U.S. COAST GUARD ACADEMY

Annual Report *of* Research

Office of Scholarship, Research and Innovation

FALL 2024

USCGA

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Be Bold, Think Differently, and Innovate for Results

– Admiral Linda Fagan, Commandant

Our world is becoming ever more complex and unpredictable, and it is changing at an ever-increasing rate. These realities mean that the demand for the U.S. Coast Guard has never been higher, and it is the mission of the U.S. Coast Guard Academy to educate, develop, train, and inspire the next generation of U.S. Coast Guard leaders. Research and scholarship have become widely recognized as crucial elements to an undergraduate education and the development of critical thinking skills. These skills are fundamental to the development of leaders who will face the unknown and unexpected and who will find answers to the Coast Guard's greatest challenges that are yet to be discovered. The Academy is also the only degree-granting institution of higher education in the Department of Homeland Security and is therefore a critical source of intellectual and scholarly service to the U.S. Coast Guard and the nation. Our faculty, students, and staff have long stepped up to this call.

In this document, you will find a deeper look into a sample of these activities at the Academy and an overview of activity by all our scholars. I know you will find it impressive!

CAPT Gregory Hall, Ph.D.
Vice Provost for Research
Office of Scholarship, Research and Innovation

Photo: CGA Public Affairs

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Writing the Book on Civil Engineering Education

In their recent book, *Compendium of Civil Engineering Education Strategies: Case Studies and Examples*, Dr. Hudson Jackson and Dr. Kassim Tarhini, Department of Civil and Environmental Engineering, deliver a comprehensive collection of teaching strategies, sample assignments, and implementation ideas for the engineering classroom.

Inspiration for the book, according to Jackson, was the desire to "contribute to the discussion of improving engineering education, share our diverse perspectives and global experience, and bring some light to the excellent work that is being done here at USCGA." Ideas for the project took shape over 5 years, although most of the writing took place in 2021.

Jackson and Tarhini draw upon decades of teaching and research experience at the USCGA to detail for readers their diverse experiences introducing cadets to engineering concepts. While the Civil Engineering program at USCGA forms the basis of the book, teaching approaches discussed in several chapters address learning objectives common to most ABET-accredited undergraduate programs in the discipline. Each chapter contains technical explanations and practical applications backed by empirical research.

The book also covers topics beyond technical content, with such chapters as "Global Perspectives in Civil Engineering Education," "Development of Leadership Skills," "Critical and Design Thinking Skills," "Professional Ethics," and

Cadets in the course, 1411 Reinforced Concrete Design, design beams meeting typical failure mechanisms in reinforced concrete. Here, cadets are gathered around the formwork containing rebar, just before placing concrete to produce five beams.

Dr. Hudson Jackson

Dr. Kassim Tarhini

"Assessment of Student Learning." It highlights how classroom instruction can be leveraged to promote universal leadership skills and other forms of professional development.

The final chapter addresses outreach, recruitment, and retention in undergraduate Civil Engineering programs.

Jackson and Tarhini cite a widening gap between the demand for engineering professionals in today's workforce and the number of college students graduating from engineering programs. The book explores some solutions, such as career imprinting in K-12 schools and offering summer outreach programs to attract students to engineering fields. As a case in point, the authors discuss the USCGA's Robotics on Water (CGAROW) program for high-school students.

Why take such a high-altitude approach to a book on practical teaching? The authors explain in the preface: "Global interconnectedness now requires engineers to not only be technically competent but to also embrace diversity, be sensitive to cultural needs, be ethical, and demonstrate good leadership qualities."

"Global interconnectedness now requires engineers to not only be technically competent but to also embrace diversity, be sensitive to cultural needs, be ethical, and demonstrate good leadership qualities."

These skills may be especially important for engineers charged with developing environmentally sustainable engineering solutions in the future. Jackson and Tarhini suggest that a holistic approach to teaching can help students better understand the impact of their work on society. They also emphasize that a flexible frame of mind can help students adapt their work to engineering needs associated with changing climatic conditions.

Learn more at: Jackson, H. and K. Tarhini. (2022). *Compendium of Civil Engineering Education Strategies: Case Studies and Examples.* CRC Press, Boca Raton, FL. 226 pp.

Social Network Analysis Helps Mitigate Stakeholder Conflict in Offshore Wind Development

Published in the journal, *Marine Policy*, Dr. Tiffany Smythe's (Department of Government) recent paper examines complex relationships between the burgeoning offshore wind industry in Southern New England and the regional commercial fishing community.

Supported by a summer fellowship from the USCGA Center for Advanced Studies (now Faculty Research Forum), Smythe studied conflict between these two groups when wind farm permitting decisions are being made.

The study focused on recent debate surrounding the Block Island Wind Farm, the nation's first offshore wind energy facility. The installation consists of five 6-MW wind turbines situated 16 miles off the Rhode Island mainland, where it has been operational since 2016.

Conflict between offshore wind and fisheries priorities stems from the growing role that wind energy plays in the nation's renewable energy portfolio and the potential for wind farms to interfere with fishing activity. To date, two offshore wind farms have been constructed in the U.S., and more are expected, as the Bureau of Ocean Energy Management has issued 25 more offshore leases to wind developers.

Meanwhile, the local fishing community contends that offshore wind farms can limit access to fishing grounds, harm fish and their habitats, pose navigational hazards to vessels, interfere with fishing gear, and raise insurance premiums.

Smythe's goal was to characterize the nature of this controversy using the Block Island Wind Farm as a case study. She expected that lessons learned from this example would highlight opportunities to mitigate similar conflict when additional wind farms are developed elsewhere in the future.

The study employed social network analysis, which involved detailed, structured mapping of relationships among stakeholders as they related to communication, coordination, and trusted sources of advice and information.

To characterize these relationships, Smythe conducted numerous interviews with offshore wind developers, fishers, fisheries advocates, and representatives of government agencies, non-governmental organizations, and universities.

She notes that interviews can be difficult with such a controversial subject: "I had to work really, really hard to build the trust and respect needed to encourage both stakeholders and decision-makers to participate in my study."

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Ultimately, results revealed that, although a wide array of stakeholders were invested in policy decisions related to the Block Island Wind Farm, three organizations emerged as the most influential within the communication and coordination networks. Two were offshore wind developers, which was unsurprising to Smythe given the nation's wind energy goals and the outsized role the wind industry played in its development.

The other influential stakeholder, however, was a fisheries advocacy group, Responsible Offshore Development Alliance (RODA). It is notable, Smythe writes, that a fisheries organization would rise to the same level of influence as wind farm developers, since previous studies identified the fishing community as holding a weak bargaining position when compared to other industries and interests.

Smythe (far right) and three USCGA cadets (left) conduct a site visit of the Block Island Wind Farm off Rhode Island. (Photo: T. Smythe)

Dr. Tiffany Smythe

In evaluating trust, Smythe discovered that two National Oceanic and Atmospheric Administration (NOAA) offices emerged as the most trusted members of the network. Both were NOAA Fisheries offices. Interviewees ranked these offices high as sources they could rely upon to hear and act upon their concerns.

Smythe writes that trusted organizations such as NOAA Fisheries can play a productive role in bridging the divide between opposing coalitions. Consequently, future offshore wind farm projects lacking a neutral, trustworthy stakeholder may find conflict difficult to resolve.

Asked if she will continue to work on these issues, Smythe says "Yes, absolutely." She also encourages other scientists to study dynamics affecting the sustainable development of natural resources in shared ocean spaces: "The issues I write about in this paper have only become more complex and controversial since I collected the data – this problem is not going away. Those working in the field need objective scientific research to help them work through these challenges."

Learn more at: Smythe, T. (2024). Conflict or cooperation? An analysis of the Southern New England offshore wind-fisheries policy network. *Marine Policy* 163:106106. https://doi.org/10.1016/j.marpol.2024.106106.

What is SPRI?

In 2018, the U.S. Coast Guard Academy signed a Cooperative Agreement with a 501c3 organization that can apply for, accept, and administer research grants and funds on our behalf. That organization is the U.S. Coast Guard Academy Sponsored Projects and Research Inc. (SPRI), a separate organization set up with the assistance of the Coast Guard Academy Alumni Association, as authorized in law (14 USC 1906.) The SPRI has been tremendously supportive of the Academy since its inception, and we thank them for their partnership and for the generosity of the Alumni Association in their efforts to establish and sustain this important capability to garner support for our scholarly activities.

Faculty Team Investigates Strategies for Inclusive Pedagogy

Inclusive pedagogical practices in the classroom may help institutions of higher education improve student retention while enhancing the educational experience for students. This was the premise of a recent study conducted by a multi-disciplinary team of USCGA faculty members investigating how inclusive teaching practices can foster students' sense of belonging in the classroom and support the "whole student."

In their 2024 article published in the journal, *Discover Education*, Dr. Angela Jackson-Summers (Department of Management), Dr. Karina Mrakovcich (Department of Marine Science), Dr. Joshua Gray (Department of Chemical and Environmental Science), CAPT Corinna Fleischmann (Department of Civil and Environmental Engineering), Dr. Tooran Emami (Department of Electrical Engineering and Computing), and Dr. Eric Page (Department of Physics) systematically investigated trends in published literature that aligns with the Center for the Integration of Research, Teaching, and Learning (CIRTL) Inclusive Pedagogy Framework.

The CIRTL is a network of 45 research universities across the United States. Their framework for inclusive pedagogy is structured around three core competencies that support the ability of faculty members to cultivate welcoming and supportive classroom environments for their students. These core competencies are inclusive communications, inclusive pedagogy practices, and inclusive curriculum design. Each core competency is associated with specific strategies and skills for promoting an inclusive learning environment.

To build these competencies, the USCGA team argues, faculty need access to a robust collection of literature from which to draw and then implement best teaching practices. How the body of literature has grown over time and which core competencies are most represented in the available research were the focus of their study.

Dr. Angela Jackson-Summers

Jackson-Summers and her colleagues also examined whether publications on inclusive pedagogy may be more prevalent (and therefore more accessible to faculty) in some disciplines, such as education, the humanities, management, and economics, than in others, such as science, technology, engineering, and mathematics (STEM).

Overall, the team examined 304 publications addressing inclusive pedagogy. The earliest dated back to the mid-1970s, but the field grew most rapidly in the 2010s. Most (80%) articles published on inclusive pedagogy discussed the topic in the context of non-STEM disciplines. Papers were especially well represented in education journals. Within the STEM disciplines, the sciences contributed most articles to the literature on inclusive pedagogy, followed by engineering.

Of the three core CIRTL competencies, inclusive communication was the competency most often addressed in the literature. Strategies and skills associated with this competency include helping students increase awareness of their own world view and teachers demonstrating caring for students through attitude, expectations, and behavior. This competency was followed in prevalence by articles on inclusive pedagogy practices, which includes fostering student choice in assignments and utilizing multi-model teaching techniques.

Relatively few articles addressed inclusive curriculum design, and the team asserts that more research is needed in this area.

Relatively few articles addressed inclusive curriculum design.

Jackson-Summers said she was motivated to conduct the study, in part, by past experiences serving on the USCGA's Inclusive Pedagogical Practices (IPP) Inquiry Team. The IPP Team provided input to USCGA's Equity Task Force, which was formed in 2017 to assess a wide range of equity and inclusion efforts at the institution. Part of that effort involved compiling a list of scholarly papers for faculty to use when designing inclusive syllabi for their own courses.

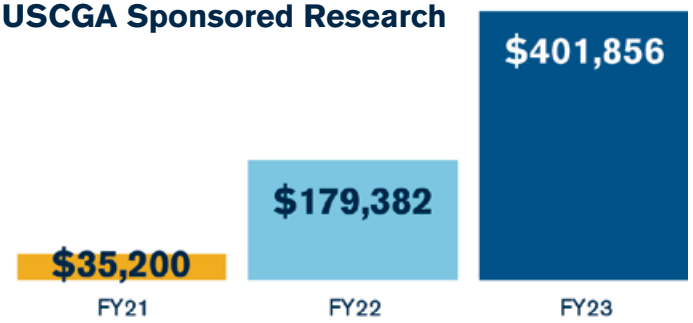
The article in *Discover Education* concludes with recommendations for future research. The team suggests that more studies on inclusive pedagogy practices be conducted in a broader range of disciplines, beyond education and science, so that findings are more robust. They also highlight the need to evaluate which strategies supporting the CIRTL core competencies are most effective at promoting inclusive learning environments for students.

Learn more at: Jackson-Summers, A.J., K.L. Mrakovcich, J.P. Gray, C.M. Fleischmann, T. Emami, and E.J. Page. (2024). A systematic review of inclusive pedagogy framework: multi-disciplinary and STEM perspectives, current trends, and research agenda. *Discover Education* 3:30. doi.org/10.1007/s44217-024-00093-y.

USCGA RESEARCH BY THE NUMBERS

Office of Scholarship, Research and Innovation AY23-24

USCGA Sponsored Research



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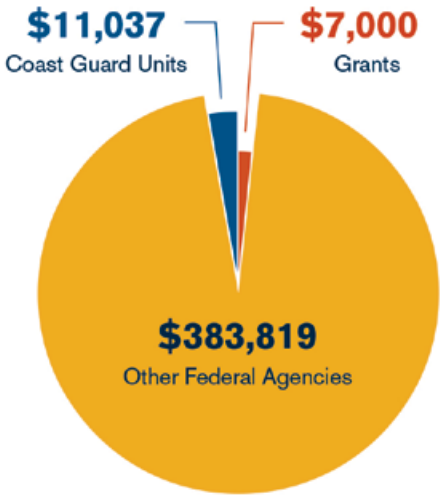
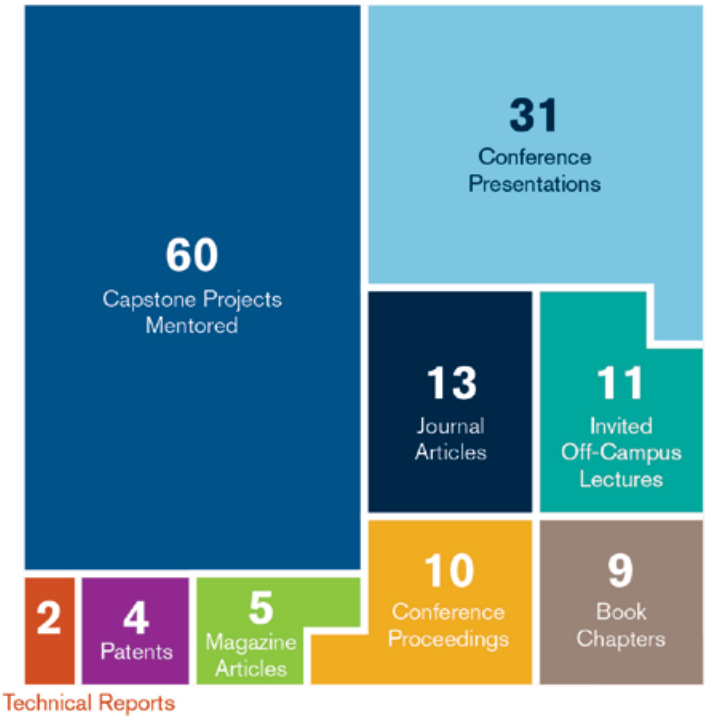


Faculty Scholarship 2023



USCGA Mathematics and the National Security Agency Advance Artificial Intelligence in the Maritime Domain

Fall Semester marks the fourth year that faculty in the USCGA Department of Mathematics will engage with research partners at the National Security Agency (NSA) to develop novel applications of artificial intelligence (AI) in maritime environments. Led by Dr. Ian Frommer and Dr. Arundhati Bagchi Misra, a 2024 Summer Research Fellowship recipient, the collaboration focuses on developing automated systems for vessel detection and classification, a capability with important applications in marine safety and national security.

As the lead U.S. federal agency for foreign signals intelligence, NSA's support of the Department of Mathematics in the form of project development and direct funding has been vital. Artificial Intelligence is one of the most versatile tools that federal agencies have to produce useful information from extremely large datasets in an efficient and effective manner.

According to CDR Matthew Williams, Mathematics Department Head, AI is likely to provide the Coast Guard with information that significantly enhances maritime domain awareness, especially when coupled with other sources of ship tracking information, like Automatic Identification System (AIS) datasets.

To support this goal, Frommer and Bagchi Misra have focused on AI techniques within the field of computer vision, which focuses on extracting information from visual data. Their approach uses human-robot teaming to collect images from sensor-equipped floating platforms in the field as well as training neural networks to automatically detect objects, like ships, from images and videos.

With support from NSA, faculty have developed new capstone projects for cadets majoring in Operations Research and Data Analytics. One such project requires cadets to deploy remote-controlled sensor platforms for image collection on the Thames River. New faculty laptops were acquired that can handle "big data," and classroom technology was upgraded to support team-based, computer-ready learning. Network improvements were also made in the Cyber Lab to facilitate data access and analysis.

In addition, Bagchi Misra and Dr. Kathy Krystinik, also in the Mathematics Department, plan to develop a directed study course focusing on image denoising models using neural network analysis.

Next steps for the collaboration are to test capabilities for image collection from other platforms native to the maritime domain, such as bridges or buoys, and to explore the use of drones. By supporting faculty research in this field, NSA aims to promote AI awareness among not only the faculty but also among cadets who will be leveraging these methods for Coast Guard missions in the future.

USCGA External Sponsors

- Bureau of Safety and Environmental Enforcement
- Department of Defense Corrosion Policy and Oversight Office
- MIT-Lincoln Laboratory
- National Geospatial-Intelligence Agency
- National Nuclear Security Administration
- National Security Agency
- Princeton Plasma Physics Laboratory
- U.S. Africa Command (AFRICOM)
- U.S. Army Corps of Engineers
- U.S. Coast Guard Command, Control, & Navigation
- U.S. Coast Guard Office of Law Enforcement Policy and Standards Division
- U.S. Coast Guard Polar Coordination Office
- U.S. Coast Guard Research and Development Center
- U.S. Coast Guard Waterway Mobility Division
- U.S. Military Academy

Center for Arctic Study and Policy News

Selected Highlights

Research highlights from the Center for Arctic Study and Policy (CASP) include several conference presentations, cadet research mentoring, grant activity, and articles published in support of Arctic strategy, safety, and sustainability.

Conference presentations by Dr. Abbie Tingstad, Visiting Arctic Research Professor, and Mr. Tony Russell, CASP Executive Director, at the 2024 Arctic Frontiers, Tromsø, Norway:

- Tingstad, A. "Characterizing diverging Arctic trajectories" Session: Navigating a Changing Arctic: Innovations for Sustainable Maritime Development.

Dr. Abbie Tingstad

- Tingstad, A. “Could serious games provide an avenue for facilitating community-based decision making in the context of Arctic climate change and development?” Evening Poster Session.
- Russell, A., A. Tingstad, L. Brigham, and M. Bennett, “Arctic Blue Economy 2050s Scenarios.” Side event, where participants collaborated to identify drivers of Arctic change and forecasted how the Arctic Ocean might look in 2050.

Op-ed articles highlighting a wide range of Arctic issues:

- Tingstad, A. "The Arctic takes center stage this week amidst geopolitical tensions." The Messenger October 19, 2023.
- Tingstad, A. "Being an Arctic nation is for the good of all Americans." The Maritime Executive, November 22, 2023
- Tingstad, A. "The U.S. is taking an important but imperfect step in initiating extended continental shelf claims – what are the implications for the Arctic?" Wilson Center Polar Institute, December 19, 2023.
- Tingstad, A. "Icebreakers are niche vessels, but their security, diplomatic value is high." The Seattle Times, July 28, 2024.

Mentored by CASP membership, 1/c Earnshaw and 1/c Green carried out an Advanced Research Project for the Government Department, “Gaming Coast Guard C2 in the Arctic” with accompanying Serious Game Facilitation Guide.

CASP-facilitated research collaborations:

- Bennett, M., A. Tingstad, and S. Stephenson, “Surveying the human and physical geography of the Arctic: baselining locations to enable planning under regional change,” National Science Foundation Principal Investigators Meeting.

CASP’s new Polar Insights series:

- A not-so ice-free Arctic Ocean: implications for Coast Guard operational capabilities, posture, and strategic messaging (Polar Insights 01-24)

Congratulations to CASP Fellow, Dr. Lawson Brigham, USCG ret., ho was recognized as the 2024 High North Hero by the High North Center for Business and Governance. This distinction honors his continued advocacy for addressing important challenges in the changing Arctic region.

2023 Faculty Publications

Peer-Reviewed Articles and Conference Proceedings

Alrishan, A.K., J. Watkins, and T. Emami (2023) Unified approach for robust stability design of PID controllers with Smith predictors. Proceedings of the IEEE International Conference on Electro Info Technology pp 95-102, Romeoville, IL.

Benin, J., W.M. Randall, and A.G. Jackson-Sum Summers (2023). The development, assessment and advancement of a student-centered cyber risk management course. ASEE Annual Conference & Exposition, Baltimore, MD.

Bidwell, D., T. Smythe, and J.G. Tyler (2023) Anglers' support for an offshore wind farm: Fishing impacts or clean energy symbolism. Journal of Marine Policy 151:105568.

Brahan, D. T. DeNucci, J. Falls, P. Miller, and P. Sousa. (2023) Assessment and experience of boatbuilding based PBL in two naval architecture programs. ASEE National Annual Conference Proceedings. Baltimore, MD.

Carter, J.A. A.L. Murphy, C.M. Holdridge, R.T. Flynn, S.M. Schollenberger, and T. Emami (2023) Smart hybrid hydrogen, solar, and battery system. Proceedings of the ASEE Annual Conference and Exhibition, Baltimore, MD.

Elkhatib D., T. Langknecht, M. Cashman, M. Reiss, K. Somers, H. Allen, K. Ho, and R. Burgess (2023) Assessment of filter subsampling and extrapolation for quantifying microplastics in environmental samples using Raman spectroscopy. Marine Pollution Bulletin 192: 115073.

Fleischmann, C., H. Jackson, and B. Maggi (2023) Enriching student learning through compelled active participation. ASEE National Annual Conference Proceedings, Baltimore, MD.

Flynn, R. T., C.M. Holdridge, A.L. Murphy, J.A. Carter, S.M. Schollenberger, and T. Emami (2023) Efficiency analysis of a hybrid solar system design. Proceedings of the ASEE Annual Conference and Exhibition, Baltimore, MD.

Fraher A.L., G. Martfeld, and T. McBride (2023) Video analysis of the Boeing 737 Max: a contribution to apology theory In Academy of Management Proceedings (1):15766.

Fulton, C., L. Taha, and T. Emami (2023) Project- based learning on solar energy from different light sources. Proceedings of the Annual IEEE International Conference on Electro Information Technology, Romeoville, IL.

Garcia, E.M.H. (2023) Project-based learning success in fundamentals of fluid mechanics. ASEE National Annual Conference Proceedings, Baltimore, MD.

Gonzalez, J.B. (2023) My father's roque. Huizache. Issue 10 September 2023.

Gonzalez, J.B. (2023) Still life of roque. Huizache. Issue 10. September 2023.

Kirby, C., K. Misra, A. B. Misra, and S.P. Cox (2023) The effects of dual-enrollment programs on students' post-secondary academic performance. CESifo Economic Studies 69(2): 91105.

Kudlak, Z., and P. Vernon (2023) Boundedness of solutions of $x_{n+1} = \frac{a'_n + b'_n y_n}{C'_n x_n}$ and $y_{n+1} = \frac{a_n + b_n x_m + c_n y_n}{A_n + B_n x_n + C_n y_n}$ with non-constant coefficients. Advances in Discrete Dynamical Systems, Difference Equations, and Applications. Proceedings of the International Conference on Difference Equations and Applications, Paris-Saclay France.

Langknecht, L., W. Lao, C. Wong, S. Kotar, D. Elkhatib, S. Robinson, R. Burgess, and K.T. Ho (2023) Comparison of two procedures for microplastics analysis in sediments based on an interlaboratory exercise. Journal of Chemosphere 313:137479.

McGarry, D., R.J. Hartnett, P.F. Swaszek, B. Chan B. Evans, and A. Kenna (2023) Potential LEO satellite augmentation for Rescue-21 in Alaska. Proc. of the 36th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2023), Denver, CO.

Miller, P. and M. Morabito (2023) Considerations of hull structural deformation on hydro-dynamic performance of sailing yachts. Journal of Ship Design and Production, SNAME, 39(02):75-78.

Park, S.K., D. Copic, T.Z. Zhao, A. Rutkowska, B. Wen, K. Sanders, R. He, H. Kim, and M. De Volder (2023) "3D porous Cu-composites for stable Li-metal battery anodes." Journal of ACS Nano 17 (15): 14658–66.

Shugart, G.W., C.L. Waters, J.D. FitzPatrick, R.S.A. Kaler, and L.S. Vlietstra (2023) Short-tailed shearwater (*Ardenna tenuirostris)* plastic loads and dimensions exhibit spatiotemporal similarity in the Pacific Ocean. Marine Pollution Bulletin 192: 115038.

Szelwach, C., K. Sweet, P. Vermeer, and K. Tarhini (2023) A holistic approach to embodied leadership development at the U.S. Coast Guard Academy. Org. Development Journal, International Society for Organization Development and Change 41(1): 54-68.

Vlietstra, L.., K.R. Hinrichs, E.R. Bernstein, A. Darden and M. Martino (2023). Polar class ship accessibility to Arctic seas north of the Bering Strait in a decade of variable sea ice conditions. Frontiers in Marine Science 10: 1171958.

Weis, D., K.S. Harpp, L.N. Harrison, M. Boyet, C. Chauvel, C.G. Farnetani, V.A. Finlayson, K.K.M. Lee, R. Parai, A. Shahar, and N.M.B. Williamson (2023) Earth's mantle composition revealed by mantle plumes. Nature Reviews Earth & Environment, 1-22

White, J. and W. Jones (2023) When should you begin receiving Social Security payments? Incorporating time value of money. Papers and Proceedings, 53rd Annual Meeting of the Southeastern Decision Sciences Institute, Wilmington, NC.

Xu, Y. and L. Dong (2023). Multicultural experiences and creative team performance: an empirical study of global virtual teams. Proceedings of the 29th Annual Conference of the International Association for Applied Management.

Xu, J., M.F. Keblis, Y. Feng, and S. Zhou. (2023) Optimal replenishment and transshipment management with two locations. Naval Research Logistics 70 (4): 305-319.

Xu, Y. and C. Shih (2023) Enhancing student understanding of decision-making traps using experiential learning. Proceedings of the 29th Annual Conference of the International Association for Applied Management.

Books and Book Chapters

Gray, J.P. and S.D. Ray. (2023) Side effects of metals and metal antagonists. In Ray, S.D. (Ed.), Side Effects of Drugs Annual, 45th ed. Amsterdam, Netherlands: Elsevier Inc.

Gray, J.P. (2023) Cotinine. Pp. 287-291 In Wexler, P. (Ed.), Encyclopedia of Toxicology, 4th ed. vol 1. Amsterdam, Netherlands: Elsevier Inc., Academic Press.

Gray, J.P. (2023) Benzo(a)pyrene. Pp. 9-15 In Wexler, P. (Ed.), Encyclopedia of Toxicology, 4th ed. vol 1. Amsterdam, Netherlands: Elsevier Inc., Academic Press.

Gray, J.P. (2023) Benz[a]anthracene. Pp. 957-960 In Wexler, P. (Ed.), Encyclopedia of Toxicology, 4th ed. vol 1. Amsterdam, Netherlands: Elsevier Inc., Academic Press.

Gray, J.P. (2023) 2-Acetylaminofluorine. Pp. 83-87 In Wexler, P. (Ed.), Encyclopedia of Toxicology, 4th ed. vol 1. Amsterdam, Netherlands: Elsevier Inc., Academic Press.

Gray, J.P. (2023) Acceptable Daily Intake. Pp. 15-16 In Wexler, P. (Ed.), Encyclopedia of Toxicology, 4th ed. vol 1. Amsterdam, Netherlands: Elsevier Inc., Academic Press.

Gray, J.P. and S.D. Ray. (2023) Society of Toxicology. Pp. 593-596 In Wexler, P. (Ed.), Encyclopedia of Toxicology, 4th ed. vol 1. Amsterdam, Netherlands: Elsevier Inc., Academic Press.

Haglund, E. (2023) 31 Flavors: The American System of Ministerial Advisers. Pp. 282-295 In Shaw, R. and C. Eichbaum (Eds.) Handbook of Ministerial Advisers, Cheltenham, UK: Edward Elgar Press.

Miller, P. and Y. Traynham (2023) Marine Materials and Structures: For Engineering Students and Practicing Engineers, Society of Naval Architects and Marine Engineers (SNAME). 390 pp.

Faculty Awards

2023 Summer Faculty Research Fellowships

- Dr. A. Bagchi Misra, Department of Mathematics, “Ultrasound Image Denoising by Faster Nonlocal Means.”
- Dr. C. LaMonica, Department of Government, “Another US 'Pivot to the Pacific?': A Discussion of Strategic Maritime Law Enforcement Partnerships in the West Pacific Region.”
- LT P. Ledzian, Department of Electrical Engineering and Cyber Systems, “Introduction to Discrete Mathematics and Computer-Assisted Proofs Using Lean.”
- Dr. K.K.M. Lee, Department of Physics, “Bridging Boundaries at Extreme Conditions: Refined High-Temperature, High-Pressure Equations of State of Common Pressure Media.”
- CDR B. Maggi, Department of Civil and Environmental Engineering, “Strategic Collaborations to Enrich Curricula and Support Multidisciplinary Research.”
- LCDR L. Schrayshuen, Department of Mathematics, “Ballast Water Management System Type Approval Statistical Verification.”

2024 Provost’s Award for Excellence in Scholarship

- Dr. T. DeNucci and CDR D. Brahan, Department of Naval Architecture and Marine Engineering.

2024 OSRI Microgrant Awards

- LCDR P. Imbriale, Post-Disaster Material Convergence: Education on Why Cash is Best.
- LT A. Nielson, Feasibility and Risks Associated with Marine Renewable Energy.

Photo: CGA Public Affairs

2023-24 Cadet Capstone Projects

School of Engineering and Cyber Systems

1/c Arnold, 1/c Bagirov, 1/c Dreher, 1/c Kim, and 1/c Mathes. Machine learning/ deep learning for cyber wargaming. Advisor: LT Ryan Quarry.

1/c Austin, 1/c Fulton, 1/c Reheuser, 1/c Taha, and 1/c Vigo. Embedded systems security. Advisor: LCDR Jason Veara.

1/c Barbee, 1/c Hiigel, and 1/c Ratliff. Roboboat competition. Advisor: Mr. Steven Choi.

1/c Bay, 1/c Beighau, 1/c Gholson, 1/c Pagan-Selby, 1/c Raymond, and 1/c Younes. "SeaLion" cube satellite. Advisor: CAPT Dan Burbank, USCG ret.

1/c Bertrand, 1/c del Rosario Chan, 1/c Mee, and 1/c Wade. Intelligent hybrid power plant. Advisor: Dr. Tooran Emami.

1/c Boykin-Holland, 1/c Esmond, 1/c Fish, and 1/c Riccio. Electric P-6 pump. Advisor: LCDR Matt Stroebel.

1/c Brady, 1/c Ortez, and 1/c Tipton. Reverse osmosis high-pressure pump. Advisor: Dr. Andrew Foley.

1/c Breidenthal, 1/c Carroll, 1/c Kerr, and 1/c Moore. Base Charleston – Consolidated administration building. Advisors: Dr. Kassim Tarhini and LT Alyssa Milanese.

1/c Carpenter, 1/c Dryer, 1/c Oakes, and 1/c To. Machine learning/artificial intelligence for maritime domain awareness. Advisor: LT Trey Maxam.

1/c Castel, 1/c Regan, and 1/c Rochard. Passive acoustic tracking and classification. Advisor: LT Patrick Ledzian.

1/c Conner, 1/c Hall, 1/c Hudson, 1/c Ingersoll, and 1/c Wood. Vessel Incidental Discharge Act – greywater treatment system. Advisors: Dr. Sharon Zelmanowitz and LCDR Matthew Stroebel.

1/c Cousineau and 1/c Norman. Formal methods for information security. Advisor: Dr. Mohamed Elwakil.

1/c DeCoste, 1/c Ferderer, and 1/c Mitchell. Satellite Rescue 21. Advisor: Dr. Richard Hartnett and LCDR Dahnyoung McGarry.

1/c Dougherty, 1/c Magee, 1/c McCue, and 1/c Wismar. Training Center Petaluma – Stormwater management design. Advisors: Dr. Dounia Elkhatib and CAPT Corinna Fleischmann.

1/c Duffin, 1/c Kunka, 1/c Rivera, and 1/c Rothe. ShipCam LiDAR. Advisor: LCDR Dan Burke.

1/c Duffy, 1/c Wagner, 1/c Kim, and 1/c France. Station Noyo River – seawall design. Advisors: Dr. David Mazurek and LT John Keiffer.

1/c Gadsden, 1/c Cowles, 1/c Morris, and 1/c Clements. U.S. Coast Guard Academy – Area Development and Planning Team. Advisors: Dr. Hudson Jackson and LT John Keiffer.

1/c Humphrey, 1/c Osborn, 1/c Wheater, and 1/c Yacovone. Station Juneau – wharf design. Advisors: Dr. David Mazurek and LT John Keiffer.

1/c Johnson and 1/c Yraola. Pressure sore prevention concept. Advisor: Dr. Ron Adrezin.

1/c McMahon and 1/c Young. Cadet accountability. Advisor: Mr. Ethan Gold.

1/c Moyer, 1/c Smith, and 1/c Soca. Zero emissions ship. Advisor: Dr. Andrew Foley.

1/c Tobey and 1/c Ryan. Lift boat research. Advisor: Dr. Todd Taylor.

School of Leadership and Management

1/c Bass, 1/c Carmen, 1/c Fenn, and 1/c Guidry. Swab Summer Day One. Advisor: LCDR Peter Imbriale.

1/c Bulger, 1/c Daughtry, and 1/c Mika. Analyzing and optimizing operations at the Academy Clinic. Advisor: LCDR Nicholas Martin.

1/c Caskey, 1/c Carroll, 1/c Nelson, and 1/c Matamoros-Flores. Social Enterprise Capstone Team: nutrition for vets. Advisor: Dr. Michael Bellissimo.

1/c Fatula, 1/c Frizzell, and 1/c Riozzi-Bodine. Optimizing Coast Guard Recruiting Command's recruiting footprint. Advisors: Dr. Ian Frommer and LCDR Edward Gailor.

1/c Gonzales, 1/c Liano-Mock, and 1/c Tran. Social Enterprise Capstone Team: foster mentoring. Advisor: Dr. Michael Bellissimo.

1/c Hegbli, 1/c Lough, 1/c McPherson, and 1/c Woodworth. Coast Guard Base Boston: revolutionizing mission support through aggregated procurement and warehousing to enable "Ask and Get Convenience" for operators. Advisors: LCDR Nicholas Martin and LCDR Nick Winiarski.

1/c Lubin, 1/c Martin, and 1/c Whalen. USAA Educational Foundation capstone: exploring effective learning strategies for financial literacy education. Advisor: CAPT Anna Hickey.

1/c Parker, 1/c Lee, and 1/c Purvis. Chase Hall cultural fluency consulting. Advisor: LCDR Chris Shih.

1/c Samples, 1/c Wood, and 1/c Possamai. Social Enterprise Capstone Team: care for the homeless. Advisor: Dr. Michael Bellissimo.

1/c Vecchio, 1/c Feely, 1/c Rumpf, and 1/c He. Coast Guard Base Boston: EZ-supply inventory management. Advisor: Dr. Matthew Keblis.

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School of Science, Mathematics, and the Humanities

1/c Ahl, 1/c Fender, and 1/c Zipf. Quantitative investigation into potential counterfeit doxycycline. Advisor: LCDR Stephanie Jocis.

1/c Anthony, 1/c Barbalato, 1/c Becker, and 1/c Chapman. U.S. Coast Guard Academy energy dashboard. Advisor: Dr. Eric Johnson.

1/c Arpino, 1/c Disque, and 1/c Inman. Computer vision for vessel detection on the Thames River. Advisor: Dr. Ian Frommer.

1/c Atkinson, 1/c Hupp, and 1/c Strommer. Analyzing vessel near misses in the maritime domain. Advisors: Dr. Katherine Krystinik and LCDR Lynn Schrayshuen.

1/c Bornarth, 1/c Kalfas, and 1/c Loomis. Changes in drift patterns due to the presence of offshore windfarms. Advisor: CDR Victoria Futch.

1/c Bragaw, 1/c Churm, and 1/c Olstad. Advanced Research Project - Asia. Advisor: CDR Jennifer Runion.

1/c Buelt and 1/c Figueroa. The socioeconomic impacts of climate change: finding solutions through sustainable resources and cultural resilience. Advisors: LTJG Ammie Chittim and Ms. Erin Lambie.

1/c Carey and 1/c Parker. Love, happiness, and society: transforming climate in a post-OFA Coast Guard. Advisor: Dr. Melissa Matthes.

1/c Carey, 1/c Drake, 1/c Foht, 1/c Holmstrup, 1/c Rollings, and 1/c Tetrault. San Remo, Italy, Law of Armed Conflict Conference. Advisor: LCDR Abbey Miller.

1/c DeLillo. Center for the Study of the Presidency & Congress (CSPC). Advisor: Dr. Evan Haglund.

1/c Earnshaw and 1/c Green. Advanced Research Project - Arctic: designing a table-top exercise to stress test command and control for Arctic presence and response. Advisors: CAPT Tony Russel USCG ret., Dr. Abbie Tingstad.

1/c Flynn and 1/c Huynh. Effect of cytochrome P450 oxidoreductase expression on susceptibility of *C. elegans* to oxidative stress. Advisor: Dr. Joshua Gray.

1/c George, 1/c Lynch-Galvin, 2/c White, 2/c Hillon, and 2/c Howard. Assessment of dielectric fluid: chemical and physical properties that impact spill modelling. Advisors: CAPT Gregory Hall and Dr. Glenn Frysinger.

1/c Herb, 1/c Farlow, and 1/c O'Brien. Natural language processing to triage maritime distress signals. Advisors: Dr. Zachary Kudlak, LCDR Justin Maio and LT Justin Sherman.

1/c Holmstrup. An inquiry into the nature and causes of sexual assault. Advisor: LCDR Daniel Fritz.

1/c Hudson and 1/c Zak. In-situ validation of Search-and-Rescue (SAR) modelling. Advisors: LCDR Collin Tuttle and CDR Victoria Futch.

1/c Kotzen. “Lost in Translation": judicial decision-making in U.S. v. Menas Aspirilla and its impact on the application of maritime drug law enforcement. Advisors: LCDR Jonathan Tschudy and LCDR Sean Gajewski.

1/c Lierman, 1/c Olson, 1/c Skurat, and 1/c Waters. Chemical analysis of plastic particles in an estuary (Thames River, CT) and the digestive system of seabirds (Tasmania, Australia). Advisors: Dr. Karina Mrakovcich, Dr. Deanna Bergondo, and LT Matthew Brigham.

1/c Nasti and 1/c Hutson. Growth of inland and coastal port infrastructure in Colombia. Advisor: Dr. Lucy Vlietstra.

1/c Nitz, 1/c O'Leary, 1/c Torres, and 1/c Willis. Advanced Research Project - Africa. Advisor: Dr. Chris LaMonica.

1/c Polon. Multi-dimensional quantitative analysis for Geographic Response Strategy validation for Sector New York. Advisors: Dr. Deanna Bergondo and CDR Mike Persun.

1/c Quinlan. Iran's expanding naval forces. Advisor: Dr. Lucy Vlietstra.

1/c Schvaneveldt, 1/c Pearson, 1/c Jenkins, and 1/c Apelizan. Operation Blue Pacific. Advisors: Dr. Donna Selch and CDR Victoria Futch.

1/c Sickendick and 1/c Garrigus. Detection of trace illicit drugs with the MX908 high pressure mass spectrometer. Advisor: Dr. Glenn Frysinger.

1/c Thoenen. Projected sea level rise and flooding of coastal infrastructure at four major Arctic maritime ports. Advisor: Dr. Lucy Vlietstra.

1/c Torres and 2/c Fredericks. Naval Academy Foreign Affairs Conference (NAFAC). Advisor: LT Dunaway.

1/c Weckler. U.S. Coast Guard role in international relations of the Indo-Pacific. Advisor: Dr. Ginger Denton.


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