

Proposal to Stockton University for a
Graduate Degree Program:
Coastal Zone Management
M.S. / P.S.M.

In the School of Natural Sciences and Mathematics

Weihong Fan Ph.D.

Associate Professor, Environmental Science

Kim McKenna, M.S.

Coastal Research Center

Susanne Moskalski, Ph.D.

Assistant Professor, Marine Science

Anna Pfeiffer-Herbert, Ph.D.

Assistant Professor, Marine Science

Kathy Sedia, Ph.D.

Associate Professor, Biology

Peter Straub, Ph.D.

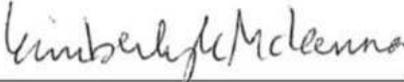
Dean and Professor, Biology

Mark Sullivan, Ph.D.

Associate Professor, Marine Science

Weihong
Fan

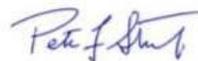
Digitally signed by Weihong Fan
DN: cn=Weihong Fan, o=Richard
Stockton College of New Jersey,
ou=NAMS,
email=fanw@stockton.edu, c=US
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PROGRAM ANNOUNCEMENT COVER PAGE

Date: 2/18/2019

Institution:	Stockton University
New Program Title:	Coastal Zone Management
Degree Designation:	Masters of Science / Professional Science Masters
Programmatic Mission Level for the Institution	Masters
Degree Abbreviation:	M.S. / P.S.M.
CIP Code and Nomenclature (if possible): <i>If outside the classification indicate Not</i>	03.205 Water, Wetlands and Marine Resources Management
Campus(es) where the program will be offered:	Galloway and Atlantic City
Date when program will begin (month and year):	9/1/2020
List the institutions with which articulation agreements will be arranged:	

Is licensure required of program graduates to gain employment? Yes No

Will the institution seek accreditation for this program? Yes No

‡ If yes, list the accrediting organization:

Program Announcement Narrative

‡ Objectives	page(s): <u>5</u>
‡ Need	page(s): <u>10</u>
‡ Student enrollments	page(s): <u>17</u>
‡ Program resources	page(s): <u>18</u>

NEW PROGRAM CHECKLIST

Institution: Stockton University

Program Title: Coastal Zone Management

Degree: Masters of Science/ Professional Science Masters

REMINDER: *The complete program package of materials should be submitted as an electronic file to the Chair of the Academic Issues Committee.*

DESCRIPTION	<i>Check to Confirm</i>
1. Program Announcement Narrative Proposal Degree Requirements	<input type="checkbox"/>
2. Consultant's Curriculum Vitae	<input type="checkbox"/>
3. Consultant Report	
* Submission date: _____	<input type="checkbox"/>
* On site visit? If yes, date(s): _____	<input type="checkbox"/>
* Consultant's curriculum vitae	<input type="checkbox"/>
4. Response(s) to Consultant's Report	<input type="checkbox"/>
5. Board of Trustees' Resolution	<input type="checkbox"/>
* Date of resolution: _____	<input type="checkbox"/>
6. Institutional Responses	<input type="checkbox"/>
* Statement of "no objections"	<input type="checkbox"/>
* Objections	<input type="checkbox"/>
* Objecting institutions: _____ _____	<input type="checkbox"/>
* Response to objections	<input type="checkbox"/>
* Information about reconciliation efforts	<input type="checkbox"/>
*Copies of letters of support from responding colleges and universities	<input type="checkbox"/>

Name: _____

Title: _____

Phone / Fax: _____

Email: _____

Coastal Zone Management Program Proposal
Stockton University

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Program Announcement
Stockton University
School of Natural Sciences and Mathematics
Master of Science in Coastal Zone Management

3. Narrative Proposal

The coastal zone is generally the most accessible and productive area of the oceans contributing natural resources for fisheries, energy production (oil, gas, wind, tidal, solar), recreation and tourism. In much of the world, population growth in the coastal zone is increasing, stressing the natural resources and those that depend on them due to over-development, pollution and overfishing.¹ At the same time, global climate change, linked to anthropogenic activities and warming are increasingly affecting the coastal zone due to an increased prevalence of high-energy storms, ocean acidification and sea level rise. Recent weather events such as flooding in Houston linked to hurricane Harvey and the massive destruction in Florida due to hurricane Irma have highlighted the intense development of shoreline regions and focused on their vulnerability.² In New Jersey, super-storm Sandy was a wake-up call exposing the vulnerability of the developed NJ coast despite regulations put in place since the catastrophic 1962 Ash Wednesday extreme nor'easter which ravaged New Jersey's coastline and affected the mid-Atlantic from Cape Hatteras to Long Island. The purpose of this degree program is to develop the knowledge and skills necessary to navigate the complexities of managing human interactions within a highly dynamic coastal environment.

New Jersey is a coastal state with over 130 miles of ocean shoreline as well as many times this area in tidal and estuarine shorelines. Like most coastal states, New Jersey has a coastal management program (NJ-CMP)³ that is part of the National Coastal Zone Management Program (US-NCZMP)⁴. The New Jersey Department of Environmental Protection oversees the NJ-CMP. The U.S. Coastal Zone Management Act (CZMA) of 1972 authorizes the US-NCZMP, which works with U.S. coastal, and great lakes states and territories to protect, restore and responsibly develop the nation's coastal resources and communities. Managing these resources requires a thorough understanding of the laws and regulatory jurisdictions (Federal, state, municipal) as well as an understanding of the scientific and engineering principles that govern interactions in this fragile ecosystem. The Coastal Zone Management degree program will prepare the next generation of coastal managers and scientists who will provide the expertise to government, private business and non-governmental organizations (NGOs) with significant investments and concerns in the coastal zone.

¹ Neumann B, Vafeidis AT, Zimmermann J, Nicholls RJ. Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment. Kumar L, ed. *PLoS ONE*. 2015;10(3):e0118571. [doi:10.1371/journal.pone.0118571](https://doi.org/10.1371/journal.pone.0118571).

² Bogost, I. Houston's Flood Is a Design Problem: It's not because the water comes in. It's because it is forced to leave again. *The Atlantic*. 8/28/17. <https://www.theatlantic.com/technology/archive/2017/08/why-cities-flood/538251/>

³ <http://www.state.nj.us/dep/cmp/>

⁴ <https://coast.noaa.gov/czm/>

a. Program Objectives

The primary goals and objectives for this program will be the development of:

1. High level of knowledge in subjects necessary for coastal zone management.
 - 1.1. A thorough scientific understanding of the physical, chemical, biological, and geological processes that affect the coastal zone.
 - 1.2. A thorough understanding of the human behaviors and policies that affect and are affected by the coastal zone.
2. High-level professional skills.
 - 2.1. Quantitative and analytical skills appropriate to coastal zone issues.
 - 2.2. Effective professional communication and teamwork skills.

These program goals and objectives will be applicable to all of the degree and certificate options embedded within the program. Upon successful completion of this program, students will be qualified for employment as coastal zone resource managers in state, local, and private agencies or businesses, or in any other position that requires knowledge of the scientific, engineering, and legal/regulatory principles of the coastal ecosystems.

The field of coastal zone management is not governed by an accrediting body or certification standards, so the new program will not seek such accreditation. Stockton University is accredited through the Middle States Association of Colleges and Schools. Being housed at an accredited university, the M.S. option in the proposed program will be acceptable for admission into doctoral programs nationwide.

b. Evaluation and Learning Outcomes Assessment Plan

Program assessment will be conducted annually and the results will be reported according to standard Stockton University procedures. Program assessment data will include direct and indirect measures of student learning outcomes, and the results of the assessments will be used to improve the program, its curriculum, teaching methods, student learning objectives, and student assessment methods.

The proposed Masters in Coastal Zone Management curriculum will be aligned to be consistent with Stockton's university-wide Essential Learning Outcomes. The following ELOs are especially pertinent to the CZM Program Goals:

- Information Literacy and Research Skills (locating, evaluating, analyzing, and using information to solve problems)
- Communications Skills (creating and sharing ideas and knowledge effectively with a variety of audiences)
- Critical Thinking (formulating an effective, balanced perspective on an issue or topic)
- Program Competence (using and integrating concepts, theories, and principles in a masterful way)
- Quantitative Reasoning (comfort and competence with mathematical concepts)

- Teamwork and Collaboration (joining with others to achieve a common goal)

Student progress toward meeting the ELOs will be assessed based on student performance in coursework requirements (exams, presentations, problem sets, writing assignments), an assessment exam, and a capstone research project (for the PSM and MS options).

2.1 Evaluation and Assessment

The CZM program will follow assessment standards for graduate education. Program and affiliated faculty will assess student progress in meeting program goals and student learning outcomes using a variety of methods at the course and program level. Direct and indirect measures will be included in the assessment methods. Results of student assessments will be used to assess the rigor of the program, its goals and outcomes, courses, teaching methods, or other program matters, which will be modified as needed to maintain sufficient rigor and applicability to the job field.

2.1.1 Indirect measures

The program will evaluate IDEA⁵ group summary reports to determine how well the program objectives are aligned with the essential and important IDEA objectives. The IDEA reports will also be used to gauge student perceptions of class content, rigor, and faculty pedagogy. An assessment exam will be developed and given to students at entrance and exit from the program. The content of the exam will reflect information and skills that a graduate should have been able to learn during the program courses. Other indirect measures will include aggregate reports on retention and graduation, and surveys of graduates' job placement.

2.1.2 Direct measures

Course faculty will evaluate individual student coursework, and certain assignments will be chosen to include in a portfolio. The portfolios and the capstone project will be evaluated for evidence of mastery of program objectives and student learning goals. Rubrics will be developed and calibrated for the portfolios and capstone project to ensure consistency in evaluation of students between different professors.

2.1.3 Program assessments

As part of the annual program report, the Graduate Program Director will conduct various assessments to evaluate the success of the program and recommend adjustments to courses and assignments. Assessment methods will follow those used in other graduate programs at Stockton, such as grades in individual courses, and annual summative and formative assessments.

Annual summative evaluations will include all surveys of continuing and graduating students, faculty evaluations, and input from program faculty. Student surveys will assess student opinions on the

⁵ <https://www.ideaedu.org/>

curriculum and courses. Faculty will meet to discuss curriculum, admissions, and other pertinent processes.

Annual formative assessment will include a review of student coursework and portfolios, with the goal of evaluating student progress and quality. The program will also submit Graduate Program director Annual Reports and undergo five-year reviews with external consultants.

Given the Program Objectives above, the Program Goals are as follows. At the end of this program, students will be able to:

1. Describe the physical, biological, chemical, and geological processes active in the coastal zone.
2. Articulate aspects of coastal zone environments that affect humans.
3. Articulate human behaviors, laws, and policies that affect coastal zone environments.
4. Apply appropriate quantitative methods to coastal zone problems.
5. Perform a variety of field and laboratory research methods.
6. Identify a problem pertinent to coastal zone management, develop a plan to study it, and conduct the appropriate research.
7. Effectively communicate scientific and management information, research results, and recommendations orally and in writing.
8. Work effectively both individually and in a team environment.

2.2 Program and student learning goals: assessment methods matrices

Program Objective 1. Students will acquire high levels of knowledge in subjects necessary for coastal zone management

Student Learning Goals	Learning Outcomes	Location in Curriculum	Assessment
1.1. Students will acquire a thorough scientific understanding of the physical, chemical, biological and geochemical processes that affect the coastal zone	1.1.1. Students will be able to describe important physical, biological and geological coastal processes, how they interact with each other and how they affect the coastal zone	CZM 5100 CZM 5200 CZM 5302 CZM 5400 + electives +capstone/thesis	Direct assessment: Exams, problem sets, papers, presentations, portfolios, capstone or thesis project, and other pertinent coursework. Course faculty will evaluate individual student coursework, and certain assignments will be chosen to include in a portfolio. The portfolios and the capstone/thesis project will be evaluated for evidence of mastery of program objectives and student learning goals. Rubrics will be developed and calibrated for the portfolios and capstone/thesis project to ensure consistency in evaluation of students between different professors. Indirect assessment: IDEA reports, student surveys, annual formative assessments.
	1.1.2. Students will be able to interpret quantitative or descriptive data to understand the genesis of coastal zone problems and recommend solutions or further studies		
1.2. Students will acquire a thorough understanding of the human behaviors and policies that affect and are affected by the coastal zone.	1.2.1. Students will be able to determine which laws and policies are applicable to particular coastal zone issues		
	1.2.2. Students will be able to describe how human laws and behavior affect the coastal zone and coastal processes, and use this understanding to refine recommendations and solutions.		
	1.2.3 Students will be able to use planning tools to recommend solutions to coastal zone problems		

Program Objective 2. Students will develop high-level professional skills appropriate to Coastal Zone Management.

Student Learning Goals	Learning Outcomes	Location in Curriculum	Assessment
2.1. Students will develop quantitative and analytical skills appropriate to coastal zone issues.	2.1.1 Students will be able to perform and understand standard laboratory and field analysis methods pertinent to coastal zone science.	CZM 5100 CZM 5200 CZM 5302 CZM 5400 CZM 5401	Direct assessment: papers, presentations, portfolios, capstone or thesis project, and other pertinent coursework. The portfolios and the capstone/thesis project will be evaluated for evidence of mastery of program objectives and student learning goals. Rubrics will be developed and calibrated for the portfolios and capstone/thesis project to ensure consistency in evaluation of students between different professors. Indirect assessment: IDEA reports, student surveys, annual formative assessments.
	2.1.2 Students will be able to apply mathematical concepts to, and perform data analysis techniques on, data generated during field and laboratory work, or collected from data archives.	CZM 5402 + electives +capstone/thesis	
2.2. Students will develop effective professional communication and teamwork skills.	2.2.1 Students will be able to orally communicate the results of scientific investigations and the importance thereof to a variety of audiences.		
	2.2.2 Students will be able to compose effective written scientific and technical communications appropriate to professional situation		
	2.2.3 Students will demonstrate the ability to work effectively and professionally with others.		

c. Relationship to Institutional Strategic Plan and Impact on its own Offerings

Stockton University is a comprehensive Master’s level institution serving the coastal region of southern New Jersey and as an anchor institution for Atlantic City. The current institutional strategic plan has four thematic areas including learning, global awareness, sustainability and community engagement. This proposed program of study supports the strategic theme of learning by offering access to graduate education to southeastern New Jersey residents who have few options in the surrounding area. Stockton is committed through its strategic plan to educational access and engagement with the coastal southern communities where it is located and this proposal supports the particular problems that the coastal communities are facing in finding sustainable solutions for current and future environmental challenges of providing services and protecting residents near to a changing coastline.

In terms of impacts of offering this new degree in the School of Natural Sciences and Mathematics, the CZM program has significant synergies with the Stockton undergraduate Marine Science and Environmental Science degrees and the graduate programs: PSM in Environmental Science and MS in

Data Science and Strategic Analytics (see letters of support below Appendix e.). All of these degree programs would share computer software, field equipment, resources and faculty with the CZM program. It will be necessary to ensure that the graduate programs do not take away resources from the undergraduate programs and offset these positive impacts. Toward this end, it is critical that the CZM program receive dedicated faculty and resources.

d. Need

A survey of employment openings in this area was undertaken to ascertain the potential level of need for employees with the skills and training expected to degree holders in this area. This program is expected to draw students from throughout the state and region and besides direct employment, students in the thesis track would also have the option of seeking additional education for a doctorate.

The Job Market

1. According to Indeed.com, one of the most popular job search engines of the nation, job openings associated with Coastal Zone Management Specialist across the US are abundant. A snapshot search in August 2017 yielded 2500+ matches (<https://www.indeed.com/q-Coastal-Zone-Management-Specialist-jobs.html>).

The screenshot shows the Indeed.com search results for 'Coastal Zone Management Specialist' jobs. The search bar contains the text 'Coastal Zone Management Speci' and 'Find Jobs'. The results are sorted by relevance. The first job listing is for a 'Project Manager' at COWI - NA - Braintree, MA, with a salary of \$97,869 - \$127,228 a year. The second listing is for a 'Project Engineer' at COWI - NA - Braintree, MA, with a salary of \$97,869 - \$127,228 a year. The third listing is for an 'Environmental Protection Specialist' at the Department of Housing And Urban Development - Newark, NJ, with a salary of \$97,869 - \$127,228 a year. The fourth listing is for a 'Project Assistant' at Arcadis:US - New York, NY, with a salary of \$97,869 - \$127,228 a year. The page also includes filters for salary estimate, job type, and location.

- Commission (1)
- Location**
 - Washington, DC (6)
 - New York, NY (4)
 - Oakland, CA (4)
 - Seattle, WA (3)
 - Braintree, MA (3)
 - Trumbull, CT (3)
 - Baton Rouge, LA (3)
 - Columbus, OH (3)
 - Newark, NJ (2)
 - Houston, TX (2)
 - Los Angeles, CA (2)
 - White Plains, NY (2)
 - Long Island City, NY (2)
 - Chicago, IL (2)
 - Fair Lawn, NJ (1)
- Company**
 - Arcadis:US (39)
 - COWI - NA (14)
 - Department of Housing And Urban Dev
 - AECOM (1)
 - TRC Companies Inc (1)
 - [more »](#)
- Experience Level**
 - Senior Level (24)
 - Mid Level (23)
 - Entry Level (5)

Project Assistant - new

Arcadis:US - ★★★★★ 3 reviews - New York, NY
 As a global top five player in water services, we focus on the entire water cycle – from source to tap and back again – while also managing rivers and coastal...
 Arcadis - 30+ days ago - [save job](#) - [more...](#)

FEMA-Disaster Response Environmental Specialists - new

Dewberry - ★★★★★ 30 reviews - United States
 NEPA, the Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act, Endangered Species Act, Coastal Barrier Resources Act, Coastal Zone Management Act...
 11 days ago - [save job](#) - [more...](#)

California Wetland Regulatory Specialist / Biologist - new

AECOM - ★★★★★ 2,361 reviews - Orange, CA 92864
 + Project and/or task-level management, client management, and leading coordination with resource agencies. + Must have experience with permitting under federal...
 21 days ago - [save job](#) - [more...](#)

Junior Environmental Planner - new

Leidos - ★★★★★ 259 reviews - Earth City, MO 63045
 Prepare environmental regulatory documentation and permit applications (e.g., CWA 404/401, Coastal Zone Management Act, ESA Section 7, etc.)...
 29 days ago - [save job](#) - [more...](#)

Senior Water/Wastewater Pipeline Project Engineer - new

Arcadis:US - ★★★★★ 3 reviews - Washington, DC
 Excellent technical engineering and Project/Task Management skills in the W/WW practice area. As a global top five player in water services, we focus on the...
 Arcadis - 30+ days ago - [save job](#) - [more...](#)

2. Search by Indeed.com also shows the average salary of such positions is around \$80,000

(<https://www.indeed.com/salaries/Coastal+Zone+Management+Specialist-Salaries,-United+States>).

Coastal Zone Management Specialist Salaries in US
 Salary estimated from 225,310 employees, users, and past and present job advertisements on Indeed in the past 12 months. Last updated: July 11, 2017

Location: United States

Job Title	Average Salary	Salary Distribution
Project Management		
Water Project Manager 696 salaries reported Water Project Manager jobs in US	\$79,997 per year	
Project Manager 111,000 salaries reported Project Manager jobs in US	\$81,135 per year	
Project Engineer 26,974 salaries reported Project Engineer jobs in US	\$77,379 per year	

Job openings related to coastal zone management specialist

- Junior Environmental Planner**
Leidos
Earth City, MO
29 days ago
- Environmental Protection Specialist**
Department of Housing And Urban Development
Newark, NJ
11 days ago
- Environmental Protection Specialist**
Department of Housing And Urban Development
Newark, NJ
11 days ago
- Asset Management Project Engineer**
Arcadis:US
Washington, DC

- Coastal Zone Management Specialist is too specific to be a category of professional occupation on its own in the job market. Jobs require coastal zone management skills are also often embedded in job titles include, but not limited to, the followings:

(<http://environmentalprograms.net/resources/coastal-management-academic-requirements-professional-outlook>)

Environmental Scientists/Specialists
 Coastal/Marine Scientists or Project Manager
 Coastal Environmental Quality Monitoring Coordinator
 Marsh Restoration Ecologist/Project Manager
 Estuarine Food Web Analyst
 Coastal Hazards Analyst
 Coastal Oceanographer
 Coastal Wetlands Science and Restoration Ecologist
 Consultant in Coastal/Estuarine Processes and Geomorphology
 Research scientist in Marine Mammalogy and Coastal Ecology

- Environmental Scientists/Specialists Job Outlook, according to the US Dept. of Labor, Bureau of Labor Statistics, (<https://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm>) shows that it has above average growth rate in the next 10 years and projected employment of the occupation would increase to 104,800 by 2024 from 94,600 in 2014:

Summary

Quick Facts: Environmental Scientists and Specialists	
2016 Median Pay ?	\$68,910 per year \$33.13 per hour
Typical Entry-Level Education ?	Bachelor's degree
Work Experience in a Related Occupation ?	None
On-the-job Training ?	None
Number of Jobs, 2014 ?	94,600
Job Outlook, 2014-24 ?	11% (Faster than average)
Employment Change, 2014-24 ?	10,200

Employment projections data for environmental scientists and specialists, 2014-24

Occupational Title	SOC Code	Employment, 2014	Projected Employment, 2024	Change, 2014-24		Employment by Industry
				Percent	Numeric	
Environmental scientists and specialists, including health	19-2041	94,600	104,800	11	10,200	[XLSX]

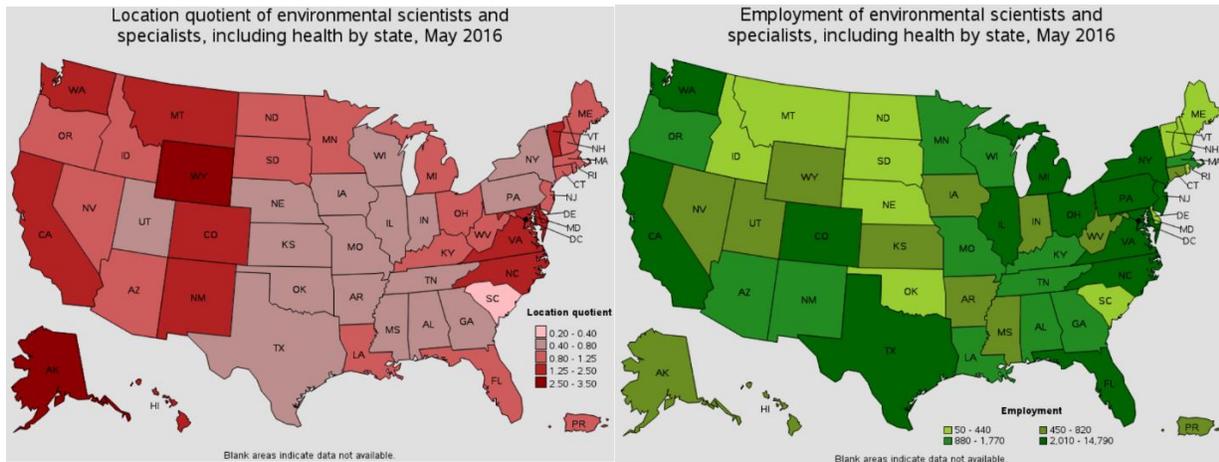
SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

5. Following Industries are most associated with Environmental Scientist/Specialist occupation:

Industry	Employment (1)	Percent of industry employment	Hourly mean wage	Annual mean wage (2)
Management, Scientific, and Technical Consulting Services	20,260	1.52	\$37.07	\$77,110
State Government (OES Designation)	19,140	0.87	\$30.88	\$64,230
Local Government (OES Designation)	11,740	0.22	\$34.15	\$71,030
Architectural, Engineering, and Related Services	10,340	0.74	\$34.74	\$72,260
Federal Executive Branch (OES Designation)	5,240	0.26	\$48.44	\$100,760

Industries with the highest concentration of employment in this occupation:

6. Geographically, as might be expected, the job market is better along the coastal states, especially in the east coast including New Jersey, Delaware, Maryland, Virginia, North Carolina and Florida, according to the location quotient of the occupation.



7. Here is the data of long term occupation projection by state (Environmental Scientists and Specialists --2024) <http://www.projectionscentral.com/Projections/LongTerm>

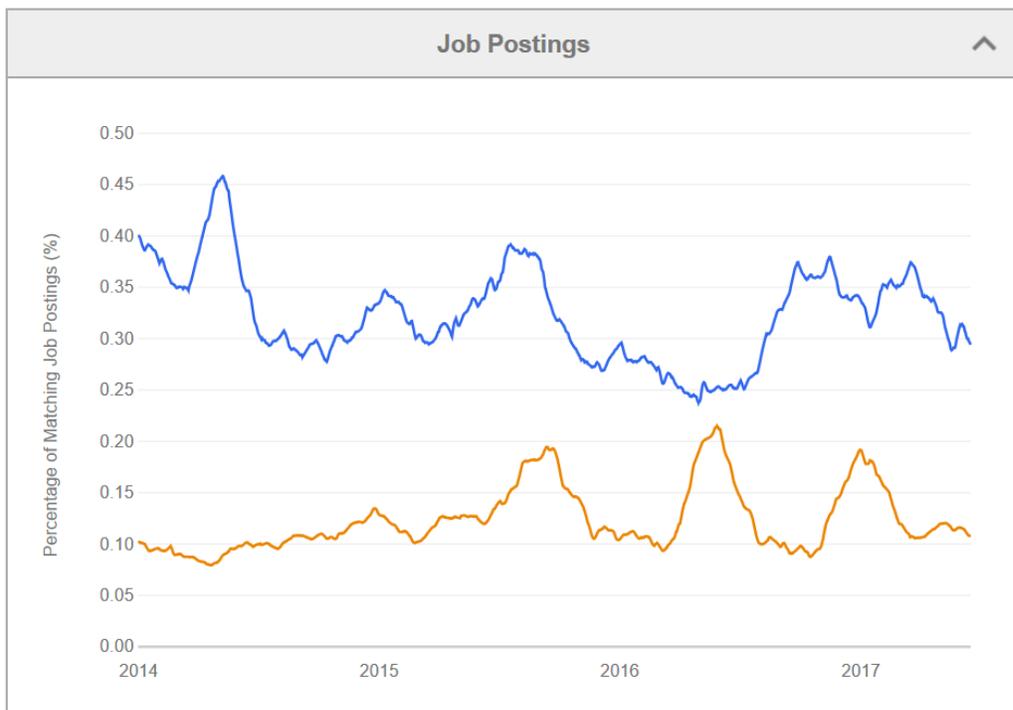
Area	Title	Base	Projected	Change	% Change	Avg. Anl Openings
New Jersey	Environmental Scientist	2,750	2,940	190	6.9	100
New York	Environmental Scientist	3,110	3,730	620	20.0	160
Delaware	Environmental Scientist	440	490	50	12.0	20
Maryland	Environmental Scientist	2,350	2,880	530	22.7	120
Virginia	Environmental Scientist	3,290	3,610	320	9.7	130

8. Job search in CareerOneStop.org (according to US.jobs in the past 60 days <https://www.careeronestop.org/Toolkit/Careers/Occupations/occupation-profile.aspx>) yielded following number of job announcements:

Job title	New York	New Jersey	Delaware	Maryland	Virginia
environmental specialist	499	278	30	180	421
coastal manager	6	22	1	5	10
Oceanographer	6	3	0	3	1
Coast (as a key word)	240	266	47	159	332

9. A trend of the job availability, according to job posting in Indeed.com, (<https://www.indeed.com/jobtrends/q-Environmental-Specialist-q-coastal.html>) shows that the percentage of job postings for Environmental specialists are slightly lower from 2014 to 2017 with significant fluctuation. Yet, among those most closely associated with coastal projects seems to increase a bit in general over the same time with a clear cycle, which is possibly caused by seasonality:

Environmental Specialist × coastal × + Add Term Find Trends



10. Education.Org network (a Monster.com/Monster Worldwide affiliate) details the academic requirements and professional outlook for coastal zone management professionals which supports the proposed curriculum and the projected need in this discipline⁶.
11. In addition to our own research above, a Market Analysis was undertaken by Hanover Research (<https://www.hanoverresearch.com>) in March 2018 (appendix a.) and confirmed the initial findings of strong employment potential with a Masters in Coastal Zone Management and high student demand for training in this area.

The Hanover Market Analysis Report Recommended (appendix a.):

1. “Based on market indicators and local competitor saturation, a master’s degree program in Coastal Zone Management would likely be a viable offering.”

“Master’s degree completions across relevant fields grew at faster than average rates at the national and state levels, theoretically pointing to growing student demand. Furthermore, Stockton may loosely compete with only two New Jersey institutions (Montclair State University and Rutgers University) for prospective students. Finally, occupational projections and job posting trends indicate a mostly positive employment landscape for graduates of the proposed program, assuming government funding continues.”

2. “Stockton should market its proposed Master of Science (MS) and Professional Science Master’s (PSM) degree programs along the East Coast.”

“Stockton is unique not only in New Jersey but also among East Coast competitors with regards to its research-focused MS and non-thesis PSM degree options. Additionally, Stockton’s focus on Coastal Zone Management may attract prospective students as many competitors only offer coastal zone management as a concentration within a broader degree program. As student demand for such programs is limited at the state level, Stockton should expand its marketing to East Coast states.”

Key Findings and Program Demand Forecast (for CZM programs in the US) from the Hanover Report

1. “Student demand for master’s degrees and certificates in coastal zone management are growing at the national level.”

“Between 2012 and 2016, master’s completions in relevant fields grew by 2.6 percent, faster than the average annualized growth across all master’s programs. Post-baccalaureate certificates grew by 43.5 percent, albeit with much lower volumes compared to those of master’s programs over the five-year range.”

2. “Labor market demand indicators point to a generally positive employment outlook.

⁶ <http://environmentalprograms.net/resources/coastal-management-academic-requirements-professional-outlook>

Most relevant occupations are projected to grow at faster than average rates. However, a large portion of job openings are concentrated in government and are therefore vulnerable to budget and staffing cuts.”

3. “Significant competitors for Stockton include Nova Southeastern University, University of Miami and Stony Brook University.”

“Coastal zone management-related programs at these institutions illustrated strong student conferral growth and volumes between 2012 and 2016. Additionally, all three competitors offer flexible curricula and concentration.”

The above analysis by Hanover found 2.6% annualized growth across coastal zone management programs in the U.S (2012-2016). The projected growth in employment of coastal zone management-related professionals is 9.8% (from 2016-2026). There are 11 competitor programs on the East Coast of the U.S. that offer master’s degrees in fields related to coastal zone management but predominantly they occur as concentrations in larger degree programs (such as marine biology and oceanography). This analysis along with our previous analysis (4-1-10) indicates that there would be a need for individuals with the proposed degrees in the employment market. To judge regional interest, a survey was designed to measure potential employer interest.

12. Regional Employer Needs Assessment Survey

A survey of 79 local and regional employers was designed and electronically delivered using “Qualtrics” to get a feeling of the employment market (complete survey appendix b.). The survey instructions were *“The purpose of the survey is to collect information about the need of graduates with Master of Science degree in the United States. Information collected here will not be shared with any third party except for accreditation agency of New Jersey. The survey should not take more than 3 minutes to complete. Thank you so much for your participation.”* The survey had an 18% response rate with respondents from government, non-profit/NGO, academic and private/corporation sectors. All of the respondents were involved in coastal management projects often or primarily.

The respondents’ services ran the gamut of possibilities including consulting, survey/database management, engineering, legal, transportation/ports, regulatory/legal, development/finance and other specified as: beach nourishment, endangered species, monitoring and assessment. The majority of respondents indicated that they would be seeking to fill positions in the upcoming year while over half expected to increase the number of jobs over the next five years. Most of these jobs were expected to be filled full-time at the entry level although experience was helpful. Employer respondents most often were looking for expertise in Natural resources management/planning, ecosystem conservation/restoration, construction/engineering, geographic information systems and remote sensing. Additional areas of expertise also of employer interest were research/data analysis, project coordination and management, water quality/remediation, risk assessment and numerical modelling. For most of the positions, employers expected minimum a BA/BS in Natural Sciences or Engineering and many also would expect an M.S. or P.S.M. degree. Less indicated interest in a Ph.D. or graduate certificate (~20%) Based on these results, it is clear that there is a regional need for masters prepared coastal scientists.

e. Students

This program is expected to draw students from throughout the state and region who have a background in environmental and marine sciences or who have an interest in further training in this area. Of course, Stockton University students in the marine and environmental sciences could be an important source of potential graduate students. Applicants interested in direct employment would benefit from the Professional Science Masters option while applicants interested in research or continuing on to doctoral work would select the thesis option. The certificate option would be useful for working professionals who cannot commit to a Master's program but who would benefit professionally from the additional skills and coursework. A survey (appendix c.) was designed and electronically implemented using "Qualtrics" to assess local student support. The survey was distributed to current Stockton students enrolled in the School of Natural Sciences and Mathematics to judge the interest of our students in continuing their education in this area. The instructions for the survey were: *"The purpose of the survey is to get your input on a potential Master Program in Coastal Zone Management at Stockton. Information collected here will not be shared with any third party except for accreditation agency of New Jersey. The survey should not take more than 5 minutes to complete. Your prompt response is greatly appreciated."*

The results of this survey (n=175 respondents) indicated that Stockton undergraduates, particularly in the biology, environmental science and marine science majors, would be very interested in graduate training in the area Coastal Zone Management. About 2/3rds of students indicated they would seek graduate education beyond their undergraduate degrees and approximately the same proportion would consider applying or would definitely apply for the proposed Stockton CZM programs. Students who indicated that they would consider applying or would definitely apply were equally split among the three options (PSM, MS Certificate). The comments at the end of the survey supported an increase in graduate offerings at Stockton and requested additional options in the future.

It is expected that the CZM programs would enroll approximately twelve to eighteen students per year. Based on student surveys, each of the tracks (PSM/MS/Certificate) would interest students. The PSM students would need to complete capstone projects and to have an advisor/ first reader and second reader while the Masters students would need to complete a thesis and also have an advisor plus a thesis committee. The certificate students would not need project advisors unless they chose to matriculate into one of the other two tracks. Given these requirements, advising student projects will be an important part of the faculty workload.

ADMISSION REQUIREMENTS

For persons who hold a baccalaureate degree, the following are the admissions requirements for the Master's or Professional Science Master's degree (PSM) in Coastal Zone Management:

- Complete application packet, including an essay explaining how the degree in Coastal Zone Management fits into his or her career goals;
- A baccalaureate degree from a regionally accredited institution with an environmentally-related major (e.g., Environmental Science, Marine Science, Earth Science, Chemistry, Biology, or other related majors); transcripts for all Colleges/universities attended are required.

- Three letters of recommendation college/university faculty or from professional colleagues.
- Completion of the Graduate Record Examination (GRE), the general test; students should have their scores sent directly to Stockton;
- Minimum college/university cumulative grade point average (GPA) of 3.0.
- An average GPA of 3.5 or better derived from all science and mathematics courses taken; and
- The TOEFL examination is required of students for whom English is a second language.
- Specific minimum requirements may be waived at the discretion of the CZM Admissions Committee.

Acceptance into the Coastal Zone Management Program will be based on a review of the entire application packet. Admission to the program is competitive and acceptance is not guaranteed.

Applicants for the graduate certificate in Coastal Zone Management will follow the same admissions guidelines for the Master's programs. Certificate holders or certificate candidates may choose to matriculate into one of the Master's tracks with permission of the Director and the Admissions Committee.

f. Program Resources

A. Faculty

Given the interdisciplinary nature of the proposed program, it is important to include faculty who represent the various employer attributes emphasized in the curriculum: (which include, but are not limited to) land use planning, coastal ecology / geology / oceanography, applied geographic information systems. Lead faculty in the proposed CZM program would be expected to hold a terminal degree in Coastal Zone Management or a related field (e.g. Ph.D.). Due to the crucial applied aspects of the proposed program, it is necessary to involve professional and/or adjunct (affiliated) faculty who are current leaders in the various organizational types included in the program. These faculty members must possess a Master's Degree (M.S.) at a minimum along with relevant, applied experience (for example, adjunct faculty member M. Cicali is a GIS scientist and Administrator at the FAA William J. Hughes Technical Center). Regional scientists and managers will also be included as guest lecturers or speakers.

Two, new full-time faculty lines are requested and essential to ensure the initial and longer-term success of the program. It is expected that one of the new faculty will serve as the Founding Director of the program. Contributing Stockton faculty have expressed an interest in teaching and research mentoring. However, many of the faculty listed below (which include current Directors and Program Coordinators) are already utilizing course releases or teaching overloads to meet their Program, School, University, and/or professional research obligations. Stretching these faculty even further would be a disservice to their home programs as well as enrolled CZM students. Given the emphasis the CZM program places on Stockton's Atlantic City Gateway Campus, the new full-time faculty members would be housed in Atlantic City and provide a crucial anchor for a program that bridges multiple sites (main campus, Atlantic City, Stockton Marine Field Station, Stockton Coastal Research Center). Stockton has specific

teaching, research, and service requirements for faculty based on rank. The new faculty members will be expected to meet or exceed these requirements.

Contributing Faculty

Weihong Fan, Ph.D. Professor of Environmental Studies
Kimberly McKenna, M.S. Director of Sponsored Programs, Stockton Coastal Research Center
Susanne Moskalski, Ph.D. Assistant Professor of Marine Science
Anna Pfeiffer-Herbert, Ph.D. Assistant Professor of Marine Science
Ekaterina Sedia, Ph.D. Associate Professor of Biology
Peter Straub, Ph.D. Professor of Biology and Dean of Natural Sciences and Mathematics
Mark Sullivan, Ph.D. Associate Professor of Marine Science

Adjunct Faculty:

Michael Cicali, (M.S.) GIS Scientist / Administrator AECOM FAA William J. Hughes Technical Center

Course Coverage: New graduate faculty will teach 9 credits per semester, minus a course release for the director. Some courses will be shared with and taught by the Professional Science Masters in Environmental Science (ENSC) program. Fulltime and adjunct contributing faculty will be expected to provide coursework on an availability basis, which for most will be once every one to two years. Faculty will also be available to serve as capstone and thesis mentors and to serve on thesis committees. Therefore we expect to be able to offer all 6 core courses and a minimum selection of 6 electives every year.

B. Atlantic City Campus, Equipment, GIS Lab, Software, Library, Student Financial Assistance

This new program is expected to be offered at the Universities new Atlantic City campus. Stockton's Atlantic City Gateway campus offers CZM graduate students the chance to live and study in an urban environment while taking advantage of the academic and applied learning resources a coastal landscape offers. The southern New Jersey shoreline is composed mainly of barrier islands of varying lengths, from 18 miles (Long Beach Island) to 5 miles (the Wildwoods). Barrier islands such as Absecon Island (home to Atlantic City) have a very different morphology and depositional history from the beaches to the north. Large lagoonal systems of open bay and salt marsh typically lie landward of the barrier island shoreline. Strong tidal currents move sand into and out of the narrow inlet channels between barrier islands. The interrelationships of wave energy distribution and beach changes around inlets influence management decisions on inlet navigation, dredging, and shore protection. Superimpose the predicted impacts of sea level rise on these barrier island dynamics and CZM faculty / students now have an unparalleled natural laboratory at their disposal. The close proximity of the Atlantic City Gateway Campus to Stockton's Marine Field Station and Coastal Research Center provides access to state of the art research vessels (temporary access to these vessels is also available via Gardner's Basin, Atlantic City) and associated mapping technologies (side scan sonar, mobile LIDAR, multi-beam sonar, etc.). Support (in-part) for the upkeep of these resources (including service agreements, normal wear-and-tear, etc.) is required.

One critical need for the Atlantic City Gateway site is a state-of-the-art Geographic Information Systems (GIS) Laboratory for various mapping, graphics, and analytical applications related to the CZM program. In addition to technical coastal zone mapping projects, GIS is also frequently used by politicians, public

health officials, regional planners, first responders, business marketing professionals, and many others (thus potentially expanding the utility of the lab beyond the CZM program proper).

A minimum of 25 high speed workstations with dual monitors (16 gb of ddr4 RAM, i7 chipset with 8 cores, 500 gb of local hard drive space, 2 gb RAM video cards) are needed to maximize use by CZM program students and faculty, other Stockton users (Business, Hospitality and Tourism, etc.), as well as potential Stockton-led community workshops and outreach. A faculty podium with identical computer specifications as above is needed with connectivity to 3 projectors: a main projector in the front of the room and 2 additional projectors on the GIS software side. Each of the additional projectors are connected to a single collaborative student workstation that can be used for group viewing or working on a collaborative project.

Based on a survey of current faculty and various potential Stockton end-users, the following software is needed at a minimum (these include applications that are free for academics or require site / individual licenses depending on the product).

Arc GIS Desktop & Arc Info Workstation (*ESRI*)
Global Mapper (*Blue Marble Geographics*)
Quick Terrain Modeler (*Applied Imagery*)
HYPACK (*HYPACK/ Xylem*)
Leica Geosystem/Infinity survey software

Trimble Pathfinder (*Trimble*)
Hexagon Geospatial (*Hexagon*)
MATLAB (*Mathworks*)
AutoCad

Based on the nature of the program, we anticipate no additional physical resources beyond the current Stockton Main Campus and Off-Campus facilities (Atlantic City, Stockton Marine Field Station, Stockton Coastal Research Center). We plan to utilize the resources and expertise offered by the Office of E-Learning and the Office of Computer Services. These offices will continue to support the online components of this program as they have already been doing for the PSM in Environmental Science. Blackboard will be utilized extensively to allow students to work off-site on assignments and projects. In terms of library reference support, the University library has significant holdings in Coastal Zone Management-related topics, including both print and internet sources. However, faculty and students would benefit immensely from a subscription to Web of Science - a platform that connects a core collection of resources to regional citation indexes, patent data, specialized subject indexes, and research data sets (totaling 33,000+ journals).

C. Student Support:

Stockton University supplies a limited amount of graduate assistantships, Distinguished Research Fellowships, EOF Graduate Grants, Stockton Foundation Scholarships and need based financial aid to the graduate students. Support for students in the form of teaching and research assistantships is also needed to help attract high quality students and partially defray the cost of tuition for degree completion. In part, some of this support can come from externally sponsored research projects and contracts as many of the faculty are research active. Currently, Professional Science Masters students in Environmental Science are deemed eligible to teach laboratories for core courses such as introductory biology as adjuncts. A more formalized program of graduate teaching assistantships by the University might allow additional support of SCM students.

University support services for graduate students include the Stockton Writing Center which offers a dedicated tutor for graduate writing, a Graduate Student Council to organize graduate issues and fund graduate clubs, access to the Student Travel fund for attending and presenting work at conferences, a graduate lounge and an annual Graduate Symposium to showcase graduate work. Housing is available for graduate students through Stockton Affiliated Services (SASI) which rents multi-shared housing units adjacent to campus. Graduate students also have access to the University Wellness Center and a full range of student support services including athletics, counseling, academic advising, IT services, library services and Career Center services.

4. Degree Requirements:

Overview

The proposed Coastal Zone Management graduate program has three tracks to a degree or certificate:

- **Professional Science Masters in Coastal Zone Management (PSM-CZM):** This non-thesis option consists of 36 credit hours, including a capstone project, and will prepare students for work or career advancement in a professional setting.
- **Master of Science in Coastal Zone Management (MS-CZM):** This option consists of 36 credit hours and includes a research-based thesis. It is intended for students aiming for further academic study or research.
- **Certificate in Coastal Zone Management:** A certificate requires 18 credit hours of coursework. This option is appropriate for working professionals and other individuals who will benefit from advanced study of coastal zone management science without completion of a graduate degree.

All CZM students will take four core courses that cover a breadth of coastal zone science, policy, management and technical skills. Students on the PSM-CZM track take additional required courses in professional development. After completing the core curriculum, students choose electives toward specialized knowledge in their intended career path. The curriculum culminates in a capstone project on the PSM-CZM track or research thesis project on the MS-CZM track. A Certificate in Coastal Zone Management requires completion of the PSM-CZM core courses. The complete curriculum is shown in Table 1 and core course descriptions in Table 2. Curriculum worksheets and additional elective courses from the Stockton Professional Science Masters in Environmental Science and the Masters in Data Science and Strategic Analytics are in appendix e.

Delivery

The CZM courses will be designed to maximize hands-on exposure and cooperative learning. It is anticipated that the PSM-CZM and MS-CZM can be completed in two years of full time study and the Certificate in 1 year of full time study. Part time study will also be permitted to allow students to complete the program while working.

Table 1. Curriculum requirements for PSM (non-thesis) versus MS (thesis) tracks. The Certificate program consists of the PSM core course requirements. Courses marked with * are cross-listed with the PSM in Environmental Science (ENSC) program.

PSM-CZM	MS-CZM
<p><i>Core Courses (18 credits)</i></p> <p>Coastal Ecosystems</p> <p>Coastal Physical Processes</p> <p>Coastal Zone Policy, Law and Planning</p> <p>Applied Geographic Information Systems*</p> <p>Project Management*</p> <p>Professional Writing*</p>	<p><i>Core Courses (12 credits)</i></p> <p>Coastal Ecosystems</p> <p>Coastal Physical Processes</p> <p>Coastal Zone Policy, Law and Planning</p> <p>Applied Geographic Information Systems*</p>
<p><i>Electives (12 credits)</i></p> <p>Coastal Data Management and Statistics</p> <p>Physical Oceanography in the Coastal Zone</p> <p>Coastal Engineering Principles</p> <p>Fisheries Science and Management</p> <p>Coastal Depositional Systems</p> <p>Hydrographic Instrumentation and Surveys</p> <p>Resiliency Planning</p> <p>Statistical Analysis*</p> <p>Watershed Management*</p> <p>Surface Water Hydrology*</p> <p>Groundwater Hydrology*</p> <p>Land Use Planning*</p> <p>Remote Sensing/Advanced Spatial Analyses*</p> <p>Coastal Zone Management*</p> <p>Wetlands Ecology*</p> <p>Environmental Modeling*</p> <p>Water Quality*</p> <p>Introduction to Data Science and Analytics (DSSA 5001)</p> <p>(Up to 3 credits of electives may be selected from ENSC or DSSA courses not listed above, upon approval of graduate advisor)</p>	<p><i>Electives (15 credits)</i></p> <p><i>Elective options at left, plus:</i></p> <p>Project Management*</p> <p>Professional Writing*</p> <p>(Up to 6 credits of electives may be selected from ENSC or DSSA courses not listed above, upon approval of graduate advisor)</p>
<p><i>Capstone Project (6 credits)</i></p>	<p><i>Thesis Research (9 credits)</i></p>

Table 2. Course descriptions for required core courses and newly created elective courses

CORE COURSES	
CZM 5100: Coastal Ecosystems	Survey of biological and biogeochemical dynamics in the coastal ocean. Covers ecological zones, biological productivity, biogeochemical cycling, and environmental challenges such as eutrophication, hypoxia, pollution and acidification.
CZM 5200: Coastal Physical Processes	Introduction to physical and geological processes in the coastal zone. Topics include waves, tides, currents, shoreline and sedimentary processes, effects of storms and flooding, and climate-driven change.
CZM 5300: Applied Geographic Information Systems	Introduce current Geographic Information Systems (GIS) technology, including GIS principles and applications while focusing on developing problem-solving skills. Course content includes concepts, data structures, spatial database development and management, analytical techniques, modeling, and objective-oriented GIS projects. (cross-listed with ENSC 5302)
CZM 5400: Coastal Zone Policy, Law and Planning	Introduction to coastal zone policy, maritime laws and regulations, federal and state coastal zone management programs.
CZM 5401: Project Management	<i>Required for PSM-CZM and Certificate.</i> This course deals with all aspects of project management from project definition, to assessment of personnel and material resources needed to carry out the project, to budgeting, work management and the reporting of results. (cross-listed with ENSC 5401)
CZM 5402: Professional Writing	<i>Required for PSM-CZM and Certificate.</i> This HYBRID course will focus on the basic techniques of writing (paragraph structure and grammar, as well as tools for effective nonfiction writing), as well as more advanced topics of interest to the PSM students. The students will practice writing scientific papers, grant proposals, press releases, and editorials, among others. The course will address many common issues in scientific writing as well as writing for the general audience, teaching the students to effectively communicate with a range of clients, organizations, and the general public. (cross-listed with ENSC 5110)

CAPSTONE EXPERIENCES	
CZM 5600: Capstone Project	<i>Required for PSM-CZM only.</i> Work with a faculty advisor and external partner organization to develop and complete an independent project in the coastal zone management field, culminating in a written report. A minimum of 6 credits (typically over two semesters) of CZM 5600 is required.
CZM 5601: Thesis Research	<i>Required for MS-CZM only.</i> Work with a faculty advisor to conduct independent research, culminating in a written thesis and oral defense. A minimum of 9 credits (typically over three semesters) of CZM 5601 is required.
ELECTIVE COURSES (does not include existing ENSC and DSSA elective options)	
CZM 5201: Coastal Data Management and Statistics	Practical skills in data collection and storage, recording metadata, and intermediate statistical analysis of time series and spatial data.
CZM 5501: Coastal Physical Oceanography	Geophysical fluid kinematics and dynamics applied to coastal ocean and estuarine systems.
CZM 5502: Coastal Engineering	Essentials of engineering covering field measurement techniques, shore protection projects, and engineering models.
CZM 5503: Fisheries Science and Management	Introduction to fish population dynamics, stock assessment and fisheries regulatory agencies.
CZM 5504: Coastal Depositional Environments	Sediment transport, landforms, and geological history of the coastal zone including coastal soils and management. (covers dredged material management and can tie in with Coastal Engineering Principles)
CZM 5505: Hydrographic Instrumentation and Surveys	Technology and methods of conducting hydrographic surveys. Includes hands-on use of sonar, acoustic Doppler current profilers and other electronic instrumentation, plus software for survey planning and post-processing.
CZM 5506: Resiliency Planning	Science, policy and politics of planning for resiliency in ecosystems and human communities of the coastal zone.

5. Consultant's curriculum vitae- To be determined
 6. Consultant's report- to be determined
 7. Institutional Response to the Consultant's Report- to be determined
 8. Board of Trustees' Resolution- to be determined
 9. Institutional Responses- to be determined
- * Statement of "no objections"
 - * Objections
 - * Objecting institutions
 - * Response to objections
 - * Information about reconciliation

Market Analysis: Master's in Coastal Zone Management

Prepared for Stockton University

March 2018

In the following report, Hanover Research assesses demand for master's degree programs in coastal zone management, defined as "the management of coastal areas to balance environmental, economic, human health, and human activities."* This report includes an examination of student and labor market demand, and an analysis of potential competitor programs.

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Executive Summary

Master's in Coastal Zone Management

Recommendations

An analysis of degree completions, labor market demand, and competitors supports the following recommendations:

- 1 **Based on market indicators and local competitor saturation, a master's degree program in Coastal Zone Management would likely be a viable offering.**

Master's degree completions across relevant fields grew at faster than average rates at the national and state levels, theoretically pointing to growing student demand. Furthermore, Stockton may loosely compete with only two New Jersey institutions (Montclair State University and Rutgers University) for prospective students. Finally, occupational projections and job posting trends indicate a mostly positive employment landscape for graduates of the proposed program, assuming government funding continues.

- 2 **Stockton should market its proposed Master of Science (MS) and Professional Science Master's (PSM) degree programs along the East Coast.**

Stockton is unique not only in New Jersey but also among East Coast competitors with regards to its research-focused MS and non-thesis PSM degree options. Additionally, Stockton's focus on Coastal Zone Management may attract prospective students as many competitors only offer coastal zone management as a concentration within a broader degree program. As student demand for such programs is limited at the state level, Stockton should expand its marketing to East Coast states.

Key Findings and Program Demand Forecast

For coastal zone management programs in the United States.

Student demand for master's degrees and certificates in coastal zone management are growing at the national level.

Between 2012 and 2016, master's completions in relevant fields grew by 2.6 percent, faster than the average annualized growth across all master's programs. Post-baccalaureate certificates grew by 43.5 percent, albeit with much lower volumes compared to those of master's programs over the five-year range.

Labor market demand indicators point to a generally positive employment outlook.

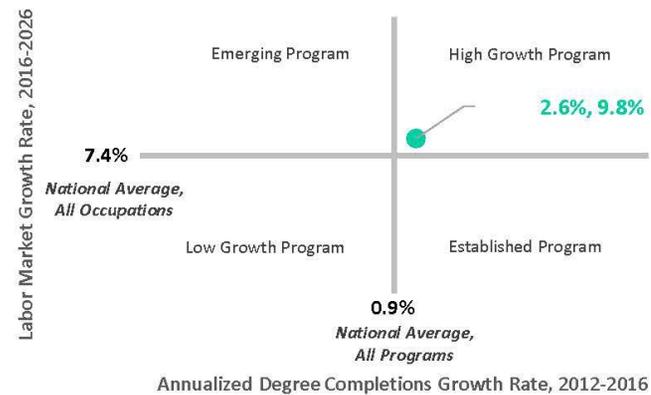
Most relevant occupations are projected to grow at faster than average rates. However, a large portion of job openings are concentrated in government and are therefore vulnerable to budget and staffing cuts.

Significant competitors for Stockton include Nova Southeastern University, University of Miami, and Stony Brook University.

Coastal zone management-related programs at these institutions illustrated strong student conferral growth and volumes between 2012 and 2016. Additionally, all three competitors offer flexible curricula and concentration areas, which Stockton should consider when developing its own program.

National Benchmark Analysis

Comparison of master's degree completions and relevant labor market to all completions and all occupations in the United States.



Fast Facts

 **2.6%**

Annualized growth across coastal zone management-related master's degrees in the United States between 2012 and 2016. The average rate of growth for master's degrees in all fields nationally over the same period was 0.9 percent.

 **9.8%**

Projected growth in employment of coastal zone management-related professionals in the United States from 2016 to 2026. Average projected growth across all occupations in the nation is 7.4 percent.

 **11**

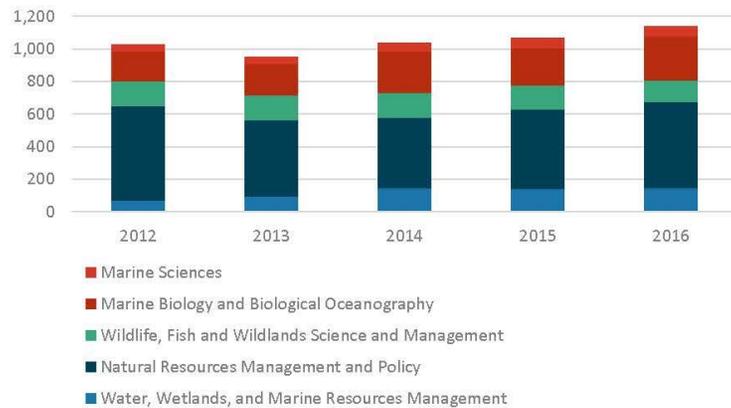
Number of competitor programs on the East Coast that offer master's degree programs in fields related to coastal zone management.

Degree Completions Analysis

Master's in Coastal Zone Management

National Degree Completions Volume

National distribution of degree completions from 2012 to 2016



Total Degree Completions

Aggregate degree completions by geographic level (2016)

	State	National
Water, Wetlands, and Marine Resources Management	0	148
Natural Resources Management and Policy	0	526
Wildlife, Fish and Wildlands Science and Management	0	134
Marine Biology and Biological Oceanography	1	269
Marine Sciences	0	61
Total	1	1,138
Annualized 5-Year Growth Rate	--	2.6%

Source: IPEDS⁵

Analysis of Findings

National master's degree completion trends suggest growing student demand for some coastal zone management-related fields.

Between 2012 and 2016, master's degree completions for relevant fields grew at an average annualized rate of 2.6 percent, slightly faster than the rate across all master's programs in all fields at the national level (0.9 percent). Over the five-year range, Water, Wetlands, and Marine Resources Management; Marine Resources Management; Marine Sciences; and Marine Biology and Biological Oceanography completions exhibited significantly faster growth rates at 19.3 percent, 12.6 percent, and 10.1 percent per year, respectively. In contrast, Natural Resources Management and Policy and Wildlife, Fish and Wildlands Science and Management conferrals declined at rates of 2.4 percent and 3.1 percent per year, respectively.

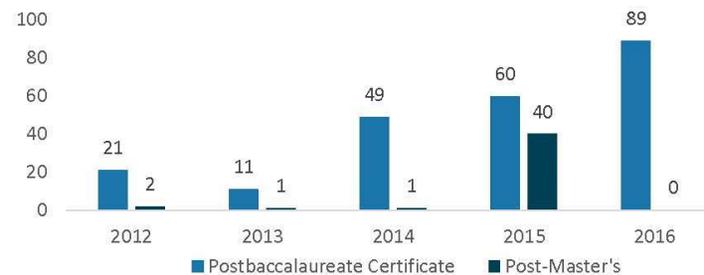
Almost no institutions in New Jersey reported master's degree completions in fields related to coastal zone management. Only Montclair State University reported one master's degree completion in Marine Biology and Biological Oceanography over the past five years.

Student demand for post-baccalaureate certificates in coastal zone management-related fields is also growing at the national level.

Shown below, the volume of completions for both postbaccalaureate and post-master's certificate programs is lower compared to master's conferrals. However, post-baccalaureate certificate completions exhibit strong growth (43.5 percent) over the five-year period. These trends suggest that there is a growing student market for Stockton's proposed coastal zone management certificate at the postbaccalaureate level, albeit not at the post-master's level.

National Certificate Completions Volume

National distribution of postbaccalaureate and post-master's completions from 2012 to 2016

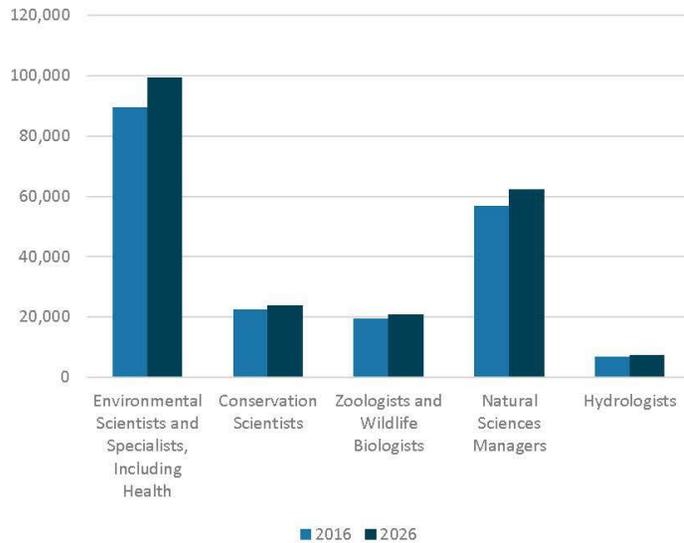


Labor Market Analysis

Master's in Coastal Zone Management

National Current and Projected Job Availability

State coastal zone management-related positions as of 2016 and 2026 (projected)



Total Labor Market

Aggregate coastal zone management-related job availability by geographic level

	State	National
Estimated Employment (Baseline Year)	7,520	194,600
Projected Employment (10-Year)	8,070	213,700
Growth Rate	7.3%	9.8%
Total Annual Openings	250	19,100

Source: Projections Central²



Analysis of Findings

State and national employment projections indicate growing labor market demand for some coastal zone management-related occupations.

Employment in coastal zone management-related occupations is projected to grow by 9.8 percent from 2016 to 2026, slightly faster than the average projected growth across all occupations in the United States (7.4 percent). State projections follow a similar trend, with relevant occupations projected to grow by 7.3 percent in New Jersey, slightly faster than the state average across all occupations (6.5 percent).

National job openings for Environmental Scientists and Specialists, Hydrologists, and Natural Science Managers will theoretically grow the fastest among the identified occupations at rates of 11.1 percent and 10.4 percent, respectively. Similarly, state-level job opening trends indicate positive prospects for Natural Sciences Managers, which will grow by 7.3 percent over the 10-year range. Despite strong growth trends, Hydrologists and Conservation Scientists are projected to add only 30 jobs each over the 10-year period.

Secondary sources indicate that demand for coastal zone managers will be affected by continuing environmental changes and government budgets.

Acting within the U.S. Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA) expresses the need for more coastal zone management professionals who can “address some of today’s most pressing coastal issues, including climate change, ocean planning, and energy facilities development.”³ With more than 1,800 miles of tidal coastline, New Jersey’s need for coastal zone management professionals is particularly pronounced. New Jersey partners with NOAA through its New Jersey Coast Management Program (NCZMP), wherein coastal zone management experts manage the state’s resources with a thorough understanding of the laws and regulatory jurisdictions (federal, state, municipal) as well as an understanding of the scientific and engineering principles that govern interactions in the fragile ecosystem.⁴

In 2017, the Trump administration proposed sharp funding cuts for NOAA, which may negatively impact employment opportunities in coastal zone management at the national and state levels. The elimination of the Coastal Zone Management Grants Program in particular may drastically reduce coastal zone management employment opportunities. States that are unable to fill funding gaps from the loss of the program are likely to make significant staffing cuts.⁵

Methodology Note

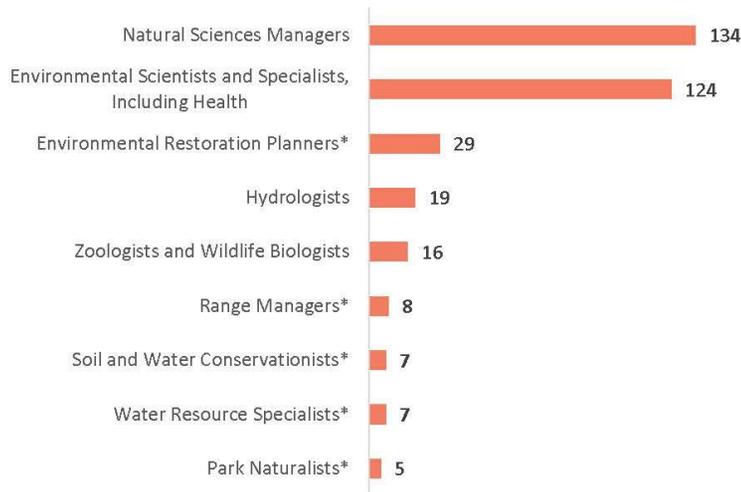
State and region occupational employment projections correspond to 2014 to 2024 projections. National projections correspond to 2016 to 2026.

Real-Time Job Postings Intelligence

Master's in Coastal Zone Management

New Jersey Job Postings Analysis

State coastal zone management-related positions by occupational group during the past 180 days as of March 2018.



*8-digit occupation.

New Jersey Employment Facts

State coastal zone management-related positions by occupational group

Occupation	Average Salary	
	New Jersey	U.S.
Natural Sciences Managers	\$188,400	\$135,900
Environmental Scientists and Specialists, Including Health	\$85,300	\$75,300
Hydrologists	\$79,000	\$83,200
Zoologists and Wildlife Biologists	\$73,500	\$64,900
Conservation Scientists	\$86,100	\$65,100

Source: JobsEQ⁶



Analysis of Findings

New Jersey job openings are concentrated among general natural sciences managers and environmental scientists.

As shown in the chart on the left, New Jersey employers are in greatest need of natural sciences managers, environmental scientists, and environmental restoration planners. Graduates of Stockton's proposed programs may also find employment as hydrologists (19 postings) or water resource specialists (7 postings). CDM Smith, for example, is seeking a Water Resources Project Manager with coastal resources and infrastructure-related academic and work experience.⁷

Employers, such as SGS and GlaxoSmithKline (both private, laboratory-testing companies), typically pay higher than the average salaries for coastal zone management professionals, as shown in the New Jersey Employment Facts table below.



Top Employers

- SGS (22)
- NJ Employer (18)
- GlaxoSmithKline (16)



Top Job Titles

- Environmental Scientist (17)
- Environmental Specialist (17)
- Laboratory Manager (16)



Top Hard Skills

- Microsoft Office (45)
- Teaching/Training (25)
- Business Development (21)

Methodology Note

While the Bureau of Labor Statistics does not provide projections for 8-digit occupations, JobsEQ provides job postings for niche 8-digit occupations listed within the 6-digit occupations. For example, JobsEQ breaks down Conservation Scientists (19.1031) into Soil and Water Conservationists (19-1031.01), Range Managers (19-1031.02), and Park Naturalists (19-1031.03).

Competitor Benchmarking

Master's in Coastal Zone Management

Master's in Coastal Zone Management Competitor Benchmarking

Benchmarked programs are institutions located in and along the East Coast, offering master's degrees in coastal zone management or a related field as a concentration. Montclair State University and Rutgers University are included to highlight potential New Jersey competitors.

Institution	Location	Program	2016 Completions	Employment Outcomes	Curriculum Details	Notable Features
Coastal Carolina University (Coastal Carolina)	SC	MS in Coastal Marine and Wetland Studies (Thesis and Professional)	13	"Recent graduates have found positions such as a hydrographer...coastal scientist...officer in the NOAA Commissioned Officer Corps...hydrologic technician...and lecturer at a university."	Core Courses <ul style="list-style-type: none"> Coastal Marine and Wetland Processes Coastal Marine and Wetland Ecology Coastal and Wetland Policy and Management 	<ul style="list-style-type: none"> Professional Track: 36 credits of coursework, 6 of which can be an internship or special topics Thesis Track: 24 credits of coursework and 6 credit hours of thesis research
Duke University (Duke)	NC	Master of Environmental Management (MEM) – Coastal Environmental Management	28	2016 employment profile: 94% of graduates found a job within 6 months of graduation, majority work in consulting in the Southeast region	Concentration Areas <ul style="list-style-type: none"> Marine Ecology Marine Social Science and Policy Fisheries and Aquaculture Ocean Health 	<ul style="list-style-type: none"> Program itself is one of eight concentrations within MEM program Second year spent at Duke Marine Lab in Beaufort, NC in preparation for master's project
Florida Institute of Technology (Florida Tech)	FL	MS in Oceanography – Coastal Zone Management	5	"Many graduates...have secured employment with organizations such as the National Oceanic and Atmospheric Administration, US Fish and Wildlife Service, Florida Department of Environmental Regulation or NASA."	Concentration Course Requirement <ul style="list-style-type: none"> Coastal Systems Planning 	<ul style="list-style-type: none"> Program itself is one of five concentrations within MS in Oceanography program Students can choose between electives or internship to fulfill "Option Requirements"
Montclair State University	NJ	MS in Marine Biology and Coastal Sciences	1	"Students completing this program will be well prepared to enter the work force in research, environmental consulting, education, and regulatory agencies...and non-profit organizations."	Core Courses <ul style="list-style-type: none"> Advanced Aquatic Biological Processes Ecology Water Resource Management or Environmental Law 	<ul style="list-style-type: none"> Offers a BS/MS program Students must complete both graduate research in aquatic and coastal sciences and a master's thesis
Nova Southeastern University (Nova Southeastern)	FL	MS in Coastal Zone Management	58	"[The program] is intended for employees of government and industry seeking career enhancement, as well as for recent college graduates seeking careers in planning and management with government agencies, industries, and other activities depending on or affecting the coastal zone or its resources."	Core Courses Sample <ul style="list-style-type: none"> Marine Ecosystems Marine Chemistry Biostatistics Relevant Electives Sample <ul style="list-style-type: none"> Coastal Policy Ocean and Coastal Law 	<ul style="list-style-type: none"> Offered on-campus, online, or hybrid Capstone Track: 39 credits of coursework; capstone = scholarly manuscript Thesis Track: 30 credits of coursework, thesis = scientific research
Rutgers University (Rutgers)	NJ	MS in Oceanography (Thesis and Non-Thesis)	1*	Not available	Courses Sample <ul style="list-style-type: none"> Coastal Ocean Dynamics Biological Oceanography 	<ul style="list-style-type: none"> Thesis Track: 24 credits of coursework, 6 credits of research Non-Thesis Track: 24 credits of coursework, 6 credits of research

Source: Institutional Websites (see embedded hyperlinks)

*Degree completions listed under "40.0607 Oceanography, Chemical and Physical."

Competitor Benchmarking

Master's in Coastal Zone Management

Master's in Coastal Zone Management Competitor Benchmarking, Continued

Benchmarked programs are institutions located in and along the East Coast, offering master's degrees in coastal zone management or a related field as a concentration. Montclair State University and Rutgers University are included to highlight potential New Jersey competitors.

Institution	Location	Program	2016 Completions	Employment Outcomes	Curriculum Details	Notable Features
Stony Brook University (Stony Brook)	NY	MA in Marine Conservation and Policy	28	"Graduates of this program should be able to compete effectively for positions in government, environmental consultancy, and non-governmental organizations."	Curriculum Key Areas <ul style="list-style-type: none"> • Marine Sciences • Conservation • Communications • Policy/Law/Economics/Management • Quantitative Assessment • Field Biology 	<ul style="list-style-type: none"> • Students choose elective coursework among the key areas that best suit their specific postgraduate career objectives • Students choose between a Capstone Project or an Internship
University of Maine	ME	Master of Wildlife Conservation	11	Graduates have found careers as: <ul style="list-style-type: none"> - Environmental planners - Policy and development directors for conservation non-profits - Environmental consultants 	General Focus Areas <ul style="list-style-type: none"> • Conservation Biology • Fisheries • Wildlife Management 	<ul style="list-style-type: none"> • Though not directly related to coastal zone management, has heavy emphasis on natural resource management; fisheries are one aspect of coastal zone management
University of Massachusetts (UMass) - Amherst	MA	MS in Environmental Conservation – Water, Wetlands, and Watersheds (Thesis and Professional)	4	Students will have "professional training for conservation science positions within academia, state and federal resource management agencies, non-governmental conservation organizations, and private industry (environmental consulting)."	Core Topic Areas <ul style="list-style-type: none"> • Environmental Science • Quantitative Science • Human Dimensions 	<ul style="list-style-type: none"> • Program itself is one of five concentrations in the MS in Environmental Conservation • Professional Track: 35 credits, comprehensive exam, professional paper • Thesis Track: 35 credits, comprehensive exam, thesis, scientific papers
University of Miami	FL	MPS in Coastal Zone Management (Professional)	55	"Students will...engage in internships with private, public or non-governmental agencies and conduct relevant fieldwork. Additional internship possibilities also exist with environmental advocacy groups and consulting firms."	Specialty Areas <ul style="list-style-type: none"> • Fisheries • Marine Protected Areas • Port Management • Aquaculture • Oil Exploration 	<ul style="list-style-type: none"> • No specific coursework; curriculum decided on a case-by-case basis during academic advising • Internship is the only required course
University of North Carolina (UNC) – Wilmington	NC	MS in Environmental Studies – Coastal Management	21	"The multidisciplinary nature of this program provides the students with a unique balance of the scientific background necessary for sound environmental decision-making within the context of educational, political, sociological, economic, and legal frameworks. This approach is intended to produce future and current environmental professionals with...broad perspective."	Required Concentration Course <ul style="list-style-type: none"> • Foundations of Coastal Management 	<ul style="list-style-type: none"> • Program itself is one of five concentrations of the MS in Environmental Studies • Students can also create their own concentration

Source. Institutional Websites (see embedded hyperlinks)

Competitor Analysis

Master's in Coastal Zone Management

Competitor Analysis

Based on an analysis of national peers, Hanover concludes the following:

Competitor saturation and degree completions trends among selected competitors suggest favorable conditions for Stockton's proposed program.

Shown on the previous slides, Hanover benchmarked a sample of 11 competitor programs based on degree completion volume and similarity to Stockton's proposal. Across the benchmarked programs, master's completions in coastal zone management-related fields grew at an aggregate annualized rate of 14.5 percent over the past five years, suggesting growing student demand for coastal zone management master's programs along the East coast.

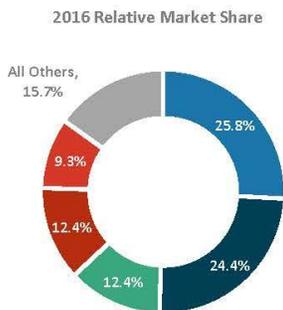
Additionally, Montclair State University is the only New Jersey institution that reported relevant master's degree completions over the five-year period, which points to an opportunity for Stockton to corner the market with its proposed master's program in Coastal Zone Management.

National Market Saturation (2012-2016)

Within the United States, do competitive conditions support an additional coastal zone management program?



Top 5 Largest Coastal Zone Management Programs*



Institution	Program Title	2016 Completions	5-Year Completions Growth	Distance from Stockton (miles)	State	Delivery Format	Tuition (per credit)
Nova Southeastern University	MS Coastal Zone Management	58	22.2%	1,213	FL	On-Campus, Online,	\$1,298
University of Miami	MPS Coastal Zone Management	55	24.4%	1,249	FL	On-Campus	\$1,960
Duke University	Master of Environmental Management	28	2.9%	446	NC	On-Campus	\$1,625
Stony Brook University	MA Marine Conservation and Policy	28	18.9%	172	NY	On-Campus	\$453 (In-state), \$925 (out-of-state)
UNC Wilmington	MS Environmental Studies – Coastal Management	21	27.3%	545	NC	On-Campus	\$578 (In-State), \$2,229 (out-of-state)**
Total	--	225	14.5%	--	--	--	--

*Largest as measured by total volume of master's degree completions in relevant fields in 2016. Several institutions report completions in multiple fields, so 2016 completions adds all completions together. See slide 4 for relevant coastal zone management fields.

**Tuition assumes a part-time credit load.

Competitor Trends

Master's in Coastal Zone Management

Degree and Curriculum Trends



With its research-focused Master of Science (MS) and Professional Science Master's (PSM) non-thesis options, Stockton's proposed program would stand out among the East coast competitive landscape.

Only three competitors (Coastal Carolina, Nova Southeastern, and UMass Amherst) offer both thesis- and non-thesis tracks within their coastal zone management programs. Additionally, University of Miami only offers a professional degree in coastal zone management.



Competitors commonly offer coastal zone management as a concentration area within a broader degree program (e.g. environmental science).

Four out of the 11 identified competitors offer coastal zone management as a concentration instead of as a standalone degree program. Additionally, the scope of required coursework for the concentration varies. While some competitors (UNC Wilmington and Florida Tech) require students to complete one course related to coastal zone management, others (UMass Amherst and Duke) have a greater number of course requirements to achieve the concentration.



Some competitors offer flexibility in selecting coursework.

According to Stony Brook's program website, "students choose elective coursework among the key areas that best suit their specific postgraduate career objectives."⁸ University of Miami offers even more flexibility as there is no list of required core courses or elective courses; instead, a student's curriculum is decided on a case-by-case basis with an academic advisor.⁹



Stockton should consider segmenting its curriculum into different "key areas" as some of its competitors have done.

Five out of the 11 competitors segment their curriculum into different concentration or topic areas. Stony Brook and UMass Amherst require students to complete one or two courses in all curriculum areas while other competitors (Duke, University of Maine, and University of Miami) allow students to specialize in one curriculum area. The figure on the right presents the most common topic areas taught by competitor programs.

Concentrations and Curriculum Areas



Source. Institutional Websites

Competitor Trends

Master's in Coastal Zone Management

Direct & Indirect Competitors

Stockton will likely compete with Nova Southeastern University, University of Miami, and Stony Brook University for prospective students.

At the state level, Stockton may compete with Montclair State University and Rutgers to a limited degree. However, neither New Jersey institution offers a program that quite matches Stockton's proposed program and should be considered more as *indirect* competitors. For example, Montclair State University's program exhibits a scientific focus and offers few management or law courses,¹⁰ and Rutgers' program offers no courses in coastal zone management or law.¹¹

Expanding to competitors along the East Coast, curriculum similarity and student volume support Nova Southeastern University, University of Miami, and Stony Brook University as the most significant *direct* competitors for Stockton's proposed program.

Nova Southeastern University: MS in Coastal Zone Management

- **Master's Degree Completions:** 22.2 percent annualized average growth (2012-2016), 58 completions (2016)
- **Shared Traits:** Program offers separate capstone and thesis tracks
- **Unique Characteristics:** Offers multiple delivery methods (on-campus, online, hybrid)

University of Miami: MPS in Coastal Zone Management

- **Master's Degree Completions:** 24.4 percent annualized average growth (2012-2016), 55 completions (2016)
- **Shared Traits:** Offers a professional degree similar to Stockton's proposed PSM
- **Unique Characteristics:** Flexible curriculum; an internship is the only required component listed.

Stony Brook University: MA in Marine Conservation and Policy

- **Master's Degree Completions:** 18.9 percent annualized average growth (2012-2016), 28 completions (2016)
- **Shared Traits:** Requires completion of a capstone project or an internship (Stockton's PSM requires completion of a capstone project), located in MidEast region (NY).
- **Unique Characteristics:** Divides its curriculum into six key areas and requires students to complete courses in each.

Source: Nova Southeastern University, University of Miami, and Stony Brook University¹²

Employment Outcomes

Nearly all benchmarked competitors provide a publicly available description of intended employment outcomes for their coastal zone management-related master's programs. Most competitors emphasize their programs' applicability to the public and private sectors and relevant industries. The figure below presents common employment areas for graduates of competitor coastal zone management programs.

Some competitors (Duke, Florida Tech, and Coastal Carolina) also list examples of employers that have hired program graduates in the past. Examples of past employers include, but are not limited to: NOAA, National Estuarine Research Reserves, US Fish and Wildlife Service, and the Environmental Defense Fund.



Endnotes

Master's in Coastal Zone Management

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- 12. [1] "Master's in Coastal Zone Management | NSU Halmos College of Natural Sciences and Oceanography at NSU." Nova Southeastern University. <https://cnso.nova.edu/academics/masters/coastal-zone-management.html> [2] "Coastal Zone Management – Masters of Professional Science," op. cit. [3] "Marine Conservation and Policy Program." Stony Brook University, January 31, 2014. <https://www.somas.stonybrook.edu/mcp/>

Appendix a.

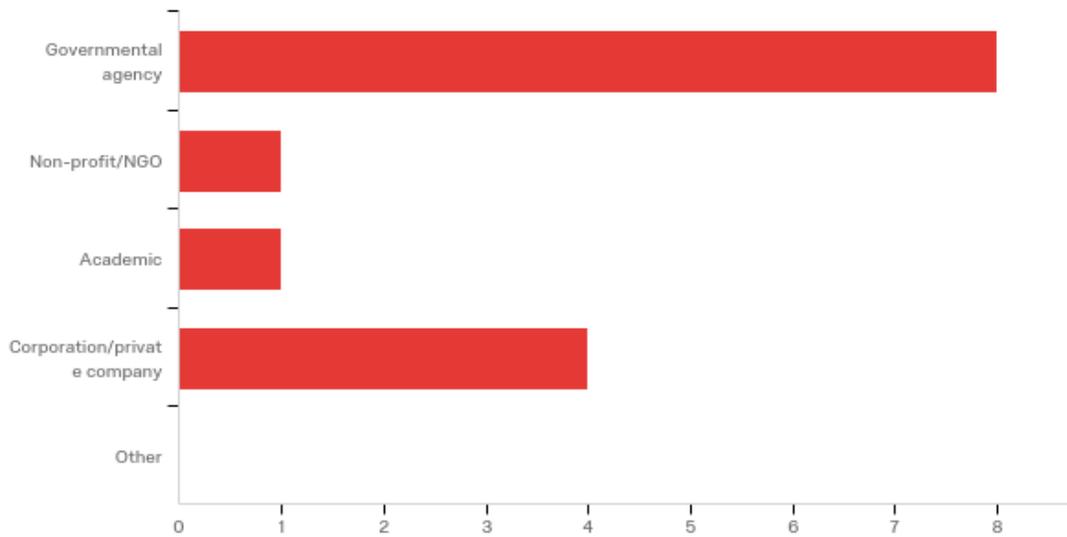


Employer survey

CZM Employer need survey

February 18th 2019, 3:59 pm MST

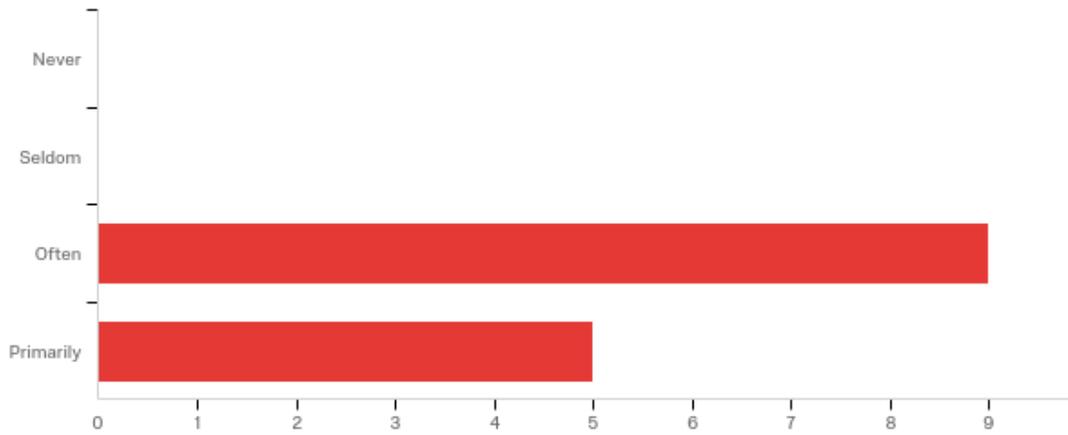
Q1 - What is the nature of your company or organization?



#	Answer	%	Count
1	Governmental agency	57.14%	8
2	Non-profit/NGO	7.14%	1
3	Academic	7.14%	1
4	Corporation/private company	28.57%	4
5	Other	0.00%	0
	Total	100%	14

Appendix b.

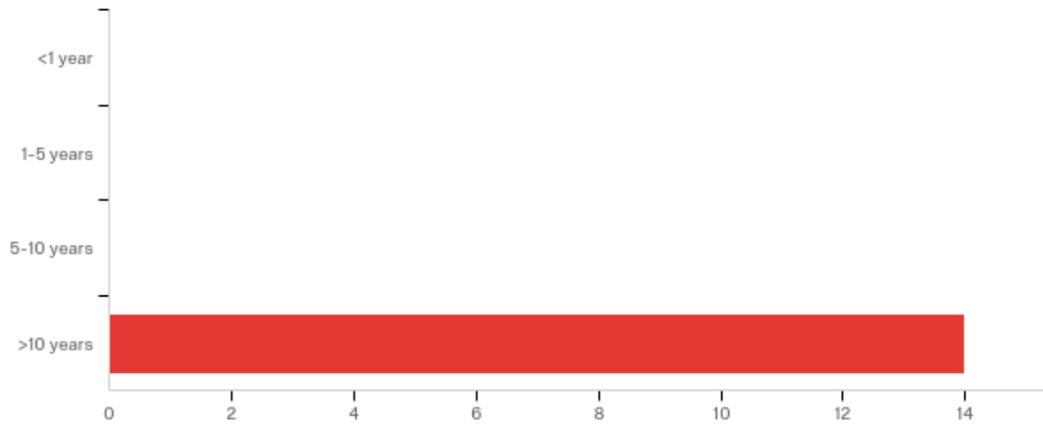
Q2 - Is your company or organization involved in any type of coastal or marine management projects?



#	Answer	%	Count
1	Never	0.00%	0
2	Seldom	0.00%	0
3	Often	64.29%	9
4	Primarily	35.71%	5
	Total	100%	14

Appendix b.

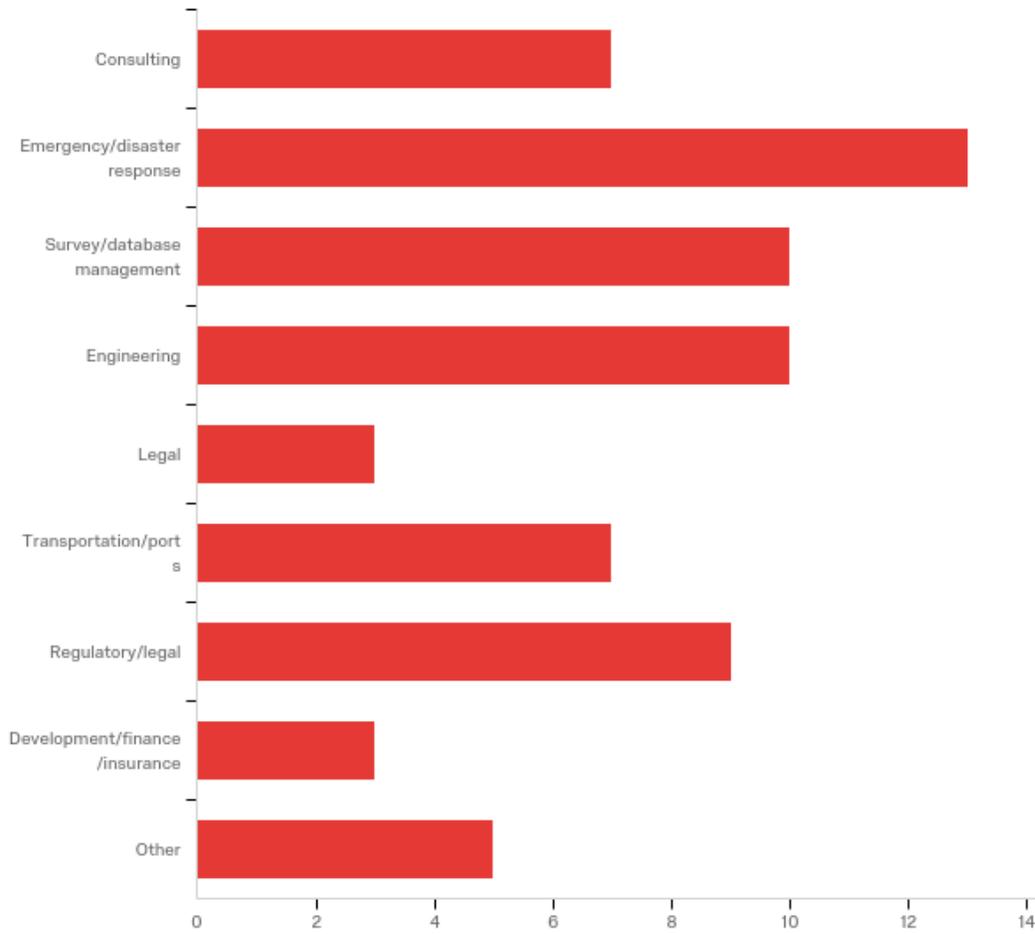
Q3 - How long has your company or organization been involved with projects related to coastal or marine management?



#	Answer	%	Count
1	<1 year	0.00%	0
2	1-5 years	0.00%	0
3	5-10 years	0.00%	0
4	>10 years	100.00%	14
	Total	100%	14

Appendix b.

Q4 - What type of services does your company or organization provide? (Select all that apply)



#	Answer	%	Count
1	Consulting	10.45%	7
2	Emergency/disaster response	19.40%	13
3	Survey/database management	14.93%	10
4	Engineering	14.93%	10
5	Legal	4.48%	3
6	Transportation/ports	10.45%	7

Appendix b.

7	Regulatory/legal	13.43%	9
8	Development/finance/insurance	4.48%	3
9	Other	7.46%	5
	Total	100%	67

Q4_TEXT - Other

Other - Text

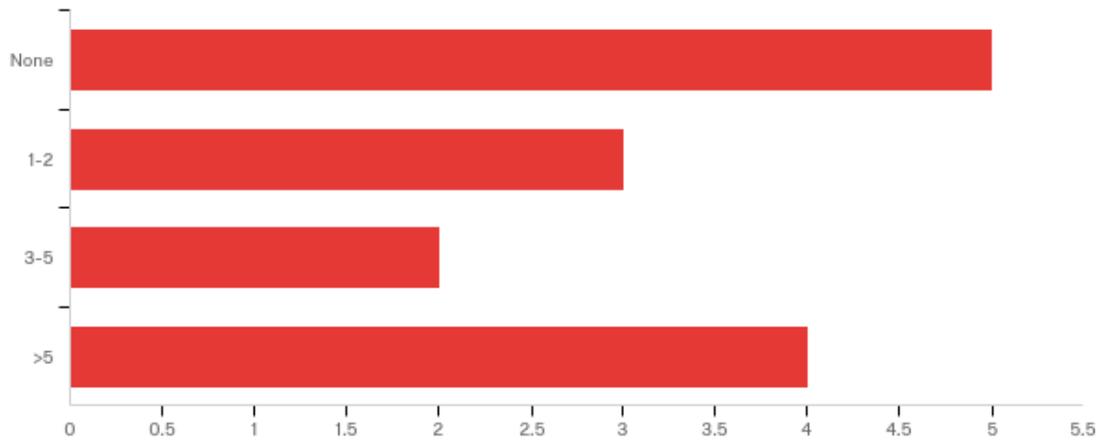
beach nourishment

endangered species work

Monitoring and assessment

Appendix b.

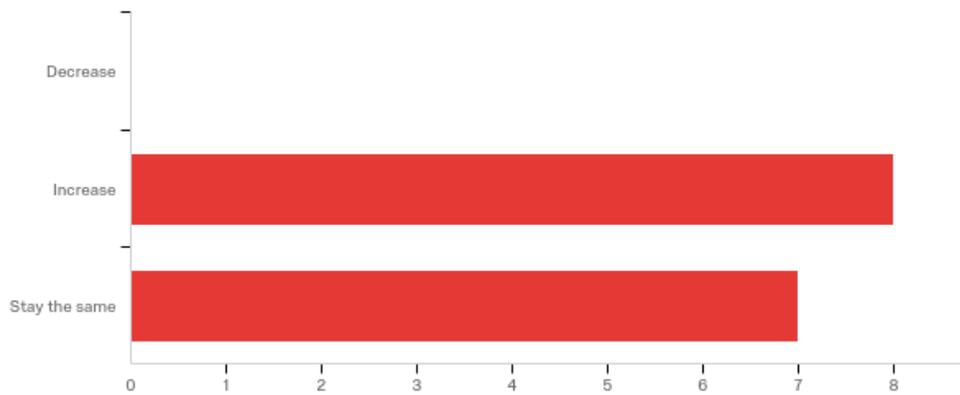
Q5 - How many relevant positions does your company or organization expect to add/refill in the next year?



#	Answer	%	Count
1	None	35.71%	5
2	1-2	21.43%	3
3	3-5	14.29%	2
4	>5	28.57%	4
	Total	100%	14

Appendix b.

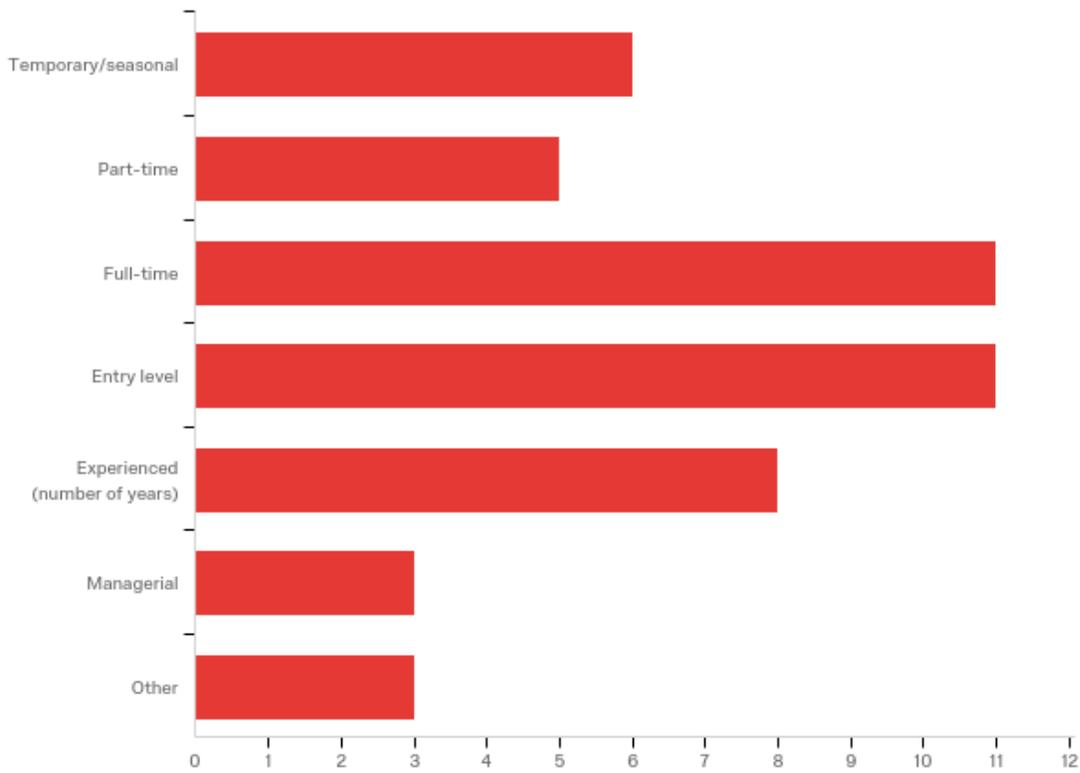
Q6 - Over the next 5 years, do you expect this need to:



#	Answer	%	Count
1	Decrease	0.00%	0
2	Increase	53.33%	8
3	Stay the same	46.67%	7
	Total	100%	15

Appendix b.

Q7 - What type of positions do you generally have to fill? (Select all that apply)



#	Answer	%	Count
1	Temporary/seasonal	12.77%	6
2	Part-time	10.64%	5
3	Full-time	23.40%	11
4	Entry level	23.40%	11
5	Experienced (number of years)	17.02%	8
6	Managerial	6.38%	3
7	Other	6.38%	3
	Total	100%	47

Appendix b.

Q7_5_TEXT - Experienced (number of years)

Experienced (number of years) - Text

5-10

10

2

5

0-15

5

Q7_7_TEXT - Other

Other - Text

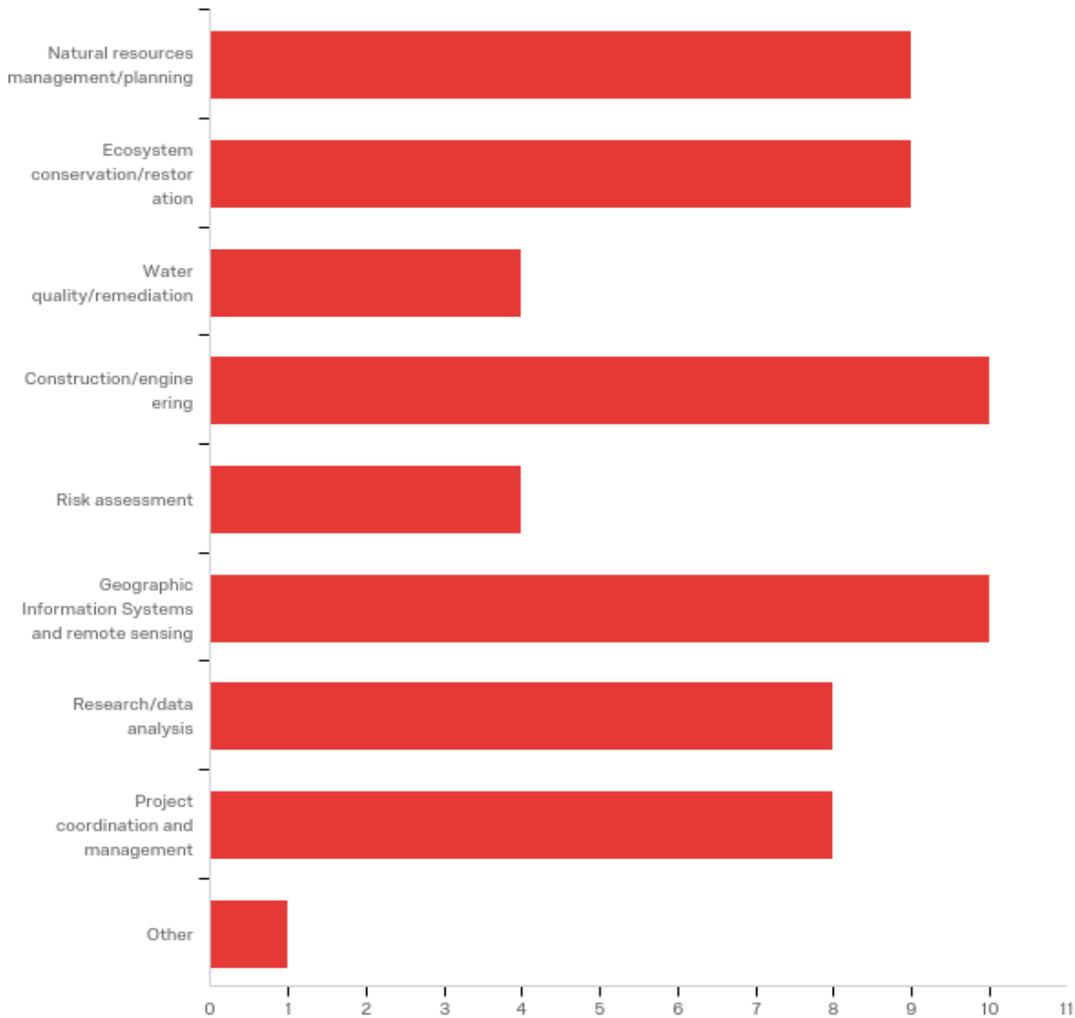
Field Engineers

Scientist

ccc

Appendix b.

Q8 - What expertise does your company or organization need for your coastal or marine management projects? (Select all that apply)



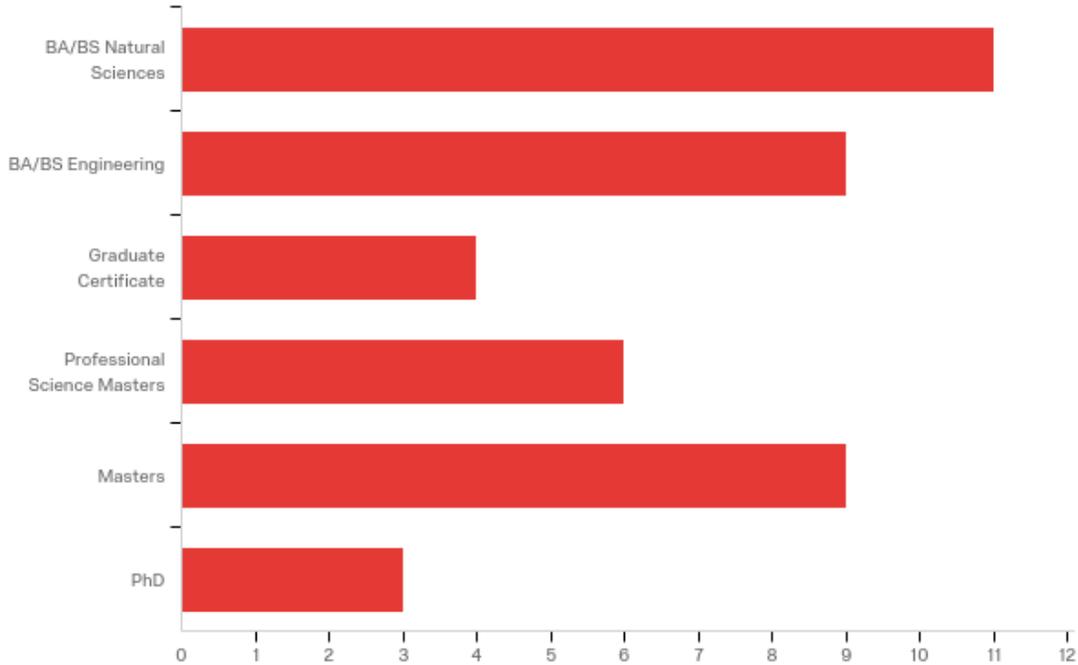
#	Answer	%	Count
1	Natural resources management/planning	14.29%	9
2	Ecosystem conservation/restoration	14.29%	9
3	Water quality/remediation	6.35%	4
4	Construction/engineering	15.87%	10
5	Risk assessment	6.35%	4

Appendix b.

6	Geographic Information Systems and remote sensing	15.87%	10
7	Research/data analysis	12.70%	8
8	Project coordination and management	12.70%	8
9	Other	1.59%	1
	Total	100%	63

Appendix b.

Q9 - What training level do you expect to see in candidates for positions in your company or organization in marine and coastal management? (Select all that apply)



#	Answer	%	Count
1	BA/BS Natural Sciences	26.19%	11
2	BA/BS Engineering	21.43%	9
3	Graduate Certificate	9.52%	4
4	Professional Science Masters	14.29%	6
5	Masters	21.43%	9
6	PhD	7.14%	3
	Total	100%	42

Q10 - Comments?

Comments?

Potential employees should have a very good understanding of the physical processes that affect the coast. (prefer majors in physical oceanography, geology, physics, engineering)

Masters or Graduate Cert. is not expected, but is viewed favorably.

Our strongest needs relate to the development of construction and engineering of "green infrastructure" projects along our coast and the beneficial reuse of dredge material.

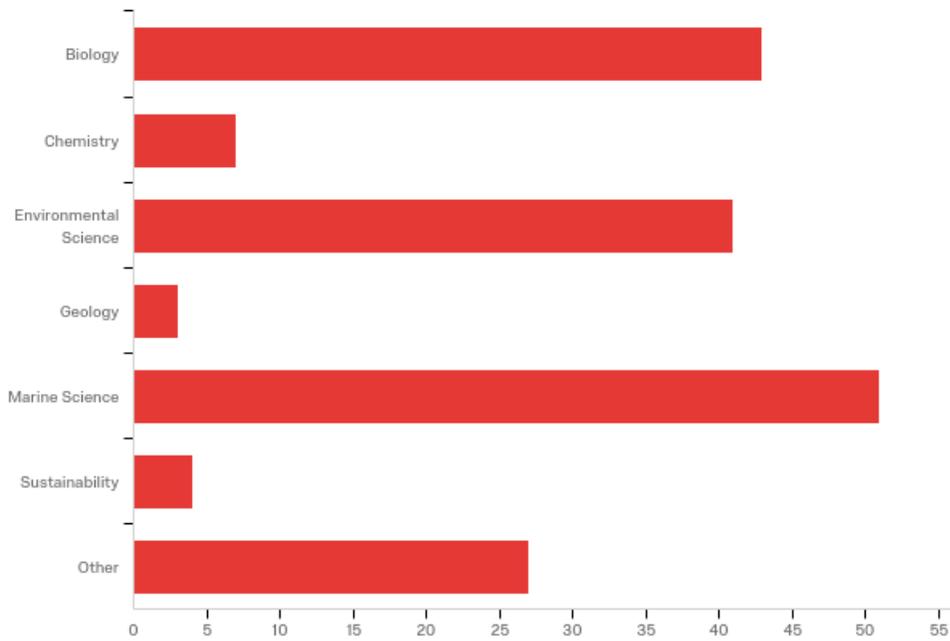
We are constantly looking for qualified Engineering, GIS/Environmental Science, and Planning candidates. Generally we are looking for entry level with a bachelors degree.

Student Interest Survey report

Coastal Zone Management Student Survey

February 18th 2019, 4:05 pm MST

Q1 - What is your undergraduate major?



#	Answer	%	Count
6	Sustainability	2.27%	4
7	Other	15.34%	27
5	Marine Science	28.98%	51
4	Geology	1.70%	3
3	Environmental Science	23.30%	41
2	Chemistry	3.98%	7
1	Biology	24.43%	43
	Total	100%	176

Appendix c.

Q1__TEXT - Other

Other - Text

Environmental studies

ENVL and SUST

Environmental science and biology

Mathematics

Environmental Studies

Marine science and environmental science

Biochemistry

BCMB

Biochemistry

BCMB

Applied Physics

Marine Science and Math Dual

biochem

Mathematics

Biochemistry

Accounting

Mathematics

Marine bio and biology double major

Applied Physics

I'm a dual major

Biochemistry

Physics

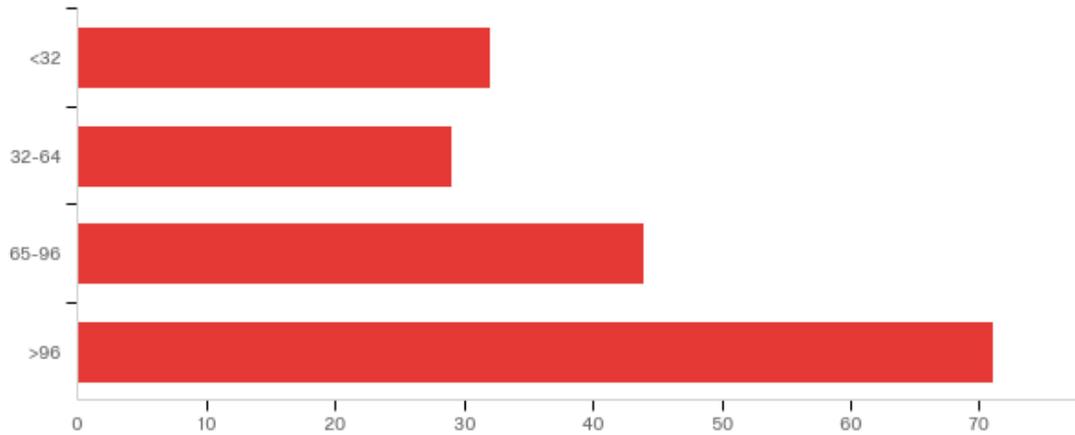
Math

Mathematics

Physics

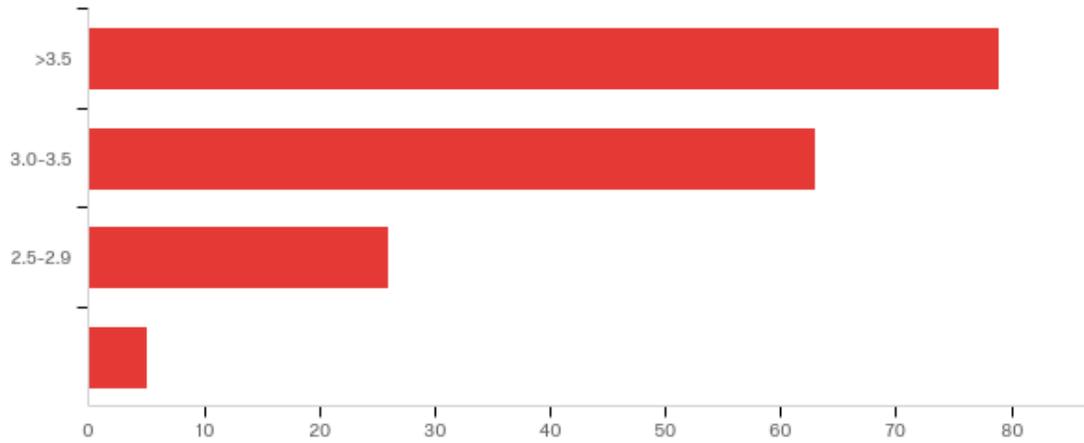
Appendix c.

Q2 - How many credits have you earned so far?



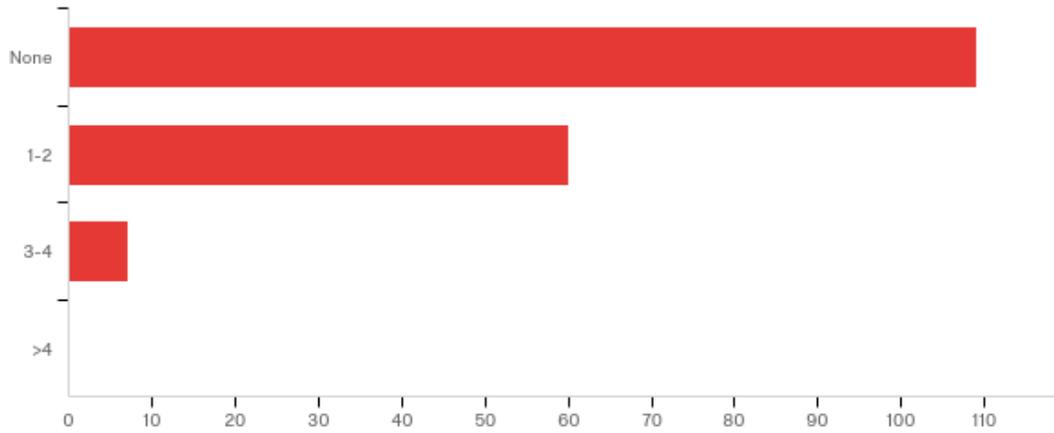
#	Answer	%	Count
1	<32	18.18%	32
4	>96	40.34%	71
3	65-96	25.00%	44
2	32-64	16.48%	29
	Total	100%	176

Q3 - What is your approximate cumulative GPA?



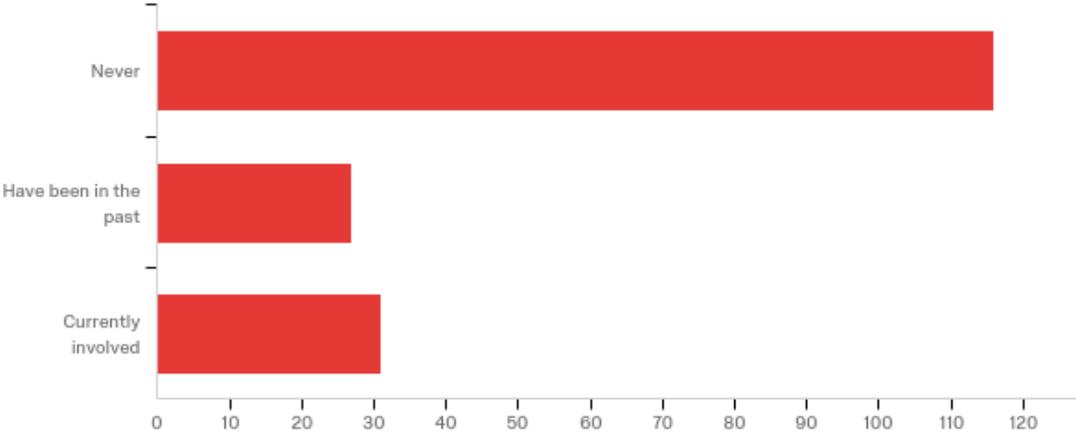
#	Answer	%	Count
1	>3.5	45.66%	79
2	3.0-3.5	36.42%	63
3	2.5-2.9	15.03%	26
4		2.89%	5
	Total	100%	173

Q4 - How many internships have you had so far?



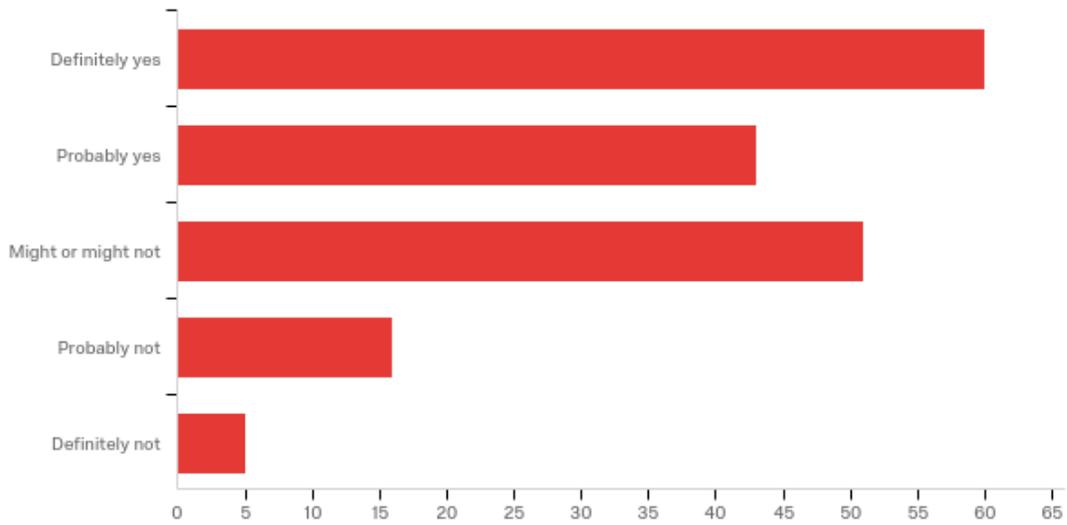
#	Answer	%	Count
1	None	61.93%	109
2	1-2	34.09%	60
3	3-4	3.98%	7
4	>4	0.00%	0
	Total	100%	176

Q5 - Are you involved in faculty research?



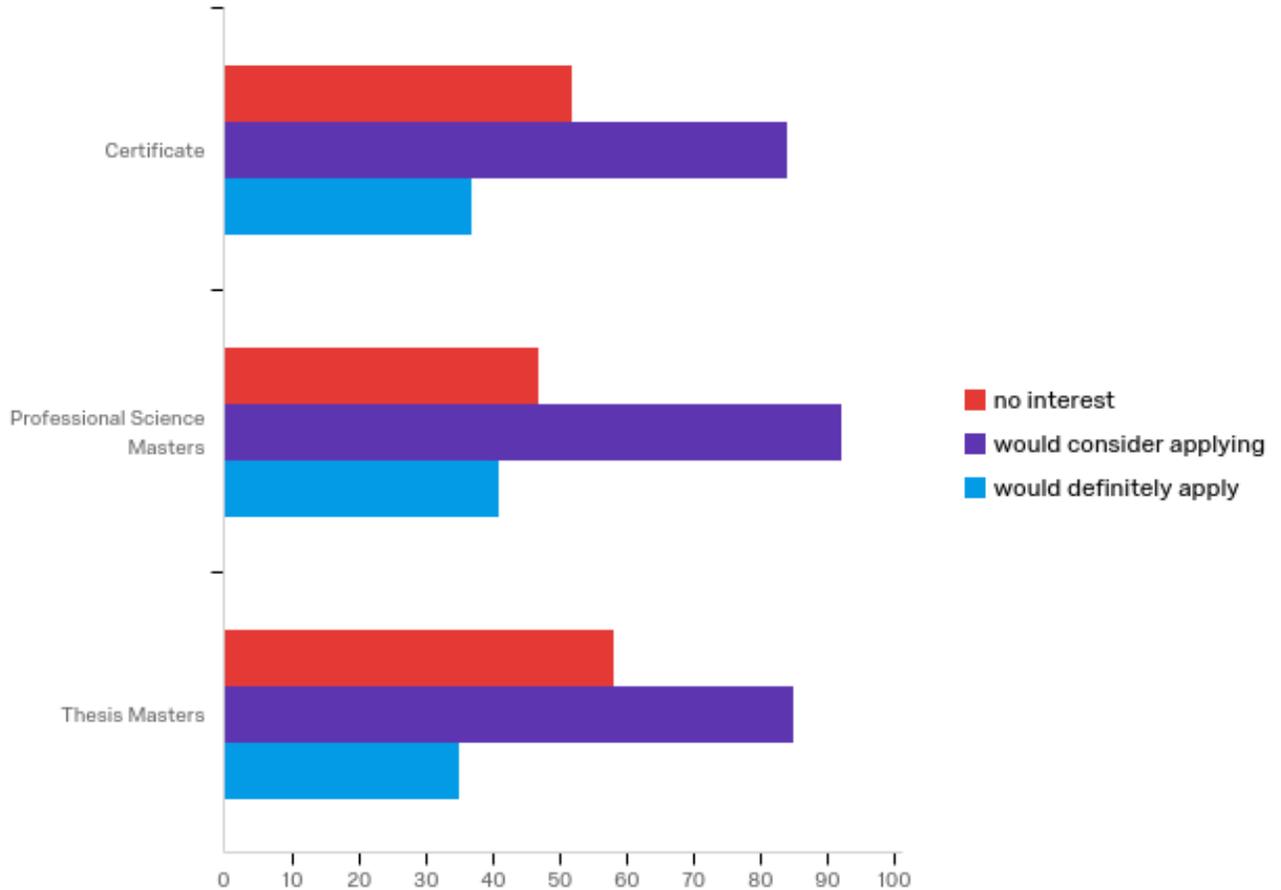
#	Answer	%	Count
1	Never	66.67%	116
2	Have been in the past	15.52%	27
3	Currently involved	17.82%	31
	Total	100%	174

Q6 - Do you plan on attending graduate school after graduation?



#	Answer	%	Count
2	Probably yes	24.57%	43
4	Probably not	9.14%	16
3	Might or might not	29.14%	51
1	Definitely yes	34.29%	60
5	Definitely not	2.86%	5
	Total	100%	175

Q7 - Several options are being considered for the graduate program in Coastal Zone Management including a one-year (18 credit) graduate certificate, a two-year (non-thesis) Professional Science Masters option (36 credits) and traditional thesis Masters option (36 credits). Please rate your interest in each of these three options.



#	Question	Certificate	Professional Science Masters	Thesis Masters	Total
1	no interest	33.12% 52	29.94% 47	36.94% 58	157
2	would consider applying	32.18% 84	35.25% 92	32.57% 85	261
3	would definitely apply	32.74% 37	36.28% 41	30.97% 35	113

Q8 - Comments?

Comments?

Although I would not apply, I think it would be worthwhile to offer all three options, as our coasts are in jeopardy due to climate change.

Would love for there to be a biology based graduate program since I am majoring in marine biology.

Please keep evolving! I would love to continue being a part of your marine science program. I have advanced so far in my field with the help of Stockton. Thank you!

I think this would be a great addition!

Perhaps if this was tied in with some sort of Disaster Response/Management I would consider, more specifically in light of the recent hurricanes and super storms.

Based on the title, I am interested in applying but I would need to know more about the program to give a definitive answer.

Great to hear (:

Would like PhD programs as well

Not interested but believe this would be a great option.

I am a freshman now.

If there were an option for an oceanography or marine biology masters thesis I think more people would apply.

I hope more people express interest, this school has perfect placement for such a program.

I believe this is a step in the right direction, but we don't have any other graduate options besides this?

Would love to have the opportunity to complete this type of masters. As a marine science student i am considering stockton's environmental science masters program but it is not my #1 field of choice. A masters program geared more towards marine science would be great !! This would also go along with the work i am currently involved in. I work for a company that is heavily involved with oyster reef and habitat restoration.

I believe this would be a great graduate study program but Stockton can and should get a graduate program in biology, chemistry, biochemistry, and biomedical just because we have faculty that is completely capable of teaching these courses and this should be the next step for Stockton's future in the next year or two.

Interesting, I would like to learn more

Tempting option!

This is the most interested I have been in taking a survey!

Seems to be a very interesting graduate program, however I do not think I am applicable

Curriculum Worksheet

P.S.M. in Coastal Zone Management

Students with a bachelor's degree who wish to earn a master's degree will complete 36 credits from a menu of courses (see curriculum below).

PSM Curriculum - 36 credits

Core Courses- 18 credits	
Science Courses	Professional Courses
CZM 5100 Coastal Ecosystems	CZM/ENSC 5401 Project Management
CZM 5200 Coastal Physical Processes	CZM/ENSC 5402 Professional Writing
CZM 5400 Coastal Zone Policy, Law and Planning	CZM/ENSC 5302 Applied GIS
Elective Courses- 12 credits	
<p>Elective courses should be chosen in consultation with your advisor. The electives offered in this program are dynamic. New courses are developed while established courses are eliminated. Additional appropriate graduate elective coursework can be taken in ENSC and DSSA.</p>	
CZM 5201: Coastal Data Management and Statistics	
CZM 5501: Coastal Physical Oceanography	
CZM 5502: Coastal Engineering	
CZM 5503: Fisheries Science and Management	
CZM 5505: Hydrographic Instrumentation and Surveys	
CZM 5506: Resiliency Planning	
CZM 5600 Capstone Project (6 credits)	

Curriculum Worksheet

M.S. in Coastal Zone Management

Students with a bachelor's degree who wish to earn a master's degree will complete 36 credits from a menu of courses (see curriculum below).

M.S. Curriculum - 36 credits

Core Courses- 12 credits
CZM 5100 Coastal Ecosystems
CZM 5200 Coastal Physical Processes
CZM 5400 Coastal Zone Policy, Law and Planning
CZM/ENSC 5302 Applied GIS
Elective Courses- 12 credits
Elective courses should be chosen in consultation with your advisor. The electives offered in this program are dynamic. New courses are developed while established courses are eliminated. Additional appropriate graduate elective coursework can be taken in ENSC and DSSA.
CZM 5201: Coastal Data Management and Statistics
CZM/ENSC 5401 Project Management
CZM/ENSC 5402 Professional Writing
CZM 5501: Coastal Physical Oceanography
CZM 5502: Coastal Engineering
CZM 5503: Fisheries Science and Management
CZM 5505: Hydrographic Instrumentation and Surveys
CZM 5506: Resiliency Planning
CZM 5601 Thesis (9 credits)

Appendix d.

Additional Elective Graduate Courses that may be taken if appropriate and with the approval of the Coastal Zone Management Program Coordinator.

ENSC 5100 Field Methods
ENSC 5101 – Ecosystem Ecology
ENSC 5102 Forested Ecosystems: Measurement and Management
ENSC 5150 Statistical Analysis
ENSC 5201 Watershed Management
ENSC 5202 Environmental Quality
ENSC 5204 Stream Restoration
ENSC 5205 Groundwater Hydrology
ENSC 5210 Wildlife Management and Conservation
ENSC 5211 NJ Pinelands
ENSC 5230 Wetlands Soil
ENSC 5240 Wetlands Ecology
ENSC 5240 Coastal Processes
ENSC 5250 Environmental Geochemistry
ENSC 5301 Land Use Planning
ENSC 5303 Environmental Planning
ENSC 5304 Sustainable Communities
ENSC 5305 Environmental Remedies and Enforcement
ENSC 5306 Advanced Spatial Analysis
ENSC 5307 Applications in Terrestrial Lidar Data Acquisition
ENSC 5310 Coastal Zone Management and Coastal Processes
ENSC 5314 Urban Infectious Diseases
ENSC 5320 Ocean Sustainability
ENSC 5330 Ecology of Tidal Wetlands
ENSC 5402 Engagement and Outreach
ENSC 5410 Environmental Earth Materials
ENSC 5414 Plant Ecology
ENSC 5420 Environmental Law
ENSC 5501 Green Energy Technology
ENSC 5502 Energy Analysis

DSSA 5001 Introduction to data science and analytics
DSSA 5101 Data exploration
DSSA 5102 Data gathering and warehousing
DSSA 5103 Data Visualization
DSSA 5104 Data Analysis and Operations Research
DSSA 5201 Machine Learning

PROFESSIONAL SCIENCE MASTER'S DEGREE IN ENVIRONMENTAL SCIENCE

The existing PSM in Environmental Science (PSMES) is the only similar program in NAMS (or Stockton) to the proposed CZM Program, and as the current Director of this program I am writing to address some of the potential concerns and impacts on the existing students and resources. Overall, we feel that the impact is likely to be purely positive, or if there are any negative effects, they are likely to be minor and outweighed by the positive ones.

- 1) Currently, PSM has NO dedicated faculty, and relies primarily on adjuncts as well as a few stalwart undergraduate faculty who mostly teach graduate courses as an overload, due to their commitments to their primary programs. With the development of a graduate program in an adjacent area with the faculty dedicated specifically to teaching graduate classes, we anticipate that this will simultaneously increase our course offerings and lessen the burden on the existing faculty. Since Environmental Science students often express interest in Marine and Coastal ecosystems, we expect that the CZM courses will likely make excellent elective options for the PSMES students;
- 2) Two programs with overlapping curricula tend to make each other more robust – as mentioned, we expect CZM courses to make excellent elective choices for PSMES students, but by the same token PSMES courses are also likely to offer attractive options for CZM students. Currently many PSM courses are under-enrolled, and adding another graduate program will ensure that our courses have robust enrollment, in addition to letting the students in both programs enjoy expanded class offerings;
- 3) Currently PSMES has a fairly wide focus, as we attempt to attract the best students interested in entering the environmental field. However, since we lack specific Marine and Coastal-focused courses, we often have to turn away qualified students interested in Coastal Zone Management – a growing area of interest. Just by reviewing PSM applications, we have noticed a steady increase in applicants excited about this area, especially since the hurricanes Irene and Sandy increased public awareness of the importance of proper management of beaches, wetlands, and

other buffer areas. In the past two years we had to turn away at least eight excellent applicants because we were not equipped to offer the courses that would allow them to fully explore this area. While this is a purely anecdotal small sample observation, there does appear to be a growing interest in CZM, and Stockton is perfectly positioned to capture these candidates. In addition, since there are so few of these programs both region- and nation-wide, this is our chance to be on the cutting edge of developing a new field in graduate and professional studies, rather than trying to catch up to research universities already dominating some other crowded space. Stockton has started as a pioneer in Marine and Environmental studies, and now is a good time to parlay our reputation into developing a new graduate program that will reaffirm our expertise in this area, while simultaneously and mutually strengthening the graduate program in Environmental Studies.

Ekaterina G. Sedia, Ph.D.

PSM in Environmental Studies Graduate Director



School of Natural Sciences and Mathematics

P: 609.652.4546 • F: 609.626.5515

101 Vera King Farris Drive | Galloway NJ 08205-9441
stockton.edu

February 25, 2019

Provost Lori Vermeulen
The Stockton University Senate
Academic Programs and Planning Committee
Stockton University

Dear Provost Vermeulen and the Stockton Senate:

The proposed graduate program in Coastal Zone Management (CZM) in the School of Natural Sciences and Mathematics (NAMS) is a natural outgrowth of the signature undergraduate programs in Marine and Environmental Sciences here at Stockton. This degree will complement the NAMS Professional Science Masters in Environmental Science by offering concentrated study on coastal processes with a PSM, M.S and certificate option.

NAMS has significant resources to support the CZM program proposed with faculty invested in teaching and research in these area, the Stockton Marine Field Station (equipment and vessels) and the Coastal Research Center (CRC) with significant research capability. The appointment of a founding graduate Coordinator and an additional graduate faculty line could accelerate the success of this program and provide the faculty to make this program work in Atlantic City. Of course these faculty could also contribute to our current undergraduate programs as could our current undergraduate faculty assist with this new program.

Please feel free to contact me if you need any further information.

Respectfully submitted,

A handwritten signature in blue ink that reads 'Peter F. Straub'.

Peter F. Straub PhD
Dean, School of Natural Sciences and Mathematics
Professor of Biology



Date: March 13, 2019

To: Provost Lori Vermeulen and The Stockton University Senate – Academic Programs and Planning Committee From: NAMS Marine Science Program

Subject: Proposed Graduate Program in Coastal Zone Management (CZM)

The proposed graduate program in Coastal Zone Management (CZM) in the School of Natural Sciences and Mathematics (NAMS) is an important addition to the curriculum provided at Stockton University. This program focuses upon the importance of the coastal environment and economy in a world impacted by climate change. There is a strong case for this program given the job market and research directions of many coastal communities. Additionally the Marine Field Station and Atlantic City Campus are ideally located to tackle these coastal zone management issues. While undergraduate program faculty are overloaded as noted by Dr. Sedia, with the addition of a graduate coordinator, a graduate faculty line and additional technician at the Marine Field Station, some of the faculty and staff to support this new program will be established. The crossover from the Professional Science Master's Degree in Environmental Science to this new CZM program will allow the overlapping of curriculum and strengthen the current graduate program work without overburdening the two new faculty lines. For the Marine Science program faculty, we are able to support the new program through three faculty providing one cross-listed course per year, enrolling both undergraduates and graduates in relevant upper-level courses. This provides unique opportunities for Marine Science program faculty to incorporate graduate students into their research agendas, mentoring student research projects, and assisting in their degree requirements.

Elizabeth A Lacey

Elizabeth Lacey

Associate Professor
of Marine Science
Marine Science
Program
Coordinator

Straub, Peter

From: Moscovici, Daniel
Sent: Friday, March 08, 2019 3:35 PM
To: Straub, Peter
Subject: Masters/PSM in Coastal Zone Management

Dear Dean Straub,
The Environmental Science/Studies (ENVL) and Geology (GEOL) Programs met on 3/7/2019. We reviewed and discussed the proposal for the Masters/PSM in Coastal Zone Management.

The summary of our discussion was unanimous support for the creation of this new degree. We saw no conflicts with our existing programs and see this as a potential avenue for students to continue their education at Stockton University.

Please let me know if you need any additional information. Best,
Dan

Daniel Moscovici, PhD
Associate Professor of Environment & Sustainability
Coordinator of Environmental
Science/Studies/Geology Programs Stockton
University
Pinelands National Reserve, NJ 08205
+1-215-688-2910
daniel.moscovici@stockton.edu
www.stockton.edu/~moscovid

March 9th 2019

Re: PSM (ENVL) statement on the proposed Masters in Coastal Zone Management (CZM)

Dear Dean Straub,

This letter is in response to your request for a statement on the potential impacts (negative and positive) of the proposed Masters in Coastal Zone Management (CZM). The PSM (ENVL) Committee, comprising Drs. Aaron Stoler, George Zimmermann (ENVL), myself (ENVL), Jeff Webber (GEOL), Ron Hutchison (BIOL), Kathy Sedia (BIOL), Mark Sullivan (MARS) and Mr. Mike Cicali (ENVL adjunct) discussed this issue in detail, and the following is a summary of our thoughts.

1. The CZM has three options (Certificate, PSM and MS). The PSM Committee sees a number of synergies with the CZM program
 - a. This program will lead to increased enrolment in PSM (ENVL) courses, thus increasing TCHs for PSM (ENVL) as three PSM (ENVL) courses will be cross-listed and required in the CZM MS program. The three PSM courses are Project Management, Professional Writing and Applied GIS.
 - b. The closeness of the areas of study means the each of the two programs can use courses in the other as elective courses, also leading to high course enrolment.
 - c. If the CZM MS option is approved, and it is successful, it could open up avenues for us to develop an MS option that would strengthen the PSM (ENVL). Several ENVL faculty members have indicated that they would be willing to sponsor research projects for MS students. The fact that we will have more science graduate courses offered at Stockton will also bolster our recruitment efforts.
2. We (PSM, ENVL) frequently get applications from students interested in coastal zones, but they don't quite fit into the PSM so they end up applying to and getting accepted into other schools. The MS in Coastal Zone Management would be ideal in attracting such students to Stockton.
3. While it is not clear, in advance, what the potential drain of the CZM will be on the PSM (ENVL) student numbers, we generally agree that, just like the undergraduate programs, movement between the two programs will be about equal. The increased pool of students drawn by the two programs from outside will far outweigh any potential internal transfers.
4. We note that the CZM is requesting new personnel. We would like to add to that by reminding the university administration that the PSM has no dedicated staff or faculty member, making the administration of this program very challenging. We would like to emphasize that the GIS course taught in the PSM (ENVL) requires significant investment in equipment and personnel to run the databases. Investment in this area will transform our PSM (ENVL) as well as give the MS (CZM) an edge over any programs that may offer comparable curricula. The GIS lab badly needs an update in

Appendix e.

order to provide the support needed for an increased number of student users.

The PSM committee will be happy to respond to any questions you may have about this statement. You can reach the PSM coordinator at tait.chirenje@stockton.edu or at either one of these numbers: 609 652 4588 (office) and 352 514 6379 (cell).

Sincerely,



Tait Chirenje, Ph.D.
Coordinator, PSM (ENVL)



Mark Sullivan, Ph.D.
Associate Professor of Marine Science (MARS)



Ekaterina Sedia, Ph.D.
Associate Professor of Biology



Aaron Stoler, Ph.D.
Assistant Professor of Environmental Science Dual-Degree
Advisor for the BS/PSM Program





101 Vera King Farris Drive | Galloway NJ 08205-9441
stockton.edu

School of Natural Sciences and Mathematics

P: 609.652.4546 • F: 609.626.5515

1st March 2019

Dear Pete,

Thank you for sharing the proposal for a graduate program in coastal zone management. I would like to offer my unreserved support for this proposal; Stockton's renown in marine sciences, our existing resources and our location make this an obvious and strategic opportunity.

The proposal is well-thought out, well-written and the curriculum looks outstanding. Certainly, there can be synergies with the Masters in Data Science and Strategic Analytics; some of our courses would be good electives for the CZM students. My own experience in three dimensional estuary modeling can also be drawn upon; there are free and open source models that the students can be taught how to apply.

Congratulations to all the folks involved on bringing this to fruition!

Yours sincerely,

A handwritten signature in cursive script that reads 'Russell'.

J. Russell Manson

Professor of Physics and Director of the Masters in Data Science and Strategic Analytics