

# CEOE IN A YEAR

ANNUAL REPORT 2023



**STEVENS**  
INSTITUTE OF TECHNOLOGY  
1870

Department of Civil,  
Environmental, and  
Ocean Engineering

# DEPARTMENT STATISTICS

**\$10M**

Research Expenditures

**267**

Undergraduate Students

**194**

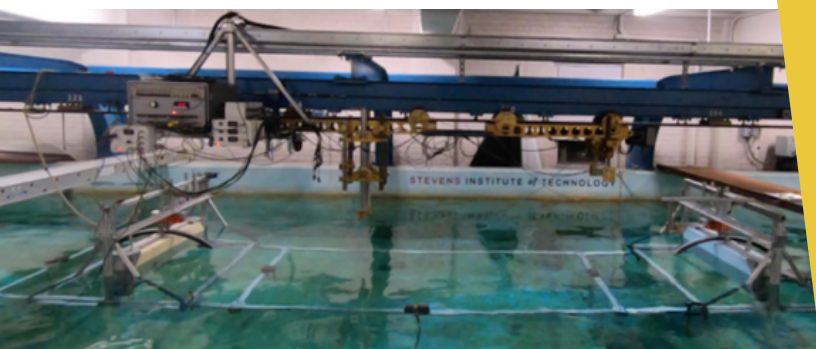
Masters Students

**4.9**

Ph.D. Students per  
T/TT Faculty

**114**

Published Journal  
Articles/yr



## REACHING NEW HIGHS EXCELLENCE IN ALL WE DO

### ABOUT CIVIL, ENVIRONMENTAL AND OCEAN ENGINEERING

The Department of Civil, Environmental and Ocean Engineering at Stevens (CEOE) is a unique department that covers disciplines usually organized in two or more separate departments. We take advantage of this distinctiveness to benefit our students greatly. Our community of expert faculty and researchers train our students to address the complex cross-disciplinary challenges faced in the design, construction and monitoring of urban/interconnected infrastructure systems, sustainable environmental systems, resilient coastal communities, and marine systems.

Through rigorous and flexible curricula, advanced research programs, and extra-curricular activities, we aspire to give our students the knowledge required to face future challenges in these areas. The combined expertise of our faculty and breadth of research programs provides our students with unique opportunities to acquire knowledge across the three disciplines and build capability to address complex cross-disciplinary problems.

#### Our mission:

- Provide students with vibrant and diverse degree programs built upon rigorous course offerings, hands-on experience, and opportunities for professional development.
- Instill creativity and innovation in the drive of our graduates to solve real-world problems.
- Perform discovery research to address future challenges.
- Set our graduates on the path to become leaders in their fields.

AY 2023-2024

**14** T/TT FACULTY

**3** TEACHING FACULTY

**5** RESEARCH FACULTY

# RIISING BEYOND EXPECTATIONS: EXCELLENCE IN ALL WE DO

## Muhammad Hajj, Chair and George Meade Bond Professor

Five years ago, our department identified goals that would set its path for success. It is very satisfying to report how far we have come towards meeting these goals as we strengthen our positions in education and research. Since then, we have clearly reached new highs, and last year was no exception. By the numbers,

- We generated an all-time high in new research funding of approximately \$15M, which is a significant milestone for a faculty consisting of 14 tenured/tenure track faculty members.
- Our faculty and students authored and co-authored 114 journal articles.
- Our research expenditures in FY 2023 were approximately \$10M.
- In fall 2023, 68 Ph.D. students enrolled in our Ph.D. programs yielding a ratio of 4.9 Ph.D. students per T/TT faculty member.
- Last year, 80 students earned a master's degree in construction engineering and management.

Our success expands beyond these numbers to a broad spectrum of innovations in education and research in support of our reputation of Excellence in all We Do. As examples,

- Sarath Jagupilla and Elizabeth O'Connell developed a holistic approach to deliver a capstone senior design that builds on synthesis of knowledge to solve industry-identified, discipline-specific and multi-disciplinary engineering problems, advances design procedures by exploiting the expertise of our faculty and the department resources, and enhances the critical skills of our students as needed to succeed in their future careers.
- Weina Meng and Yi Bao and their students are developing knowledge-guided generative AI methods to efficiently design negative carbon concrete and other infrastructure materials, from available concrete, glass, slag, and plastics wastes. Their AI methods can discover physical and chemical reactions, which not only promotes engineering design but also advances fundamental knowledge in material science.
- Marouane Temimi and his students are developing new tools, based on integration of satellite data and numerical models, to predict high-resolution precipitation. When combined with hydrologic models and in-situ observations, these tools will support high-resolution flood level prediction and better protect local communities.
- Muhammad Hajj, Raju Datla, their students and colleagues and students from the Department of Naval Architecture and Marine Engineering at the University of Michigan have completed the design of an innovative 100kW wave energy converter for potential testing at the PacWave South site in Oregon. Our co-design (or interconnected design) approach yielded innovative concepts for the prime mover, above-water power take-off system, and active control approaches.

Beyond all of the above and other examples, I note the support by our staff and achievements by our students in winning some of the most competitive awards as listed in this report. These awards and achievements make us very proud of all of them and are a tangible testament of who we are and what we do.

Finally, the support by our alumni and industry partners has been phenomenal. We look forward to building up on this support.

I hope you enjoy reading this report and learning more about the department. Meanwhile, congratulations to everyone on their individual achievements and our collective successes.

## EXCELLENCE

## FACULTY

**Christos Christodoulatos** was recognized with the 2022 Schaefer School of Engineering & Science at Stevens Research Funding Award.

**Reza Marsooli** received the 2023 New Jersey American Society of Civil Engineers Educator of the Year Award, a testament to his contributions to education in the field of civil engineering.

More than 50% of full time faculty members and 50% of adjunct faculty members who taught in the fall 2022 semester scores above 4.75 (out of 5) in student evaluations. Several others recorded above 4.5.

**An Wang** was selected as an Impact Influencer by the Navy Talent Acquisition Group Empire State. He was selected following a nomination from one of his students for his engagement in the classroom and genuine passion for the topic of study.

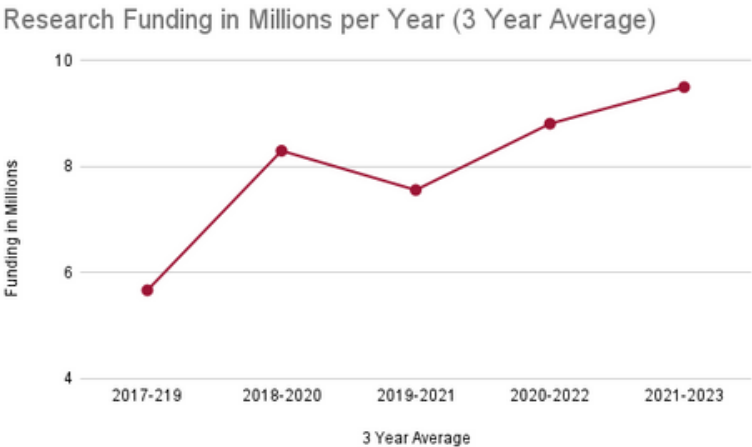
**Tsan-Liang Su** was recently honored as the recipient of the Patrick J. Higgins Award from the American Society of Sanitary Engineering (ASSE) for outstanding contributions in the field for codes and standards..

## STAFF

**Elizabeth O'Connell** received the Stevens Excellence in All We Do Award. This recognition is presented to a staff or faculty member whose work embodies the values of quality and excellence above all else.

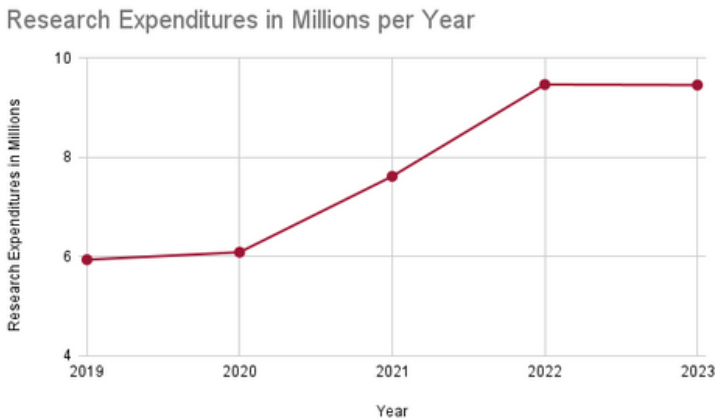
# BY THE NUMBERS

3 YEAR AVEARGE	\$M/YEAR
2017-2019	\$5.67
2018-2020	\$8.30
2019-2021	\$7.56
2020-2022	\$8.81
2021-2023	\$9.50



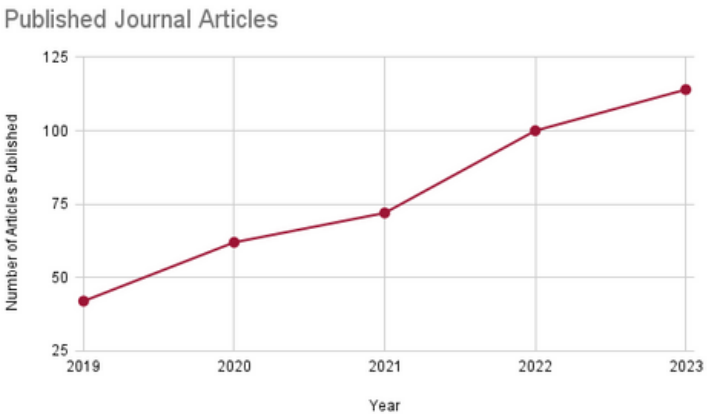
- Three-year average is at an all-time high in 2023
- The department should be able to maintain a three-year average of at least \$8 million in generated research funding for the foreseeable future
- On average, the generated research per T/TT faculty member in AY 22-23 is > \$550K per year

RESEARCH EXPENDITURES IN \$M / YEAR	
2019	\$5.94
2020	\$6.09
2021	\$7.62
2022	\$9.47
2023	\$9.46



- Research expenditures increased by about 59% since 2019
- Research expenditures perT/TT faculty member is \$550K year

PUBLISHED JOURNAL ARTICLES	
2019	42
2020	62
2021	72
2022	105
2023	114



- Number of journal articles published by department faculty increased by about **170% since 2019**
- Number of journal articles per T/TT faculty member is > 8



# MAJOR SCHOLARSHIP RECIPIENTS

**Amanda Beltre** and **Melissa Colella** received the 2023 Moles scholarships in the amount of \$12,500 each on the basis of their academic achievement and demonstrated interest in the heavy construction industry.

**Robert Stepien** received the 2023 Arline Gallagher scholarship also from the Moles Foundation in the amount of \$15,000 based on his excellent academic achievement and internship experience.

**Julie Garry** and **La’Nasya Coleman-Dewitt** each received the Professional Women in Construction New Jersey Chapter Scholarship.

**Ryan Krawchzyk** was awarded the Daniel E. Bigler Award from the New Jersey Water Environment Association which is awarded to students with academic and research excellence.

**Aspa Pacome Kokro** was awarded the inaugural Donald L. Blount Scholarship, provided by the Society of Naval Architects and Marine Engineers (SNAME) to graduate students who will be pursuing studies focusing on high-speed craft hydrodynamics.

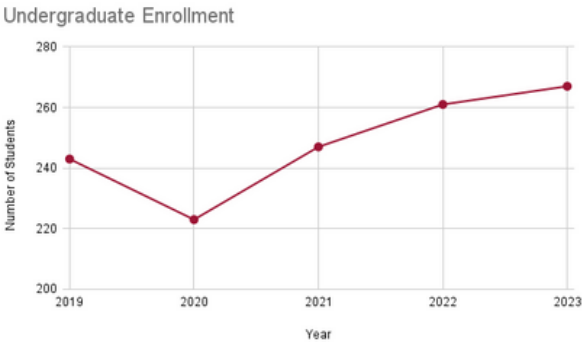
**Yash Shah** was the recipient of the 2022 Jerome Frommer Memorial Scholarship, issued through the Utilities and Transportation Contractors Association to provide New Jersey students with the opportunity to advance their studies in the field of construction.

American Council of Engineering Companies of New Jersey (ACECNew Jersey) awarded the George Kelley Memorial Scholarship to **Jake Wills** and the WSP Inc., USA Scholarship to **Robert Stepien**.

**Misagh Esmaeilpour** and **Shengfeng Huang** were each awarded the American Society of Civil Engineers Metropolitan Section Geo-Institute Graduate Scholarship

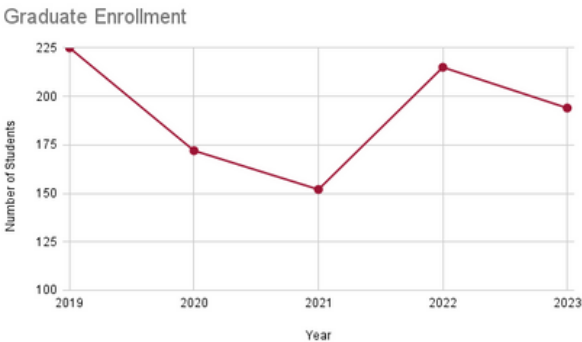
# CONTINUED BY THE NUMBERS

NUMBER UNDERGRADUATE STUDENTS	
2019	243
2020	223
2021	247
2022	261
2023	267



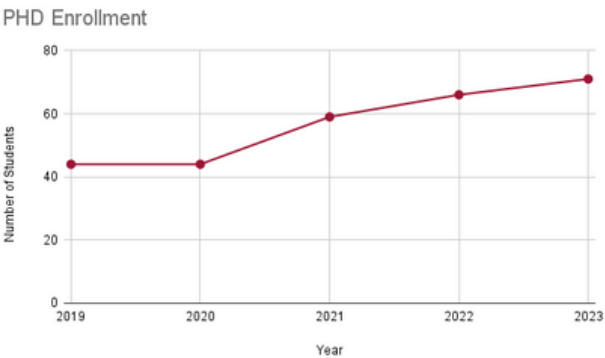
- The department maintains strong undergraduate degree programs.
- Number of undergraduate students per T/TT faculty member is ~16.

NUMBER MASTER STUDENTS	
2019	225
2020	172
2021	152
2022	215
2023	194



- The department maintains strong master’s degree programs.

NUMBER PH.D. STUDENTS	
2019	44
2020	44
2021	59
2022	66
2023	68



- Number of Ph.D. students has increased by about 55% since 2017.
- Number of advised Ph.D. students per T/TT faculty member in fall 2023 is 4.9.
- Nine Ph.D. students graduated in the 2022-2023 academic year.



'Saving Metro New York from Climate Change' Event



Yi Bao



Jon Miller

# IMPACT

During the fall, the Davidson Laboratory hosted the '**Saving Metro New York from Climate Change**' event with over 170 attendees from the alumni clubs of Stevens Institute of Technology, MIT, Princeton, Yale, Harvard, Cornell, Penn and other organizations.

Attendees toured the laboratory facilities and saw demonstrations from several research initiatives.

The tours included explanations and discussions of:

- The Stevens Flood Advisory System for predicting storm surge in New Jersey and New York
- The Integrated Spatial Modeling and Remote Sensing Technologies Laboratory (I-SMART) and its nowcasting efforts
- The Coastal Protection Technical Assistance Service
- Impact of Climate Change on the New York Metropolitan Area
- The Estuary Impacts and Closure Management of Storm Surge Barriers Under Climate Change

Throughout the academic year, department faculty members and students collaborated with **Escuela Superior Politécnica del Litoral**, a coastal technical university in Ecuador, to help create smoother — and lower-impact — rides between the Galapagos islands, one of the world's most intriguing island groups.

**Yi Bao** received the Best Paper Award from Elsevier for his paper published in the Journal of Engineering Structures. The article is titled, "Flexural Behavior of Fire-Damaged Concrete Beams Repaired with Strain-Hardening Cementitious Composite." His co-authors are Xiuling Li, Xi Lu and Jianan Qi.

The Davidson Laboratory was selected to manage the **New Jersey Wind Institute Fellowship** program at Stevens Institute of Technology. Sponsored by the Wind Institute for Innovation and Training at the New Jersey Economic Development Authority, this fellowship program is designed to foster knowledge and innovations in all fields related to the development of offshore wind energy that focus on cost reduction and economic development. Examples include improved integrity and reliability of turbine and grid components, and innovative foundations and substructure designs for fixed and floating wind turbines. The program is offered to upper class undergraduate and graduate students irrespective of their major; it includes a stipend and covers travel expenses.

**Jon Miller** was invited by the University of the West Indies and Future Earth to discuss the implementation of nature based solutions for sustainable hazard mitigation in coastal zones at the Sustainability Research and Innovation Congress held in Panama City, Panama.

## CONTINUED IMPACT

The Coastal Engineering Research Group, led by **Jon Miller**, authored an updated version of its Living Shorelines Engineering Guidelines and Eco Shorelines on Developed Coasts Guidance and Best Practices for the New Jersey DEP. These documents serve as the official state resource for the design of living shorelines project in New Jersey and have been widely applied throughout the northeast.

**Weina Meng** played an active role in organizing the Third International Interactive Symposium on Ultra-High Performance Concrete (UHPC) in Wilmington, Delaware. This symposium served as a platform for researchers and industry professionals to exchange ideas and promote advancements in UHPC technology.

**Jon Miller** presented at the 2023 State of the Shore press conference alongside the Commissioner of the New Jersey Department of Environmental Protection, Shawn LaTourette. Dr. Miller commented on the condition of New Jersey's beaches heading into the critical summer tourism season.

**Yi Bao** and Dr. Victor C. Li from the University of Michigan - Ann Arbor were invited to develop an industry guideline for bendable concrete in construction. Stevens was granted \$25K to contribute multiple chapters to the guideline.

**George Korfiatis** chaired a panel for the US Department of Defense (DoD) and produced a report titled: 'Defense Civilian Training Corps (DCTC) Implementation Recommendations'. The DCTC ([www.DCTC.mil](http://www.DCTC.mil)) is a scholarship-for-service program with a mission to develop a highly skilled civilian talent pipeline to fill critical skill gaps in DoD occupations related to acquisition, digital technologies, critical technologies, science, engineering, and finance. Congress has appropriated \$50 million in FY 2023 to implement a pilot DCTC program. This effort is led by the Stevens based Acquisition Innovation Research Center (AIRC). Dr. Korfiatis is co-leading the DCTC Curriculum Development and Implementation Workstream.

The Department of Civil, Environmental and Ocean Engineering welcomed the **New Jersey Economic Development Authority (NJEDA)** for a campus tour and overview of their sponsored WindPort multidisciplinary Senior Design project.

The Sustainability Management Master's Program, led by **Dibs Sarkar**, co-organized a summer workshop with the Transportation Research Board. The theme was "Making Transportation More Sustainable." The event featured keynote addresses by Mr. Thomas Abdallah of MTA Construction and Development and the City of Hoboken's Office of Sustainability and Resiliency. The two days included multiple presentations on transportation and environmental topics from industry professionals, educators, researchers and students.



Weina Mengi



George Korfiatis



Dibs Sarkar

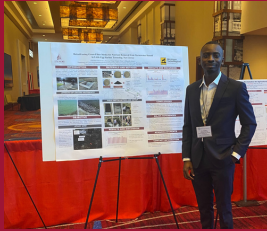




Xiao Tan



Mohamed Abdelkader  
and Berina Kilcarslan



Olayinka Olayiwolai



Erfan Amini



Amy Bredes



Soroush Mahjoubi

# EXCELLENCE GRADUATE STUDENTS

**Xiao Tan**, a Spring 2023 graduate, received notable recognition for outstanding research performance. He was honored with the Richard I. Hires Research Award from Stevens' Department of Civil, Environmental and Ocean Engineering in May 2023. Xiao Tan also earned the prestigious \$6,000 Outstanding Self-Financed Students Abroad scholarship from the Chinese Ministry of Education in September 2022. He is advised by Dr. Yi Bao.

**Mohamed Abdelkader** and **Berina Kilcarslan** were selected as 2023 fellows of the National Water Center (NWSNWC) Innovators Program Summer Institute. They are advised by Dr. Marouane Temimi.

**Olayinka Olayiwola** won in the master's category of the 2023 NJWEA Student Poster Competition at the NJWEA 108th John J. Lagrosa Annual Conference in Atlantic City. His research project on storm pollution prevention emphasized the use of a "green filter media" for efficient phosphorus removal.

**Zhoobin Rahimi** participated in the American Geophysical Union Michael H. Freilich Student Visualization Competition Program, which provides students with the opportunity to explore creative ways to communicate and present data relating to complex problems facing earth and space. He was awarded the runner up prize. He is advised by Dr. Rita Sousa.

**Erfan Amini** was selected as the Clean Energy College Student of the Year 2022 by Cleanie Awards. He was awarded this honor due to his research and achievements in the field of ocean renewable energy optimization. He is advised by Dr. Reza Marsooli.

**Mohamed Abdelkader** was selected to participate in the CyberTraining Workshop 2023 at Purdue University. This workshop, centered around a Module Development Hackathon, offers a unique opportunity to collaborate with esteemed faculty members and fellow students. It also forms part of the NSF-funded project entitled "Cross-disciplinary Training for Findable, Accessible, Interoperable, and Reusable (FAIR) science." He is advised by Dr. Marouane Temimi.

**Amy Bredes** was awarded a grant from the PADI Foundation to support the collection of wave attenuation data at local oyster aquaculture farms. The objective of Amy's research is to assess the degree to which commercial oyster aquaculture may reduce wave heights and therefore stem shoreline erosion. She is advised by Dr. Jon Miller.

**Abdullah Alnutayfat** was recently recognized with the "Best Presentation" award at the International Conference on Non-Destructive Testing in Civil Engineering in Spain. His topic discussed vibro-acoustic modulation for crack detection in windmill blades. He is advised by Dr. Alexander Sutin.

**Soroush Mahjoubi**, a Spring 2023 graduate, achieved notable recognition at Stevens. He received the prestigious \$1,500 Paul Kaplan Award in May 2023 for outstanding research and leadership development. Soroush was also honored with the Ph.D. Peer Mentor Award for exceptional student leadership in the mentor program, along with the Outstanding Graduate Student Leader award for remarkable leadership in student organizations and dedication to student life. These accolades exemplify his exceptional contributions during his academic journey. Soroush will be continuing his impactful research at MIT as a post doc starting in Fall 2023. He is advised by Dr. Yi Bao.



# EXCELLENCE UNDERGRADUATE STUDENTS

**Emily Leiby**, civil engineering undergraduate student, and **Emma McCann**, environmental engineering undergraduate and co-op student, received the Department of Defense Science, Mathematics, and Research for Transformation (SMART) Scholarship. This award provides both students with full tuition for up to five years, mentorship, summer internships, a stipend and full-time employment with the DoD after graduation.

Environmental engineering students **Sabrina Benayoun**, **Ryan Krawczyk** and **Keilly Valverde** were selected to participate in the 2023 Hult Prize Competition which aims to improve the sustainability of fashion today. This summer these three students attended the summit in Brazil to present their designs and business strategies.

The Professional Engineers in Construction of New Jersey (PEC) sponsored the 2022-2023 Sol Seid Award for Excellence. Each college or university in New Jersey offering a civil engineering bachelor's degree nominated one junior civil engineering student. The nominee from Stevens, **Amanda Beltre**, won the award based on her academic excellence, extracurricular activities, work experience, an ability to express ideas, and an interest in career opportunities in the construction industry. Amanda was awarded a \$10,000 scholarship.

Naval engineering students **Esha Talur**, **Liam Walker** and **Carter Pomponio** presented at the Society of Naval Architects and Marine Engineers (SNAME) New York Metro Chapter Student Paper night. Their topic discussed "An Innovative Ocean Cleanup Hullform." The group was also awarded the 'Best Civil, Environmental, and Ocean Engineering Senior Design.'

**Robert Stepien**, civil engineering student, was awarded the WSP Inc., USA Scholarship on behalf of WSP and the American Council of Engineering companies of New Jersey (ACECNJ). Robert was honored at the 52nd Annual Engineering Excellence Awards Banquet.

**Ryan Krawczyk** received the Dr. Wesley Eckenfelder Award through Brown and Caldwell for his studies in environmental engineering.

The **Construction Industry Advancement Program (CIAP) of New Jersey** awarded 13 undergraduate students scholarships and guaranteed summer internships:

- Ramadan Ajdar, Trevcon
- Caitlin Barry, AM Higley
- Connor Brenna, New Jersey Transit
- Jake Burdge, George Harms Construction
- La'Nasya Coleman-Dewitt, Michael Riesz and Co.
- Mohamadou Diagne, PSEG
- Andrew Korbul, Atlantic Infra
- Julia Lupo, Tilcon NY
- Ian Pulver, Dynamic Engineering
- Trent Redman, RE Pierson
- Robert Stepien, J. Fletcher Creamer
- David Youm, Dynamic Engineering
- Gordon Yu, Railroad Construction Co.

**Thirteen senior design projects** were sponsored by industry professionals. These included:

- WSP-USA Inc. USA
- Stantec
- Naik Consulting Group
- Orangetown Environmental Commission
- TYLin International
- Engineers in Action
- Thornton Tomasetti
- Structural Workshop
- Pegasus Partners
- Langan Engineering
- Kimley-Horn & Associates
- American Society of Naval Engineers
- New Jersey EDA
- Tishman Construction Corp of New Jersey
- American Pile LLC
- Royal Caribbean Group
- United Nations Development Group
- ESPOL University

Department faculty and students are very appreciative of this support and mentorship.



Emily Leiby



Emma McCann



Amanda Beltre



Esha Talur, Liam Walker  
and Carter Pomponio



Ryan Krawczyk



Robert Stepien



## Schaefer School of Engineering and Science

Department of Civil, Environmental,  
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