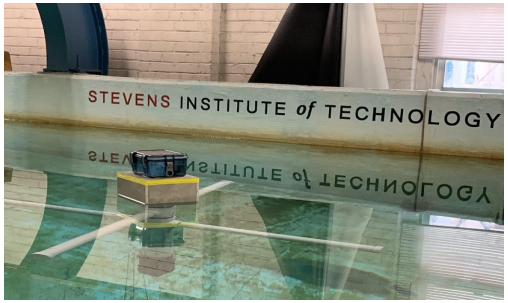
Jonathan Adamson
Chemistry/Nanotechnology
Research: ***Qualitative Identification of Fentanyl and its Analogs by use of Functionalized Carbon Quantum Dots***
Stakeholder: Dr. Adam Hutter, CBP NY Lab

Eric Isaksen
Ocean Engineering
Research: ***Impacts of Offshore Wind Farm Booster Stations on USCG Operations***
Stakeholder: CDR Moon, Sector SE New England

Kevin Raleigh
Ocean Engineering
Research: ***Hydrodynamics of Waystations for Autonomous Drone Charging***
Stakeholders: MSC and Stevens Davidson Lab



Research Assistantship Program Activities and Accomplishments

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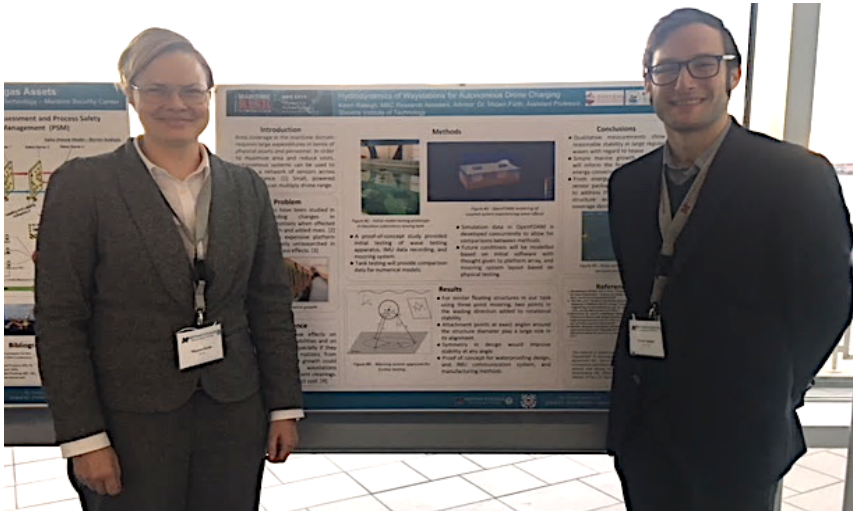

Dr. Mirjam Furth and MSC Research Assistant Kevin Raleigh – Maritime Risk Symposium 2019 Best Student Poster Winner

- 20 hours per week of research
- Fulltime enrollment
- Bi-monthly MSC and faculty mentor research reviews
- Stakeholder meetings/visits
- Attendance at professional conferences

Expected next steps:

- Complete remaining academic coursework
- Present research outcomes - May 19, 2020
- Submit final report and research poster
- Internship placement and ongoing research engagement

Research Assistantships Program Impacts

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"The partnership between MSC and NUSTL has provided the Lab with a continuous stream of skilled STEM students for internship projects that have led to careers in public service. Working together, we are an incubator for the next generation of the DHS STEM workforce." **Alice Hong, Director, NUSTL**

Port of Houston - Field Test
Four out of the seven NUSTL reps in this picture are MSC student alumni.

Image credits: NUSTL

MSC Student Alumni in the HS Workforce

Customs and Border Protection New York Laboratory (CBP)
National Urban Security Technology Laboratory (NUSTL)
NATO-Centre for Maritime Research & Experimentation (NATO CMRE)
Pacific Northwest National Labs (PNNL)
U.S. Army – Logistics Data Analysis Center
USCG Research and Development Center (USCG RDC)

Research Assistantship Program
Sustainability / Institutionalization

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- Partnerships made through the Assistantship Program will be transitioned to relevant Stevens academic departments and to research faculty for ongoing student /stakeholder project engagement, as well as to MSC's Academic Partners.

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MSC Research Assistantship Program Questions?

Contact: bdefares@stevens.edu

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