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February 12, 2021

James D. Fielder, Jr., Ph.D.
Secretary of Higher Education
Maryland Higher Education Commission
6 North Liberty Street
Baltimore, MD 21201

Secretary Fielder:

Please find the attached proposal for a major in Marine Science at St. Mary's College of Maryland. I believe you will find the proposal an excellent addition to our curriculum.

As per the proposal template, President Jordan and I confirm that the College's Hilda C. Landers Library has sufficient resources to support the proposed program and that the College has sufficient equipment and facilities to support the proposed program.

If there are any questions concerning this proposal, please contact Dr. Christine Wooley, Associate Dean of Curriculum (cawooley@smcm.edu or 240-895-3081).

Sincerely,

A handwritten signature in blue ink that reads "Michael R. Wick".

Michael R. Wick, PhD
Provost and Dean of Faculty



Cover Sheet for In-State Institutions

New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	St. Mary's College of Maryland
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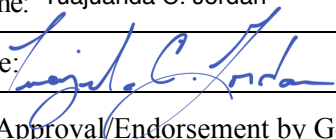
Each action below requires a separate proposal and cover sheet.

- | | |
|---|---|
| ☒ New Academic Program | ☐ Substantial Change to a Degree Program |
| ☐ New Area of Concentration | ☐ Substantial Change to an Area of Concentration |
| ☐ New Degree Level Approval | ☐ Substantial Change to a Certificate Program |
| ☐ New Stand-Alone Certificate | ☐ Cooperative Degree Program |
| ☐ Off Campus Program | ☐ Offer Program at Regional Higher Education Center |

Payment ☐ Yes	Payment ☒ R*STARS #	Payment \$850	Date 2/16/21
Submitted: ☐ No	Type: ☐ Check #	Amount:	Submitted:

Department Proposing Program	Departments of Biology and Chemistry		
Degree Level and Degree Type	Bachelors of Science		
Title of Proposed Program	Marine Science		
Total Number of Credits	128		
Suggested Codes	HEGIS: 040418	CIP: 261302	
Program Modality	☒ On-campus ☐ Distance Education (<i>fully online</i>)		
Program Resources	☒ Using Existing Resources ☐ Requiring New Resources		
Projected Implementation Date	☒ Fall ☐ Spring ☐ Summer Year: 2021		
Provide Link to Most Recent Academic Catalog	URL: https://www.smcm.edu/catalog/		

Preferred Contact for this Proposal	Name:	Christine Wooley
	Title:	Associate Dean of Curriculum
	Phone:	240-434-5674
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President/Chief Executive	Type Name:	Tuajuanda C. Jordan
	Signature:	 Date: February 16, 2021
	Date of Approval/Endorsement by Governing Board:	2/6/21

Revised 1/2021

Marine Science Major Proposal
submitted by St. Mary's College of Maryland

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A. Centrality to Institutional Mission and Planning Priorities:

1) Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.

This proposal is to establish a Marine Studies Program incorporating a new undergraduate major in Marine Science.

The institution's approved mission statement is:

St. Mary's College of Maryland is Maryland's honors college, a selective, public liberal arts college-a vibrant community of scholars and learners. We foster a rigorous and innovative curriculum; experiential learning; scholarship and creativity; close mentoring relationships; and a community dedicated to honesty, civility, and integrity. We are committed to diversity, access, and affordability. Our students, faculty and staff serve local, national, and global communities and cultivate and promote social responsibility.

SMCM's mission statement speaks of students being a part of a collaborative learning community that embraces the College's unique environment. This proposal directly addresses the use of the St. Mary's River and Chesapeake Bay to create a one-of-a-kind program that will be unique, rigorous, and innovative. Because of the unique location of St. Mary's College on the St. Mary's River and because of the College's close association with the St. Mary's River Watershed Association, many opportunities exist for marine science that are not available at the other Maryland higher education institutions. Furthermore, Marine Science will consist of a rigorous curriculum of foundational physics, chemistry, and biology courses along with innovative new advanced courses that utilize our campus resources. Experiential learning will be at the heart of the program, with numerous opportunities to explore the waters of Maryland and build community within the student cohort. Additionally, a required field experience, with its focus on application and professional development, offers a modern approach to a liberal arts curriculum.

2) Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.

A Marine Science program addresses several components of the College's mission and vision. The marine scholars and the students they graduate will provide a valuable service to the local, national and global communities by enhancing understanding and protection of one of the planet's most valuable resources: water. Such a commitment to environmental stewardship is reflected in SMCM's core values, specifically our commitment to [local, national, and global engagement and environmental stewardship](#).

The Marine Science major proposal came about through a year-long college process that reviewed proposals for new majors as part of our strategic planning. A presidential task force reviewed numerous new proposals and recommend marine science to President Jordan as a new program within our college's strategic plan. President Jordan then made a recommendation to the Board of Trustees that Marine Science should be pursued as a program within the college's next strategic plan. The Office of Institutional Advancement is already working to investigate sources of financial support. This proposal has been recommended by the Curriculum Review Committee, the Faculty Senate, the faculty of SMCM, the Provost, and the President, and it has been approved by the SMCM Board of Trustees.

3) Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L.

St. Mary's anticipates that Marine Science will draw new students to the College. To the extent that the program will grow, it will do so at a rate that is sustained by increased enrollments. In addition, because of the program's interdisciplinary nature, many of our current faculty are able to contribute courses to the program, allowing Marine Science to be established without an initial round of hiring.

4) Provide a description of the institution's commitment to:

- a) ongoing administrative, financial, and technical support of the proposed program**
- b) continuation of the program for a period of time sufficient to allow enrolled students to complete the program.**

The College has created a five-year implementation plan and anticipates that this program will become a signature SMCM major. In addition, because many of our current Biology, Chemistry & Biochemistry, and Environmental Studies courses will contribute to this program, we are well-positioned to support students enrolled in the program from the moment it is implemented.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan:

- 1. Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:**
 - a) The need for the advancement and evolution of knowledge**

As one of the largest, most productive estuaries in the world, the Chesapeake Bay is a cornerstone of Maryland's culture and economy. Its waters are estimated to drive economic

activity worth \$33 billion per year, and they have served as a model system for landmark discoveries in the field of coastal science. As our coastal environment rapidly changes, the need for knowledgeable professionals to advance emerging industries and develop creative environmental solutions is increasing. For example, the health of the Chesapeake Bay is improving but sea levels are also rising. Aquaculture is expanding, but industry success in any given year is unpredictable due to intensifying coastal storms. Maryland needs people who understand and can address the complexities of these and other problems facing coastal communities. Yet there is not one undergraduate program in the state dedicated to preparing students for careers that are oriented around the water. St. Mary's College of Maryland (SMCM) is seeking to establish the only undergraduate Marine Science major in Maryland.

Broadly, the goals of the new Marine Science program are to 1) prepare our diverse students to be leaders in marine-oriented science, technology, engineering, and math (STEM) professions, 2) make globally relevant contributions to the field of coastal marine science, and 3) provide regionally-relevant public outreach.

SMCM is well-positioned to meet these goals. The College is only one of two designated Public Honors Colleges in the nation. We are also the only Maryland public institution of higher education and one of only twenty-five public institutions nationally with a Carnegie classification of Baccalaureate - Liberal Arts. SMCM has the highest 4-year graduation rate and one of the highest percentages of STEM graduates of any Maryland public school. The Marine Science major will be situated within this strong existing framework designed to prepare students to excel in STEM fields and beyond. Grounded in research-backed pedagogy, the Marine Science curriculum emphasizes experiential learning and authentic research opportunities, which have been shown to improve oral and written communication skills and promote teamwork. Students will learn to do science, think creatively, be leaders, learn independently, and live ethically.

Furthermore, our waterfront campus, located minutes from the Lower Potomac River, is ideally situated as a home base for learning and research on the water, with access to the saltwater main-stem Chesapeake Bay and the tidal fresh reaches of its tributaries. Students will be able to explore the newly restored oyster reefs situated just offshore from our campus, monitor the infamous Chesapeake Bay dead zone, “rediscover” a sunken submarine only 20 minutes up the Potomac, and track aquatic organisms – from the smallest microbes to crabs, striped bass and even dolphins, which frequent the lower Potomac river. They will also work closely with our faculty, whose research programs address a wide array of cutting-edge coastal problems, from microplastic pollution to ocean acidification.



Figure 1. SMCM's waterfront campus makes an ideal location for a marine science major.

b) Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education

The SMCM Marine Science Program will create important new in-state opportunities for Maryland students. The State of Maryland belongs to the Academic Commons Marketplace (ACM), which is a consortium of several southeastern states. It allows a student from one state to attend another state's public universities and pay in-state tuition if the student's major is not offered in their home state. While this tuition program is a great opportunity for students, it is a both a financial drain on Maryland schools (loss of revenue) and a brain drain on the state. According to MHEC records, nearly 1,000 Maryland students have used the ACM and left the State to enroll in undergraduate programs in Marine Science and Marine Biology between 2008-2018.

Table 1. MHEC Certifications for In-State Tuition for Marine Science & Marine Biology at member schools of the Academic Commons Marketplace.

SCHOOL/ PROGRAM	TEN YEAR ANNUAL AVERAGE FROM AY 2008-2018	AY2018-2019	FALL 2019
COASTAL CAROLINA U./ MARINE SCIENCE	65.7	58	38
OLD DOMINION U./ MARINE BIOLOGY	4.8	5	3
U. OF SOUTH CAROLINA/ MARINE SCIENCE	15.7	11	20
TOTAL	86.2	74	61

Mrs. Cade, the MHEC representative who provided these data, stated that developing competitive program offerings by Maryland institutions can promote increased enrollment of Maryland students in these highly sought-after programs and draw additional out-of-state

students to Maryland schools through the ACM. If we leverage our waterfront location with existing and additional faculty and appropriate infrastructure to create a Marine Science program, then those 50-100 students/year would not be eligible for in-state tuition at Coastal Carolina, USC, and ODU. SMCM would certainly draw a fraction of those students to this new, public, one-of-a-kind-in-Maryland program.

Furthermore, the Marine Science undergraduate program at SMCM will actively work to recruit and retain underrepresented groups in higher education broadly and the geosciences specifically, where people of color earn less than 10% (42 out of 444 in 2015) of all doctorate degrees in Earth, Atmospheric and Ocean Sciences. The SMCM [mission statement](#) affirms our commitment “to diversity, access, and affordability.” Our programs work to fulfill this mission. For example, we successfully leveraged NSF funding to implement the Emerging Scholars Programs (ESPs). This voluntary program aims to improve underrepresented students access to and success in STEM fields. ESPs engages students in collaborative work, provides social networks, and enrichment activities during the first year of college when students are most likely to leave the field. The College’s [DeSousa-Brent Scholars](#) program actively recruits and supports students from groups underrepresented in higher education, including people of color and first-generation college students. One of our new first-year [Inquiry](#) programs revolves around the topic of social justice, which encourages students to unpack the systems and processes that create injustices in our country. Once the Marine Science program is established, we plan to pursue additional funding to advance our inclusion efforts specifically in the geosciences (e.g., NSF’s [Improving Undergraduate STEM Education: Pathways into the Earth, Ocean, Polar and Atmospheric & Geospace Sciences](#)).

c) The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs

Not applicable.

2. Provide evidence that the perceived need is consistent with the [Maryland State Plan for Postsecondary Education](#).

The Marine Science major at St. Mary's College of Maryland addresses several of the 2017-2021 state plan strategies. These include:

Maryland Strategy 1 Continue to improve college readiness among K-12 students, particularly high school students.¹ The Marine Science program will provide community outreach to K-12 students through hands on learning opportunities to promote environmental stewardship and STEM education. Our goal is to build on the college's successful St. Mary's River Project that introduced thousands to the St. Mary's River ecosystem.

¹ Maryland Higher Education Commission - Maryland State Plan For Postsecondary Education Report,

Strategy 3: Expand efforts to cultivate student readiness, financial literacy, and financial aid for individuals outside traditional K-12 school channels. St. Mary's College is recognized as a Top College for Veterans by US News & Report. Numerous departments have created Articulation Agreements with CSM, AACC, PGCC, BCCC, HCC and Montgomery Community College. Once established, the Marine Science program will also enter into similar articulation agreements. The college also seeks to promote first generation and other at-risk student populations through intensive community building, advising and career preparation activities.

Strategy 6 Improve the student experience by providing better options and services that are designed to facilitate prompt completion of degree requirements. Approval of the Marine Science major at St. Mary's College will create the only opportunity and best option for students to pursue this highly sought-after STEM field in Maryland.

Strategy 7 Enhance career advising and planning services and integrate them explicitly into academic advising and planning. The proposed Marine Science major includes a hands-on career preparation requirement. The current general education requirements also include a career exploration and professional development component. Additionally, all students receive career advising and planning from both a professional career services department and an academic advisor at SMCM.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State:

- 1. Describe potential industry or industries, employment opportunities, and expected level of entry (*ex: mid-level management*) for graduates of the proposed program.**
- 2. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.**
- 3. Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.**
- 4. Provide data showing the current and projected supply of prospective graduates.**

Liberal Arts and Sciences are excluded from answering sections C (Market Demand) and D (Duplication) only. The corresponding COMAR references can be found in 13B.02.03.08D Market Demand Data and 13B.02.03.09 Duplication.

D. Reasonableness of Program Duplication:

- 1. Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.**

According to the Academic Commons Marketplace there are no Marine Science or similar programs such as Marine Biology, Marine Policy or Marine Business at the undergraduate level in the State of Maryland.

2. Provide justification for the proposed program.

SMCM's location and local connections make us uniquely positioned to attract students who are interested in pursuing a Marine Science major. The Chesapeake Bay is globally renown and locally cherished. President Obama designated the bay a national treasure in 2009. It is one of the most well-studied marine ecosystems in the world and has recently become an iconic example of successful coastal restoration. The bay drives the Maryland economy and is at the heart of Maryland culture. A Marine Science program that emphasizes intensive experiential study of the Chesapeake Bay would offer an unparalleled undergraduate experience. The Chesapeake Biological Laboratory—a world-class marine research facility—is located 30 minutes away in Solomons Island and could potentially offer students valuable research opportunities. Other nearby marine science opportunities include federal facilities such as NOAA HQ, EPA HQ, the State Department's Bureau of Oceans, Smithsonian Environmental Research Center and the recently declared Mallows Bay National Marine Sanctuary in Charles County (Figure 1). SMCM Marine Science graduates would also be well-positioned to transition into graduate school. The University of Maryland Center for Environmental Science (UMCES) and the Morgan State Patuxent and Estuarine Research Center (PEARL) maintain graduate level marine science programs but they do not offer undergraduate degrees, making this proposed program the only undergraduate feeder to their graduate level institutes.



Figure 2. Locations of Research Labs and Federal Facilities that would interact with Marine Science Majors.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

- 1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.**

The proposed St. Mary's Marine Science degree program is not offered by any of Maryland's HBI's, and the proposed program will not impact HBI's identities or missions.

F. Relevance to the identity of Historically Black Institutions (HBIs)

- 1. Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.**

The proposed St. Mary's Marine Science degree program is not offered by any of Maryland's HBI's, and the proposed program will not impact HBI's identities or missions.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR 13B.02.03.10):

- 1. Describe how the proposed program was established, and also describe the faculty who will oversee the program.**

SMCM President Tuajuanda Jordan created an opportunity for SMCM faculty to think critically about existing programming at the college and to propose new programs that would take advantage of our physical location and existing resources. Faculty members from Biology, Chemistry and Environmental Studies, each with doctorates in Marine Science, joined forces to create the proposal before MHEC. The Marine Science major proposal will have been recommended for approval by the faculty members of the SMCM Curriculum Review Committee, recommended for approval by the faculty senate, recommended for approval by the faculty body and received approvals from the Provost, President and college Board of Trustees before being delivered to MHEC for evaluation and final approval.

The Marine Science program will be overseen by a diverse group of faculty who possess doctorates in marine science or related fields. These include Professor Randolph Larsen whose doctorate is in Marine, Estuarine and Environmental Science from the University of Maryland. Professor Larsen has over 18 years of experience at SMCM where he has chaired the Department of Chemistry & Biochemistry and served as a college senator and coordinator of the cross-discipline Environmental Studies Program. Professor Jeffrey Byrd whose doctorate is in microbiology with an emphasis on microbial ecology has over 30 years' experience at SMCM where he has chaired the Biology Department and served as college senate president. Assistant Professors Cassie Gurbisz and Emily Brownlee are in their fourth year at SMCM. Professor Gurbisz's doctorate is in Marine, Estuarine and Environmental Science while Professor Brownlee's

doctorate is in biological oceanography. Further discussion on Marine Science faculty is presented in section I (1) Adequacy of Faculty Resources.

2. Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.

MARINE SCIENCE PROGRAM REQUIREMENTS

The discipline of marine science is broad, deep and rewarding. As a marine scientist you'll explore rivers, estuaries, and oceans, and you will analyze their interactions with the surrounding environment. You'll sample marine life and measure the tides, waves, and currents. You may spend your days working on the water, in the lab, behind a computer, or a combination of all three. Through this diverse field of study, marine scientists strive to understand fundamental questions about our oceans and their interactions with the land. Marine scientists also apply this understanding to predict earth system changes, inform policy, and cultivate an ethos of environmental stewardship.

The SMCM marine science program takes full advantage of our unique waterfront location through intensive, experiential study of the St. Mary's River and the Chesapeake Bay, which is just a short boat ride from campus. The college is also within a short drive of Mallow's Bay National Marine Sanctuary and two National Estuarine Research Reserve sites. Numerous federal agencies, such as the National Oceanographic and Atmospheric Administration and the Environmental Protection Agency, are headquartered just down the road in Washington, D.C. Other research opportunities are available in laboratories at St. Mary's College and through the internship programs at government and privately funded research laboratories in Maryland and elsewhere. A cooperative agreement between the College and the University of Maryland's Center for Environmental Science provides opportunities for St. Mary's College students to take graduate courses and conduct research with faculty members at the nearby Chesapeake Biological Laboratory in Solomons, MD.

The curriculum in marine science reflects a breadth of fundamental training in physics, chemistry, and biology before advancing into applied topics of marine science and oceanography. Depth is provided within the marine science major by courses that focus on progressively more specific aspects of selected subject areas. All marine science students participate in field and/or laboratory opportunities through classes, independent study, internships, and the capstone experience. Marine Science students at St. Mary's have the dual opportunity to develop expertise in a focused applied science while also becoming broadly educated in the liberal arts. To earn a bachelor's of science degree with a major in marine science, a student must satisfy the following minimum requirements.

Marine Science Learning Outcomes

- Demonstrate understanding of fundamental concepts in marine science, including principles of geological, physical, chemical, and biological processes in the marine environment.
- Demonstrate understanding of common laboratory, field, and modeling methods used in marine science.
- Demonstrate the ability to

- formulate a falsifiable hypothesis,
- design an experiment or observational study to test your hypothesis,
- analyze your results in a statistically rigorous way,
- draw logical conclusions based on your analysis.
- Communicate effectively the concepts, methods, results, and conclusions of marine science research, in oral and written form, to specialists and the general public.
- Apply knowledge and skills learned to solve problems in marine geology, physics, chemistry, or biology.
- Demonstrate understanding of how human activities impact the marine environment, and how the marine environment impacts human activities.

3. Explain how the institution will:

a) provide for assessment of student achievement of learning outcomes in the program

St. Mary's College of Maryland has a three-year assessment cycle for institutional as well as programmatic learning outcomes. The assessment cycle of programmatic learning will necessarily include this new major as describe in section M of this proposal.

Programmatic assessment at St. Mary's is organized by the Department Chair in consultation with the Assessment Implementation Team and the Coordinator of Transparent Teaching and Assessment, who helps departments conduct curricular mapping that links course-level outcomes to programmatic outcomes. In order to assess the programmatic outcomes for the Marine Science major, members of this proposal in consultation with the Coordinator of Transparent Teaching created an assessment cycle (see section M) that identifies courses in which learning outcomes map to outcomes for both the program and institution, each of which will be assess over the same three year period.

b) document student achievement of learning outcomes in the program

Currently, assessment data generated by programmatic assessment cycles are recorded in Campus Labs Outcomes, an assessment software package. Faculty members evaluate students' achievement via a designated course artifact and assessment instrument, such as a rubric. These data provide faculty with information about student performance that can inform the future iterations of their classes. At the same time, by entering these data into Outcomes, programs can track the percentage of students in a given course who have met (or not met) a course learning outcome; taken together, data from course learning outcomes linked to a program learning outcome tells us how many students have met the program learning outcome. The Assessment Implementation Team, with the support of the Provost's Office, works with faculty members and chairs to make sure that these achievements are documented.

4. Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements

General College Requirements

All St. Mary's College students complete the following as part of their Foundational Study for LEAD:

Core Seminar

New students practice skills of inquiry and communication by completing:
CORE101 or CORE301 (4 credits)

Core Knowledge and Methods

Students extend their breadth of learning and experience the importance of cultural literacy by completing:

Language Requirement
(4 credits)

Core Exploration (6 courses, one each from the following areas: Arts, Cultural Literacy, Humanities, Mathematics, Natural Sciences (with Lab), and Social and Behavioral Sciences) or **Core Inquiry** (4-5 thematically integrated courses that meet outcomes in all six Core Exploration areas)
(17-25 credits)

Professional Pathway

Students establish connections between academic and career preparation by completing:
CORE-P101, CORE-P102, and CORE-P201
(4 credits)

Total Credits: 29-37

Marine Science Course Requirements**Physical Science Courses (12 credit hours)**

- CHEM 106: General Chemistry II & CHEM 106L
- College Physics 1&2 (PHYS 121, 122) or General Physics 1&2 (PHYS 141, 142) or Fundamental of Physics 1&2 (PHYS 151, 152)

Biology Core Courses (10 credit hours)

- BIOL 105: Principles of Biology I & BIOL105L
- BIOL 106: Principles of Biology II & BIOL 106L

Math Core Courses (4 credits)

- Math 221: Statistics
- OR
- BIOL 311: Biostatistics

NOTE: Calculus I and II (MATH 151, 152) are recommended for all students and are required by most graduate and professional schools.

Marine Science Core Courses (12 credits)

- MRNE 110: Introduction to Marine Science
- MRNE 220: Physical Oceanography
- BIOL 383: Biological Oceanography

Professional Discovery (4 credits)

- MRNE 398: Marine Internship
- MRNE 397 Marine Science Directed Research
- MRNE 399 Marine Science Independent Study
- MRNE 493 First Semester Marine Science SMP

Marine Science Elective Courses (16 credits)

- Students must select 16 credits of marine science related elective courses of which a minimum of 12 credits must be upper level (300 or 400).

Marine Science Elective Courses

PHEC 232 Advanced Open Water SCUBA	BIOL 384 Ichthyology
BIOL 303 Invertebrate Zoology	BIOL 432 Limnology
BIOL 463 Ecology of Coastal Systems	ENST 392/MRNE392 Field Research Methods
ENST 393/MRNE393 Coastal Ecosystem Management	MRNE 181 Lower Level Marine Science Transfer Course
MRNE 181 Lower Level Marine Science Transfer Course	MRNE 3XX/ENST 3XX Quantitative methods
MRNE 307 Student Assistantship	MRNE 3XX/ BIOL 3XX Plankton Ecology
MRNE 3XX/BIOL 3XX Ecology of Marine Plants	MRNE 3XX/ENST 3XX Marine Environmental Toxicology
MRNE 3XX/BIOL 3XX. Marine Microbiology	MRNE 481 Upper Level Marine Science Transfer Course
MRNE 480 Topics in Marine Science	ANTH 351 Underwater Archeology
CHEM 301 Marine Chemistry	CHEM 302 Geochemistry

Marine Science Capstone Experience (4 credits)

Students complete one of the following Capstone Experiences:

- MRNE 490: Marine Science Capstone or
- MRNE 494: Second Semester Marine Science SMP or
- Completion of an 8 credit SMP sequence in any of the following departments:
 - Biology
 - Biochemistry
 - Chemistry
 - Computer Science
 - Environmental Studies
 - Math
 - Physics

Total Credits for Marine Science major: 62

Total Credits Required for Graduation: 128

Minimum Grade and GPA Requirements

Students must earn a grade of C or better in BIOL105, BIOL105L, BIOL106 and BIOL106L. Students must earn a grade of C- or better in all other courses used to complete the major. Students must have a 2.0 or greater overall GPA in the major.

Excluding graduate level transfer courses from UMCES, at least half of the credits required for the major must be taken at the College.

Sequence of Study

The following sequence of courses is a typical model for the fulfillment of the requirements for the major:

- **First Year:**
CORE 101, BIOL 105, BIOL 105L, BIOL 106, BIOL 106L, CHEM 103, CHEM 106, MATH 151, MATH 152, MRNE110
- **Sophomore Year:**
PHYS 141, PHYS 142, MRNE 220, BIOL 311 or MATH 221, BIOL383, Core Curriculum requirements
- **Junior Year:**
Marine Science Electives, Core Curriculum requirements, MRNE Internship or Directed Research
- **Senior Year:**
MRNE 490, Core Curriculum requirements, Marine Science Electives

Marine Science Courses

MRNE 110 Introduction to Marine Science (4S)

An introduction to the physical, biological, geological, and chemical structures and functions of marine ecosystems.

MRNE 181 Lower Level Marine Science Transfer Course (1-4E)

This course number is for students transferring lower level marine science courses from other institutions when the course does not directly translate to an existing SMCM course code due to either credit value or topic. Students seeking approval for this course must send a copy of the transfer course description and syllabus to the program chair.

MRNE 220 Physical Oceanography (4F)

An overview of physical oceanography, including seawater properties, coastal and ocean circulation, waves, and tides. Students will explore the theory and applications of these physical processes as well as how they are observed and quantified. Prerequisites: *Both PHYS 121 and PHYS 122 or both PHYS 141 and PHYS 142 or both PHYS 151 and PHYS 152.*

MRNE 307 Student Assistantship (1E)

This course provides a credit-based experience for classroom and laboratory assistants. The student assistants will attend their assigned classes or labs, hold review sessions, assist professor with lab preparation and other in-class assignments, among other duties. This course will follow the general college policies for classroom assistantship courses. This course may be repeated once. *Prerequisites: Permission of the instructor, minimum 3.0 GPA and at least 8 credits of 300-level or above in Marine Science coursework.*

MRNE 3XX/ENST 3XX Quantitative methods (4AS)

Methods and approaches to wrangling, analyzing, and visualizing large datasets using the R computing environment. An emphasis will be placed on coastal and oceanographic datasets. Lecture sessions will primarily include discussion and hands-on coding exercises. No programming experience required. *Prerequisite: MRNE 110 and either MATH 221 or BIOL 311.*

MRNE 3XX/ BIOL 3XX Ecology of Marine Plants (4AS)

Principles of population, community, and ecosystem ecology as they apply to aquatic plants. An emphasis will be placed on natural and human effects on aquatic plant structure, growth, and distribution. *Prerequisites: MRNE 110 and BIOL 106*

MRNE 3XX/ BIOL 3XX Plankton Ecology (4AF)

An in-depth examination of the taxonomic and functional groups of planktonic organisms (bacteria, protista, and metazoa), including morphology, physiology, ecology, and community structure. Laboratory will include current methods of research. *Prerequisites: MRNE 110 and BIOL 106.*

MRNE 3XX/BIOL 3XX. Marine Microbiology (4AF)

An introduction to the diverse set of microorganisms that inhabit ocean and estuarine systems. Diversity, physiology, metabolism, ecology, and survival of marine microorganisms will be the overall focus of the course. Both microbes that are beneficial and detrimental to marine system will be discussed. Methods used to collect and analyze marine microorganisms will be utilized in the laboratory portion of the course. *Prerequisites: Biol105, Biol105L, Chem106*

MRNE 3XX/ENST 3XX Marine Environmental Toxicology (4AS)

An overview of toxicology within the scope of aquatic environments will be covered. Students will learn how to describe chemical and biological baselines of aquatic systems, and how to study the qualitative and quantitative aspects of toxicology from the local environments to organisms to molecular levels. In addition, students will utilize environmental databases to predict the entry path of contaminants into aquatic systems and the toxic consequences. *Prerequisites: CHEM 106, BIOL 311/MATH 221, BIOL 106, and MRNE 110.*

MRNE 397 Directed Research in Marine Science (1-4E)

Under the direct supervision of a faculty member, a student participates in laboratory or field research. A learning contract that specifies the research goals and methodology must be filed with the Office of the Registrar. A maximum of four credit hours of directed research in marine

science may be applied to major requirements. May be repeated for credit. *Prerequisite: Learning contract filed in the Office of the Registrar.*

MRNE 398 Off-Campus Internship (4E)

A variety of off-campus experiential learning opportunities can be arranged through the Career Development Center. The off-campus internship is an individually designed experience that allows the student to explore the relationship between learning in the classroom and the practical application of knowledge in everyday work situations. *Prerequisites: Admission to the Internship Program and approval of the academic adviser and the department chair. Credit/no credit grading.*

MRNE 399 Marine Science Independent Study (1-4E)

This course consists of an independent creative or research project designed by the student and supervised by a biology faculty member. The nature of the project, the schedule for accomplishment and the means of evaluation must be formalized in a learning contract prior to registration. (See “Independent Study” under “Academic Policies” section.)

MRNE 480 Topics in Marine Science (4)

An investigation of a specialized area of marine science not normally covered in the marine science curriculum. Topics will be selected by the marine science faculty according to student interest. Students are encouraged to suggest topics for this course. May be repeated for credit if the topic is not repetitive. Lecture, or lecture and laboratory. Taught according to student demand and staff availability.

MRNE 481 Upper Level Marine Science Transfer Course (1-4E)

This course number is for students transferring upper level marine science courses from other institutions when the course does not directly translate to an existing SMCM course code due to either credit value or topic. Students seeking approval for this course must send a copy of the transfer course description and syllabus to the program chair.

MRNE 490 Marine Science Capstone (4S)

A capstone experience in which students design, execute, and report on a marine science research project. Provides students with the opportunity to synthesize knowledge and skills developed through their marine science learning experiences. *Prerequisites: MRNE 110, MRNE 220, and BIOL 383/MRNE 383. MRNE 220 and BIOL 383/MRNE 383 can be taken as corequisites.*

MRNE 493/494 Marine Science SMP 1 & 2 (1-8E)

The project, which may take many forms, draws on and extends knowledge, skills of analysis and creative achievement developed through previous academic work. In consultation with a faculty mentor, the student initiates the project, identifies an area to be explored, and proposes a method of inquiry appropriate to the topic. Students will be responsible for proposing a project NLT February 1 of the student’s junior year. The proposal must gain the approval and support of

the marine science faculty. The project should include a reflection on the body of literature, or the conceptual framework to which it is a contribution. It must be shared with the College community through posters, presentations, or other means. This course is repeatable for up to eight credit hours. Consult faculty mentor for project proposal guidelines. *Prerequisites: Proposal approval of faculty mentor and program chair, MRNE 110, MRNE 220, and BIOL 383/MRNE 383. MRNE494 requires the prerequisite of MRNE 493.*

BIOL 383/MRNE383. Biological Oceanography (4S)

An examination of major patterns and processes in the ocean's pelagic and benthic ecosystems, emphasizing analysis of mechanisms controlling production and abundances of organisms, from plankton to fish. Introduces interdisciplinary study of effects of anthropogenically induced changes in climate on organisms, ecosystem processes, and biogeochemical cycles. Laboratory will include a combination of field experiences and quantitative examinations of real oceanographic data sets. Lecture and laboratory. *Prerequisites: MRNE 110, BIOL 106.*

ENST 393/MRNE393. Coastal Ecosystem Management (4AS)

An in-depth examination of the Chesapeake Bay ecosystem as well as the principles and practices of adaptive ecosystem management. Students will explore the physical, chemical, geological, and biological components of estuaries and how science informs ecosystem restoration efforts. They will also gain hands-on experience deploying ecosystem management tools, including environmental monitoring and ecosystem simulation modeling. *Prerequisites: Any two of the following: MRNE 110, BIOL105, BIOL 106, CHEM 106, ENST 250.*

ENST 392/MRNE392. Field Research Methods (4AF)

Methods of sampling and analyzing physical, chemical, and biological properties of the air, water, and earth. An emphasis will be placed on research question formulation and sampling design. By the end of the course, students will be able to independently develop a field study, collect and analyze field data, and present their findings in a written report. We will focus on our local estuarine environment, although the general research process covered can be applied to any system. *Prerequisites: Any two of the following: MRNE 110, BIOL 105, BIOL 106, CHEM 106, ENST 250.*

5. Discuss how general education requirements will be met, if applicable.

The program will be subject to the general graduation requirements of St. Mary's of Maryland for the bachelor of arts degree, as published in the course catalog.² These are:

- **Completion of at least 128 credit hours (credits), including at least 44 credit hours of upper-level (300- and 400-level) courses, with a cumulative grade-point average of at least 2.00, both on an overall basis and in those courses that meet major requirements.**

² <http://www.smcm.edu/catalog>

- At least 30 of the last 36 credit hours of academic work toward the degree at St. Mary's College must be completed by credits earned from St. Mary's College courses. With the permission of the Academic Policy Committee, this provision may be waived for students engaged in departmentally approved off-campus learning experiences.
- The LEAD Curriculum Foundational Study requirements (see summary above or table below).

Lead Foundational Study Requirement	Courses Available to Fulfill Requirement	Credits
Core Seminar	• CORE 101 or CORE 301	4
Language Requirement	• Any College-level language course at 102/110 level or higher.	3-4
Professional Pathway	Students must complete <u>each</u> of the following courses. • CORE-P101 (1 credit) • CORE-P102 (1 credit) • CORE-P201 (2-4 credits)	Variable (See cell to the left)
Core Knowledge and Methods <u>Option #1</u> : Core Exploration	Core Exploration: <i>Arts</i> Choose <u>one</u> of the courses below to fulfill the Arts requirement of Core Exploration. • ART 204: Introduction to Drawing • ART 206: Introduction to Painting • ART 208: Introduction to Sculpture • ART 212: Introduction to Photography • ART 214: Introduction to Digital Art • ART 233: Topics in Studio Art • ART 239: Painting and Drawing from Life • ART 269: Community Arts • ARTH 220: Rock, Paper, Sword: The Media of the Ancient and Medieval World • ARTH 250: Topics in Western Art History • ENGL 106: Introduction to Literature • ENGL 130: Literary Topics • ENGL 270: Creative Writing • ENGL 281: Literature in History I • ENGL 282: Literature in History II • ENGL 283: Literature in History III • HIST 264: Introduction to Museum Studies • MUSC 112: Music as Communication • MUSC 203: Music Theory I (3) • MUSC 205: The Story of Music • MUSC 217: The Jazz Makers • MUSC 221: Topics in Music History • MUST 200: Introduction to Museum Studies • TFMS 106: Introduction to Dramatic Literature • TFMS 130: Introduction to Performance	4 each

	• TFMS 170: Stagecraft • TFMS 171: Elements of Theatrical Design • TFMS 200: Theater in History • TFMS 220: Introduction to Film and Media Studies • TFMS 221: Film and Media Production Modes • TFMS 225: Topics in Film and Media • TFMS 228: Media Production I • TFMS 230: Acting I • TFMS232: Voice and Speech for the Actor • TFMS 234: Acting for the Camera • TFMS 250: Movement I • TFMS 255: Modern Dance I • TFMS 258: Dance in History • TFMS 260: Topics in Dance/Movement • TFMS 275: Costumes and Clothes in History • TFMS 280: Topics in Production Core Exploration: <i>Cultural Perspectives</i> Choose <u>one</u> of the courses below to fulfill the Cultural Perspectives requirement of Core Exploration. • AADS 214: Africa and the African Diaspora • ANTH 150: Gambian Languages and Cultures • ANTH 230: Cultural Anthropology • ANTH 250: Language and Culture • ARTH 224: Ancient American Art and Architecture • ARTH 255: Topics in Global Art History • ASIA 200: Introduction to Asian Studies • ENGL 235: Topics in Literature and Culture • HIST 253: Latin American Civilization • HIST 268: Russian Civilization • HIST 280: Africa and the African Diaspora • ILAS 210: Latin American Cultural Studies • ILAS 206: Introduction to Latin American Literature in Translation • ILC/LNG102, 201, 202, 205, 206, or 260 courses, if they are not used to fulfill the language requirement. • ILCT106: Introduction to World Literature • MUSC 216: Introduction to the World's Music • MUSC 223: Topics in Ethnomusicology • POSC 252: Comparative Politics • POSC 269: International Politics • RELG 221: Islamic Civilizations • RELG 231: Religions of Ancient India • RELG232: Religions of Modern India • TFMS 210: Japanese Performance Traditions • TFMS 251: Introduction to Traditional African Dance Core Exploration: <i>Humanistic Foundations</i> Choose <u>one</u> of the courses below to fulfill the Humanistic Foundations requirement of Core Exploration. • ARTH 100: Introduction to Art History	
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	• HIST 104: Historical Foundations of the Modern World to 1450 • HIST 105: Western Civilization • HIST 108: History of the Modern World • HIST 200: United States History, 1776-1980 • HIST 206: East Asian Civilization • HIST 219: Colonial American Survey • HIST 272: Ancient Mediterranean • HIST 274: Europe, 1815-1914 • HIST 276: Twentieth Century World • PHIL 101: Introduction to Philosophy • PHIL 120: Introduction to Ethics • RELG 110: Introduction to the Study of Religions • RELG 210: Biblical Foundations • RELG 211: Speaking of God: Introduction to Theology • RELG 220: Introduction to Islam • WGSX 220: Introduction to Women, Gender, and Sexuality Studies Core Exploration: <i>Mathematics</i> Choose <u>one</u> of the courses below to fulfill the Mathematics requirement of Core Exploration. • COSC 120: Introduction to Computer Science • MATH 131: Survey of Mathematics • MATH 151: Calculus I • MATH 152: Calculus II • MATH 200: Discrete Mathematics • MATH 255: Vector Calculus • MATH 256: Linear Algebra • MATH 281: Foundations of Mathematics Core Exploration: <i>Natural Sciences with Laboratory</i> Choose <u>one</u> of the courses below to fulfill the Natural Sciences with Laboratory requirement of Core Exploration • ASTR 154: Solar System Astronomy • ASTR 155: Stellar Astronomy and Cosmology • BIOL 101: Contemporary Bioscience with Laboratory • BIOL 105 and BIOL105L: Principles of Biology I and Laboratory • CHEM 101. Contemporary Chemistry with Laboratory • CHEM 106: General Chemistry II • GEOL 130: Introduction to Geology • PHYS 104: Basic Physics with Laboratory • PHYS 121: College Physics I • PHYS 141: General Physics I • PHYS 142: General Physics II • PHYS 151: Fundamentals of Physics I • PHYS 152: Fundamentals of Physics II • PHYS 251: Fundamentals of Physics III	
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	Core Exploration: <i>Social Sciences</i> Choose <u>one</u> of the courses below to fulfill the Social Sciences requirement of Core Exploration • ECON 102: Principles of Microeconomics • ECON 103: Principles of Macroeconomics • POSC 100: Introduction to Politics • PSYC 101: Introduction to Psychology • SOCI 101: Introduction to Sociology	
Core Knowledge and Methods <u>Option #2</u>: Core Inquiry	Core Inquiries are designed as groupings of thematically-linked courses taught over multiple semesters. In order to satisfy certain learning objectives (as opposed to a standard number of credits), Inquiries may be comprised of four courses, four courses plus a stand-alone requirement (such as a math or language course), or 5 courses. Current inquiry themes include Justice, Climate, and the Idea of the West.	Credits vary. See cell to the left for more details.

- The LEAD Curriculum Advanced Study requirements, which include:

- Academic Major
- Capstone Experience.

6. Identify any specialized accreditation or graduate certification requirements for this program and its students.

Not applicable.

7. If contracting with another institution or non-collegiate organization, provide a copy of the written contract.

No contracting with other organizations is planned.

8. Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and cost and payment policies.

Course and degree requirements will be published in the course catalog and on the college website. St. Mary's College of Maryland publishes information on its website on the nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies. It also communicates this information by email and hard copy mailing, and through advising appointments. Each student is assigned a faculty advisor.

9. Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.

As with all of its programs, St. Mary's College of Maryland will ensure that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available. Upon MHEC approval of the program, full catalog copy will be added for inclusion in the 2020-2021 catalog; program overview and promotional materials will be uploaded to the SMCM website and accompanying social media; and Admissions representatives will be fully briefed on the parameters of the new program to speak knowledgeably of the curriculum when recruiting.

H. Adequacy of Articulation

1. If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.

In 2019, each major at St. Mary's College drafted articulation agreements with five Maryland Community Colleges including the College of Southern Maryland, Anne Arundel Community College, Baltimore City Community College, Howard Community College, and Montgomery Community College. The purpose of these articulation agreements is to lower the barriers of successful transition from a community college to a 4-year state college. The Marine Science major will complete the same articulation agreements within 1 year of receiving MHEC approval.

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11).

1. Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faculty member will teach in the proposed program.

The core faculty of the Marine Science Major are primarily already among the current SMCM faculty. Professor Randy Larsen and Assistant Professor Cassie Gurbisz hold doctorates in Marine, Estuarine and Environmental Science from the University of Maryland Center for Environmental Science. Currently, Assistant Professor Gurbisz's research on submerged aquatic vegetation is being funded through multiple awards from Maryland Sea Grant, Maryland Department of Natural Resources, and the Chesapeake Bay Trust.

Professor Larsen is collaborating with a Professor from American University and an D.C. Government Environmental Protection Officer on microplastics in the Potomac Watershed. He is also supported by a NSF Major Research Instrument grant for studying the impact of persistent organic pollutants on the biochemistry in oysters.

Assistant Professor Emily Brownlee holds a doctorate in Biological Oceanography from MIT/Woods Hole Oceanographic Institute.

Professor Jeff Byrd holds a doctorate in microbiology from the University of Maryland, College Park and specializes in Microbial Ecology.

Assistant Professor Shanen Sherrer holds a doctorate in Biochemistry from The Ohio State University. Her specialty is examining how environmental toxins impact DNA processing pathways and is also supported by an NSF Major Research Instrument grant to study protein structural changes as a function of environmental conditions.

Assistant Professor Sarah Latchney holds a doctorate in Toxicology from the University of Rochester. Her research interests are broadly aimed at studying the impact of the environment on neural stem and progenitor cells.

Adjunct Professor Susan Langley holds a doctorate in Archeology from the University of Calgary. She is the Maryland State Underwater Archeologist with decades of experience in maritime archeology and emergency planning for marine resources threatened by oil and hazmat spills.

Adjunct Professor John Kiser is our resident diving instructor. John has certified more people through PADI than anyone in the world. He will continue to teach the elective Open Water SCUBA class with an emphasis on scientific diving skills.

A faculty hire would be required to initiate this new major. The faculty member would be a physical oceanographer who would teach Introduction to Marine Science, Physical Oceanography w/Lab and Marine Science Capstone. Recent retirements in Biology will be replaced with aquatic biologists who could support both the biology and marine science programs.

Table 4. Faculty instructors for the Marine Science Major.

Faculty member/rank	Degree	Department	Status	HEGIS code	Course Title
Randolph Larsen Professor	Ph.D.	Chemistry	Full Time	CHEM 301	Marine Chemistry
Geoff Bowers Assist. Professor	Ph.D.	Chemistry	Full Time	CHEM302	Geochemistry
Jeff Byrd Professor	Ph.D.	Biology	Full Time	MRNE3XX/ BIOL3XX	Marine Microbiology
Emily Brownlee Assistant Professor	Ph.D.	Biology	Full Time	BIOL383/ MRNE383	Biological Oceanography with Lab
				BIOL3XX/ MRNE3XX	Plankton Ecology
Sarah Latchney Assistant Professor	Ph.D.	Biology	Full Time	MRNE3XX/ ENST3XX	Marine Environmental Toxicology
Shanen Sherrer Assistant Professor	Ph.D.	Chemistry	Full Time	MRNE3XX/ ENST3XX	Marine Environmental Toxicology
Cassie Gurbisz Assistant Professor	Ph.D.	Environmental Studies	Full Time	ENST393/ MRNE393	Coastal Ecosystem Management
				ENST3XX/ MRNE3XX	Quantitative Methods
				ENST392/ MRNE392	Field Research Methods
Susan Langely	Ph.D.	Anthropology	Adjunct	ANTH 351	Underwater Archeology
John Kiser Instructor	PADI Certified	Physical Education	Adjunct	PHEC232	Open Water SCUBA

2. Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:

a) Pedagogy that meets the needs of the students

St. Mary's provides faculty with opportunities for professional development through the support of the Center for Inclusive Teaching and Learning, which hosts the 3I Teaching

Conference each August as well as learning communities and workshops throughout the academic year. In addition, our Assessment Implementation Team is headed by the Coordinator of Transparent Teaching and Assessment; her role explicitly connects assessment to the kinds of intentional, evidence-based strategies that improve teaching practices. As such, the Assessment Coordinator has tailored her work with faculty on assessment to include substantive discussions on ways to respond to assessment data by developing more effective pedagogical strategies.

b) The learning management system

St. Mary's utilizes Blackboard for its learning management system. The Office of Information Technology includes a position for an instructional technologist who trains new faculty on Blackboard and other technology-based tools for teaching. This position also provides support for faculty when they have questions about Blackboard and other such tools.

c) Evidenced-based best practices for distance education, if distance education is offered.

Distance education is not applicable.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12).

1. Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.

The St. Mary's College of Maryland Library is the largest library in the St. Mary's, Calvert, and Charles tri-county region. Our collection includes over 200,000 books, DVDs, CDs and periodicals available to loan to members of the St. Mary's College community as well as alumni and local patrons. Online research databases, e-journals, and e-books are available to St. Mary's students, faculty and staff from anywhere in the world 24 hours a day, 7 days a week. The SMCM Library is part of the University System of Maryland and Affiliated Institutes consortium which allows us to share collections with statewide lending of over 11 million items and core group-licensed e-resources. Through the library, students and faculty can obtain a copy of Endnotes, a reference management software.

With specific regards to Marine Science, a survey of current holdings found 101 journals that apply to the field of Marine Science. Tables 5 lists current and pending Marine Science related journals at the St. Mary's College Library.

Table 5. Current SMCM Library Holdings Related to Marine Science

Title	ISSN
Advances in Oceanography and Limnology	19475721
Aquaculture Environment Interactions	18697534

Aquatic Biology	18647782
African Journal of Marine Science	1814-232X
Annals of GIS	1947-5683
Annual Review of Marine Science	19411405
Aquatic Ecology	1386-2588
Aquatic Geochemistry	1380-6165
Asia-Pacific Journal of Marine Science and Education	2221-9935
Ausmarine	2202-3178
Australian Journal of Marine and Freshwater Research	0067-1940
Bedford Institute of Oceanography	1499-9951
Biological Bulletin	0006-3185
Bulletin of Marine Science	0007-4977
Bulletin of the Marine Geology	1410-6175
CCAMLR science	1023-4063
Coastal Management	0892-0753
Coral Reefs	0722-4028
Crustaceana	0011-216X
Current: The Journal of Marine Education	2632-850X
Cryosphere	1994-0416
Elementa	23251026
Estuaries and Coasts	1559-2723
Fish Bulletin	0096-0985
Fishery Bulletin	0090-0656
Frontiers in Marine Science	2296-7745
Geo-Marine Letters	0276-0460
Gulf and Caribbean research	1528-0470
Hydrology	23065338
Hydrology and Earth System Sciences	10275606
Helgoland Marine Research	1438-387X
Hydrobiologia	0018-8158
ICES Journal of Marine Science	1054-3139
International Soil and Water Conservation Research	20956339
JFMR-Journal of Fisheries and Marine Research	2581-0294
Journal of Agricultural and Marine Sciences	2410-1060
Journal of Atmospheric and Ocean Science	1741-7538
Journal of Atmospheric and Oceanic Technology	0739-0572
Journal of Coastal Conservation	1400-0350
Journal of Coastal Research	0749-0208
Journal of Experimental Biology	1477-9145

Journal of Experimental Marine Biology and Ecology	0022-0981
Journal of Maps	1744-5647
Journal of Marine and Aquatic Sciences	2302-8114
Journal of Marine Biology	1687-9481
Journal of Marine Engineering and Technology	2046-4177
Journal of Marine Environmental Engineering	1061-026X
Journal of Marine Research	0022-2402
Journal of Marine Science and Engineering	2077-1312
Journal of Marine Technology and Environment	1844-6116
Journal of Oceanography	0916-8370
Journal of Phycology	0022-3646
Journal of Physical Oceanography	0022-3670
Journal of Spatial Hydrology	1530-4736
Journal of the Marine Biological Association of the United Kingdom	0025-3154
Journal of Integrative Environmental Sciences	1943-815X
Journal of Hydrology: Regional Studies	22145818
Journal of the North American Benthological Society	0887-3593
Limnology and Oceanography: Bulletin	1539-607X
Limnology and Oceanography: Methods	1541-5856
Limnology and Oceanography	0024-3590
Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science	1942-5120
Marine and Freshwater Behaviour and Physiology	1023-6244
Marine and Freshwater Research	1323-1650
Marine Behaviour and Physiology	0091-181X
Marine Biodiversity Records	1755-2672
Marine Biology	0025-3162
Marine Biology Research	1745-1000
Marine Biotechnology	1436-2228
Marine Drugs	1660-3397
Marine Ecology Progress Series	0171-8630
Marine Environment and Health Series	1649-0053
Marine Environment News	1810-1372
Marine Fisheries Review	0090-1830
Marine Geodesy	0149-0419
Marine Georesources and Geotechnology	1064-119X
Marine Ornithology	1018-3337
Marine Pollution Bulletin	0025-326X
Marine Resource Economics	0738-1360

Mediterranean Marine Science	1108-393X
Ocean and Polar Research	1598-141X
Ocean Dynamics	1616-7341
Ocean Science	1812-0784
Ocean Science Discussions	1812-0806
Ocean Yearbook	0191-8575
Oceanography	1042-8275
Oceanologia	0078-3234
Phycological Research	1322-0829
Physical Oceanography	1573-160X
Survey of federally-funded marine mammal research and studies	2324-7606
Sustainability: Science, Practice and Policy	1548-7733
San Francisco Estuary and Watershed Science	15462366
STAR: Science & Technology of Archaeological Research	2054-8923
Tellus, Series A: Dynamic Meteorology and Oceanography	1600-0870
Thalassas: An International Journal of Marine Sciences	0212-5919
Traditional marine resource management and knowledge information bulletin	1025-7497
Turkish Journal of Maritime and Marine Sciences	2564-7016
Underwater naturalist	0041-6606
Water Alternatives	19650175
Water Resources and Industry	22123717
Water Science	1110-4929

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment (as outlined in COMAR 13B.02.03.13)

- 1. Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences.**

The key resource for the Marine Science program is SMCM's several thousand linear feet of tidal shoreline. The St. Mary's River along with its easy access to the Potomac River and Chesapeake Bay is unique among Maryland colleges. To best utilize our waterfront location, we will invest in watercraft to take classes out into the marine environment. The administration will support the capital and operating expenses of such craft and ancillary equipment. We recommend the administration stagger purchases of research and teaching vessels to spread out costs and to refine purchasing priorities as we gain experience with expected student demand. Until we are adequately equipped, we plan to rent research vessel time from the Chesapeake Biological Lab located in nearby Calvert County.

From the courses listed in Table 2, there are eight new courses and one new lab. However, five of the eight courses are specific topics courses taught by existing faculty, and therefore, classroom allocations are part of the existing scheduling matrix. Introduction to Marine Science, Physical Oceanography, Physical Oceanography Lab and Marine Capstone are new courses taught by new faculty. These courses will need to be integrated into the existing scheduling matrix. Initially this will depend on close partnerships with existing STEM departments to access lab space. The underutilized classroom and lab located in the River Center will make an ideal teaching and research space. Future marine science faculty are expected to be excellent instructors and active researchers. An ideal marine science faculty candidate would conduct research focused on our local environment. Growth in the program may require the administration to consider program space needs in the next strategic plan.

2. Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:

- a) An institutional electronic mailing system, and**
- b) A learning management system that provides the necessary technological support for distance education**

The proposed major in Marine Science will not be a distance education activity, therefore this section is not applicable.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14)

- 1. Complete [Table 1: Resources and Narrative Rationale](#). Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.**

Table 1. Program Resources

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	0	0	0	0	0
2. Tuition/Fee Revenue (c + g)	\$226,860	\$274,950	\$308,560	\$311,640	\$393,450
a. Number of F/T students	5	8	12	20	20
b. Annual tuition/fee rate	\$15,124	\$15,275	\$15,428	\$15,582	\$15,738
c. Total F/T revenue (a x b)	\$226,860	\$274,950	\$308,560	\$311,640	\$393,450
d. Number of P/T students	0	0	0	0	0

e. Credit Hour Rate	\$200	\$200	\$200	\$200	\$200
f. Annual Credit Hour Rate	0	0	0	0	0
g. Total P/T revenue (d x e x f)	0	0	0	0	0
3. Grants, Contacts, and Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (add 1-4)	\$226,860	\$274,950	\$308,560	\$311,640	\$393,450

Table 1 Narrative: The College anticipates that the Marine Science major will draw new students to St. Mary's. The delivery of the academic program does not rely on grants or reallocated funds.

2. Complete [Table 2: Program Expenditures and Narrative Rationale](#). Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each expenditure category.

TABLE 2: PROGRAM EXPENDITURES					
Expenditure Categories	Year 1 2021/22	Year 2 2022/13	Year 3 2023/24	Year 4 2024/25	Year 5 2025/26
1. Faculty (b + c below)	\$0	\$78000	\$156000	\$234000	\$390000
a. Number of FTE	0	1	2	3	5
b. Total Salary	\$0	\$60000	\$120000	\$180000	\$300000
c. Total Benefits	\$0	\$18000	\$36000	\$54000	\$90000
2. Admin. Staff (b + c below)	\$0	\$0	\$0	\$0	\$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	\$0	\$0	\$0	\$0	\$0
c. Total Benefits	\$0	\$0	\$0	\$0	\$0
3. Support Staff (b + c below)	\$0	\$0	\$0	\$0	\$0
a. Number of FTE	0	0	0	0	0
b. Total Salary	\$0	\$0	\$0	\$0	\$0
c. Total Benefits	\$0	\$0	\$0	\$0	\$0

4. Technical Support and Equipment	\$0	\$0	\$0	\$0	\$0
5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$0	\$4000	\$7000	\$10000	\$15000
TOTAL (Add 1 - 7)	\$0	\$82000	\$163000	\$244000	\$405000

3. Table 2 Narrative: We anticipate growth in this program that will nearly cover the expense of hiring a total of five additional faculty members over the next five years. These faculty members will also contribute to the Biology and Chemistry & Biochemistry programs at SMCM, so the cost of their lines does not fall exclusively to Marine Science. There are no new costs for administrative staff or support staff, as the Marine Science program will utilize staff that currently supports the Biology major and our waterfront center. Other expenses include support for faculty research and travel, as well as supplies needed for courses and student research projects.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15).

1. **Discuss procedures for evaluating courses, faculty and student learning outcomes.**

a) Evaluation of Student Learning Outcomes

The MRNE Major will assess student learning following the process implemented by the college. The section below is excerpted from the St. Mary's College of Maryland Assessment Handbook:

Overall, student learning assessment at St. Mary's College is accomplished through a combination of 3 assessment tiers: institutional, programs (majors, minors), and course-based assessment. The mission of St. Mary's College informs the institutional learning outcomes (ILOs) at the College. The institutional learning outcomes articulate the expectations of what all graduates should know, be able to do, and value upon earning a degree from the College. SMCM expects 80% of its graduates to meet these outcomes upon graduation from the college.

Every three years, SMCM completes its institutional assessment cycle. We assess the breadth of students' disciplinary literacy via courses that fulfill our Core science requirement. Several courses in this proposed program will contribute to that dimension of our institutional assessment. Further, within the assessment system process for the campus, we do a collective look at the depth of students' disciplinary literacy. This is accomplished via their majors, with an aggregate of students' capstone assessment in the programs that are aligned to disciplinary literacy.

Individual programs, whether department-based or cross-disciplinary, majors or minors, establish their own program learning outcomes (PLOs), which articulate what students should know, be able to do, and value upon completion of that particular program. For majors/minors, program learning outcomes complement the requirements students must fulfill to earn a particular degree. Programs are required to include their PLOs in the SMCM Course Catalog. Program-level student learning outcomes defined within each major or minor reflect not only the disciplinary and interdisciplinary content of the program, but also the linkage to the broader role each of these plays in achieving the institutional-level student learning outcomes. PLOs should thus at least somewhat align with the ILOs, but program outcomes may also address discipline-specific dimensions that otherwise do not align with the ILOs. Most PLO assessment is accomplished by collating assessment results from courses whose learning outcomes align with the targeted level of mastery/complexity of the PLO, rather than by having students complete additional assessment activities outside of the course experience.

Further, each program at SMCM is responsible for articulating and monitoring progress relative to its own program learning outcomes (PLOs). Each program must submit an articulated overview of its outcomes, including course learning outcomes (CLOs) for courses that count in the program. For cross-disciplinary study areas (CDSA), the CLOs are the purview of the home department, but the CLOs must be relevant/applicable to their PLOs. Every three years, programs are expected to complete an assessment of all PLOs; annually, each program submits an update of their assessment progress within the cycle. PLOs for Marine Science have been paired with Institution Learning Outcomes (Table 6.). This will allow for PLO evaluations on the same 3-year schedule as the College Level Learning Outcomes. Tables 7 and 8 articulate the Program Learning Outcome expectations (Foundational, Developmental and Capstone) addressed by each of the Marine Science required and elective courses. Tables 9 and 10 articulate the College Liberal Arts Literacies expectations (Foundational, Developmental and Capstone) addressed by each of the Marine Science required and elective courses.

Table 6. Definitions of Program Learning Outcomes and their Cross-Reference to College Liberal Arts Literacies.

SMCM Standardized Liberal Arts Literacies	Marine Science Program	
	Learning Outcomes	Learning outcome definition
Disciplinary	Content knowledge	Demonstrate understanding of fundamental concepts in marine science, including principles of geological, physical, chemical, and biological processes in the marine environment.
Disciplinary, Interpretive & Expressive	Methods	Demonstrate understanding of common laboratory, field, and modeling methods used in marine science.
Information Literacy, Professional	The scientific process	Demonstrate the ability to i) formulate a falsifiable hypothesis, ii) design an experiment or observational study to test your hypothesis, iii) analyze your results in a statistically rigorous way, and iv) draw logical conclusions based on your analysis.
Interpretive & Expressive, Professional	Scientific communication	Communicate effectively the concepts, methods, results, and conclusions of marine science research, in oral and written form, to specialists and the general public.
Interpretive & Expressive, Professional	Applied problem-solving	Apply knowledge and skills learned to solve problems in marine geology, physics, chemistry, or biology.
Community, Professional	Human-environment interactions	Demonstrate understanding of how human activities impact the marine environment, and how the marine environment impacts human activities.

Table 7. Curriculum Map for the Marine Science Major based on *Program Learning Outcomes*. Students complete the following 11 courses (42 credits).

Learning Level of Program Learning Outcomes								
Proposed core courses	Existing SMCM courses	Credits	Content knowledge	Methods	The Scientific Process	Scientific communication	Applied problem-solving	Human-environment interactions
Introduction to Marine Science	To Be Created	4	Foundational		Foundational	Foundational		
Introductory Biology I	BIOL 105 + 105L: Principles of Biology I	5	Foundational		Foundational	Foundational		
Introductory Biology II	BIOL 106 + 106L: Principles of Biology II	5	Foundational		Foundational	Foundational		
Introductory Chemistry II	CHEM 106 & 106L: General Chemistry II	4	Foundational		Foundational	Foundational		
Introductory Physics I	PHYS 121/141/151*	4	Foundational		Foundational	Foundational		
Introductory Physics II	PHYS 122/142/152**	4	Foundational		Foundational	Foundational		
Statistics	MATH 221: Introduction to Statistics or BIOL 311: Biostatistics	4		Developing	Developing			
Biological Oceanography	BIOL 380: Topics in Biology - Oceanography	4	Developing	Developing	Developing	Developing		Developing
Physical Oceanography	To Be Created	4	Developing	Developing	Developing	Developing		Developing
Marine Science Capstone or MRNE494	To Be Created	4		Capstone	Capstone		Capstone	Capstone

*PHYS 141 or 151 & MATH 151 recommended for students interested in pursuing graduate studies in marine science

**PHYS 142 or 152 & MATH 152 recommended for students interested in pursuing graduate studies in marine science

Table 7 Continued. Students must select 16 credits of marine science electives, of which 12 credits must be upper level.

Proposed elective courses	Existing SMCM courses	Credits	Content knowledge	Methods	The scientific process	Scientific communication	Applied problem-solving	Human-environment interactions
Coastal Ecology	BIOL 463: Ecology of Coastal Ecosystems	4	Developing	Developing	Developing		Developing	Developing
Marine Chemistry Geochemistry	CHEM 480 Environmental Chemistry	2 2	Developing		Developing		Developing	Developing
Coastal Ecosystem Management	ENST 395: Chesapeake Bay Science and Management	4	Developing		Developing		Developing	Developing
Marine Science Field Methods	ENST 395: Environmental Field Research Methods	4		Developing	Developing	Developing	Developing	Developing
Marine Invertebrate Zoology	BIOL 303: Invertebrate Zoology	4	Developing	Developing	Developing	Developing		
Plankton Ecology	To Be Created	4	Developing	Developing	Developing	Developing		
Quantitative methods	To Be Created	4	Developing	Developing	Developing	Developing		
Ecology of Marine Plants	To Be Created	4	Developing	Developing	Developing	Developing		
Marine Toxicology	To Be Created	4	Developing	Developing	Developing	Developing		
Marine Microbiology	To Be Created	4	Developing	Developing	Developing	Developing		
Ichthyology	BIOL 384: Ichthyology	4	Developing	Developing	Developing	Developing		
Underwater Archeology	ANTH 351: Underwater Archeology	4	Developing	Developing	Developing	Developing		
Advanced Open Water SCUBA	PHEC 232: Advanced Open Water SCUBA	1		Developing				

Table 7 Continued. The following are additional non-routine Elective Courses which would allow for transfer work, summer courses, and non-routine topics courses.

Proposed elective courses	Existing SMCN courses	Credits	Content knowledge	Methods	The scientific process	Scientific communication	Applied problem-solving	Human-environment interactions
MRNE 181 Lower Level Marine Science Transfer Course	N/A	1-4	To Be Determined on a Case-by-Case Basis.					
MRNE 307. Student Assistantship	N/A	1	Developing	Developing	Developing	Developing	Developing	Developing
MRNE 480 Topics in Marine Science	N/A	4	To Be Determined on a Case-by-Case Basis.					
MRNE 481 Upper Level Marine Science Transfer Course	N/A	1-4	To Be Determined on a Case-by-Case Basis.					

Table 8. Students must fulfill the following field experience requirement.

Learning Through Experiential and Applied Discovery	Credits	Content knowledge	Methods	The scientific process	Scientific communication	Applied problem-solving	Human-environment interactions
Applied marine field experience: Internship, job, co-op, on or off-campus research experience, study tour, or study abroad experience with a marine science focus. (≥ 160 hours). This includes: MRNE 397; MRNE 398; MRNE 399; MRNE493.	4		Capstone			Capstone	

Table 9 Curriculum Map for the Marine Science Major based on *College Liberal Arts Literacies*. Students must complete the following 11 courses (46 Credits).

Proposed core courses	Existing SMCM courses	Credits	Disciplinary	Interpretive & Expressive	Information Literacy	Community	Cultural	Professional
Intro. Marine Science	To Be Developed	4	Foundational	Foundational				Foundational
Biology I	BIOL 105 + 105L: Principles of Biology I	5	Foundational	Foundational	Foundational			
Biology II	BIOL 106 +106L: Principles of Biology II	5	Foundational	Foundational				
Chemistry II	CHEM 106 & 106L: General Chemistry II	4	Foundational	Foundational	Foundational			
Intro. Physics I	PHYS 121 or 141 or 151*	4	Developing	Developing				
Intro. Physics II	PHYS 122 or 142 or 152**	4	Developing	Developing				
Statistics	MATH 221: Introduction to Statistics or BIOL 311: Biostatistics	4	Developing	Developing				
Biological Oceanography ⁺	BIOL 380: Topics in Biology - Oceanography	4	Developing	Developing		Developing		Developing
Physical Oceanography	To Be Developed	4	Developing			Developing		Developing
Marine Science Capstone or MRNE 494	To Be Developed	4	Capstone	Capstone	Capstone	Capstone		Capstone

*PHYS 141/151 and MATH 151 recommended for students interested in pursuing graduate studies in marine science

**PHYS 142/152 and MATH 152 recommended for students interested in pursuing graduate studies in marine science

*Biological Oceanography currently only addresses Disciplinary and Interpretive & Expressive College Liberal Arts Literacies. This new program will work with the Biology Department to add Community and Professional Literacies, so that it pairs with the Human-Environment Interactions Program Learning Outcome for Marine Science.

Table 9 Continued. Students must select 16 credits of marine science electives, of which 12 credits must be upper level.

Proposed elective courses	Existing SMCM courses	Credits	Disciplinary	Interpretive & Expressive	Information Literacy	Community	Cultural	Professional
Coastal Ecology	BIOL 463: Ecology of Coastal Ecosystems	4	Developing	Developing	Developing			
Marine Chemistry Geochemistry	CHEM 480 Environmental Chemistry	2 2	Developing	Developing	Developing			
Coastal Ecosystem Management	ENST 395: Chesapeake Bay Science and Management	4	Developing	Developing				
Marine Science Field Methods	ENST 395: Environmental Field Research Methods	4	Developing	Developing				
Plankton Ecology	N/A	4	Developing	Developing				
Quantitative methods	N/A	4	Developing	Developing				
Ecology of Marine Plants	N/A	4	Developing	Developing				
Marine Toxicology	N/A	4	Developing	Developing				
Marine Microbiology	N/A	4	Developing	Developing				
Marine Invertebrate Zoology	BIOL 303: Invertebrate Zoology	4	Developing	Developing				
Ichthyology	BIOL 384: Ichthyology	4	Developing	Developing				
Underwater Archeology	ANTH351: Underwater Archeology	4	Developing	Developing				
Advanced Open Water SCUBA	PHEC 232: Advanced Open Water SCUBA	1		Developing				

Table 9 Continued. The following are additional non-routine Elective Courses which would allow for transfer work, summer courses, and non-routine topics courses.

Proposed elective courses	Existing SMCM courses	Credits	Disciplinary	Interpretive & Expressive	Information Literacy	Community	Cultural	Professional
MRNE 181 Lower Level Marine Science Transfer Course	N/A	1-4	To Be Determined on a Case-By-Case Basis.					
MRNE 307. Student Assistantship	N/A	1	Developing	Developing	Developing	Developing	Developing	Developing
MRNE 480 Topics in Marine Science	N/A	4	To Be Determined on a Case-By-Case Basis.					
MRNE 481 Upper Level Marine Science Transfer Course	N/A	1-4	To Be Determined on a Case-By-Case Basis.					

Table 10. Students must fulfill the following field experience requirement.

Learning Through Experiential and Applied Discovery	Credits	Disciplinary	Interpretive & Expressive	Information Literacy	Community	Cultural	Professional
Applied marine field experience: Internship, job, co-op, on or off-campus research experience, study tour, or study abroad experience with a marine science focus. (>=160 hours). This includes: MRNE 397; MRNE 398; MRNE 399; MRNE493.	4	Capstone	Capstone				Capstone

For individual courses, faculty articulate the course learning outcomes (CLOs) in their syllabi. Assessment at the course level may be completed for the purpose of determining how to improve student learning within that particular course experience, and/or it may be implemented for the purpose of informing decision-making about student learning at the program or institutional level.

The choice of assignment is at faculty discretion, but in cases where the course is designated to assess an ILO (a Core course, for example, or an SMP), faculty may be asked to use a specific rubric or other tool to assess whether students have met a particular outcome. Programs that have courses with sections taught by multiple instructors may also use a common tool to determine if students have met an outcome being assessed, either at the program or institutional level.

Otherwise, faculty have the individual discretion to determine how often they will assess student learning in their courses for the purposes of informed decision-making about any changes to the student learning experience.

b) Evaluation of faculty.

For tenure-track faculty, performance is evaluated via a pre-tenure review, a tenure and promotion review, and periodic reviews (every three years until promotion to full professor, then every five years). Performance at each of these post-tenure reviews is evaluated by the provost based on a system of up to three increments of merit.

Reviews for tenure and promotion to full professor include faculty course evaluations, which are required for each course taught, and narrative evaluations, which are administered by the department chair in all courses taught by the faculty member in two of the three semesters prior to the submission of their file. Students provide detailed, written responses to questions about the faculty's member expertise and teaching effectiveness in these evaluations. Faculty members up for promotion are also observed by their colleagues who evaluate their teaching effectiveness.

Adjunct and visiting professors are also required to administer course evaluations. Results are monitored by department chairs and the Associate Deans of Faculty and Curriculum, who will discuss evaluations as needed with faculty.

- 2. Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.**

In addition to the program assessment procedures outlined above, academic programs at St. Mary's undergo a program review process every 7-10 years. These reviews include reflection on assessment procedures as well as an evaluation of curricula, student programming, and support for faculty by an external team.

Student satisfaction is tracked through various survey opportunities, including NSSE, our senior exit survey, and our alumni surveys (alums are surveyed the year after they graduate and every five years after that). Individual programs also periodically survey their students and alums to gather data on their experience and make adjustments to curricula and programming.

Because St. Mary's is a small school, retention is primarily tracked at the institutional level. However, individual programs can request data concerning students' performance in required courses for the major, and the Office of Institutional Research, Office of the Provost, and the Office of Student Support Services work together to evaluate patterns of performance in gateway courses for majors.

Cost-effectiveness is monitored via the Provost and the President's Executive Council (which includes the Provost), with input from the Academic Planning Committee. This committee reviews line proposals and evaluates need for resources based on current class sizes.

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR 13B.02.03.05).

1. **Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.**

The College has an excellent record of recruiting and retaining minority students, and we expect that the proposed major in marine science will contribute positively to the continuing success of minority student recruitment and retention. For the ten years, 2010-2019, minority student population risen from 19.1% to 26.2%. The 6-year graduation rate (averaged over the most recent 5 years) is 77% for all students, 72% for all minority students, 74% first generation, and 76% need-based aid students.

Minority access and achievement are important components of the College's mission and strategic plan, and these are consistent with minority achievement goals outlined in the State Plan. The Marine Science undergraduate program at SMCM will actively work to recruit and retain underrepresented groups in higher education broadly and the geosciences specifically, where people of color earn less than 10% (42 out of 444 in 2015) of all doctorate degrees in Earth, Atmospheric and Ocean Sciences. The SMCM mission statement affirms our commitment "to diversity, access, and affordability." Our programs work to fulfill this mission. For example, we successfully leveraged NSF funding to implement the Emerging Scholars Programs (ESPs). This voluntary program aims to improve underrepresented students access to and success in STEM fields. ESPs engages students in collaborative work, provides social networks, and enrichment activities during the first year of college when students are most likely to leave the field. The

College’s DeSousa-Brent Scholars program actively recruits and supports students from groups underrepresented in higher education, including people of color and first-generation college students. One of our new first-year Inquiry programs revolves around the topic of social justice, which encourages students to unpack the systems and processes that create injustices in our country. Once the Marine Science program is established, we will contribute to these voluntary programs and plan to pursue additional funding to advance our inclusion efforts specifically in the geosciences (e.g., NSF’s [Improving Undergraduate STEM Education: Pathways into the Earth, Ocean, Polar and Atmospheric & Geospace Sciences](#)).

The SMCM undergraduate Marine Science degree is most closely associated with the STEM graduate degree field of Earth, Atmospheric and Ocean Sciences as categorized by the National Science Foundation. This degree field historically has significant under representation of minority students. Table 11 summarizes findings of a 2018 report by the National Academies of Sciences, Engineering, and Medicine showing that on a national level, minority students earning graduate degrees in Earth, Atmospheric and Ocean Sciences number in the single digits to a few dozen. SMCM has a track record of minority achievement in STEM fields. The mentorship and opportunities provided by the new Marine Science program could significantly improve the national statistics on underrepresented populations entering the Earth, Atmospheric and Ocean Sciences.

Table 11. Students earning graduate degrees in Earth, Atmospheric and Ocean Sciences.³

Graduation Year	Master's Degree		Doctorate Degree	
	2000	2015	2000	2015
African American Students	7	45	3	11
Hispanic or Latino/a Students	30	104	9	31
White Students	1036	1512	344	444

O. Relationship to Low Productivity Programs Identified by the Commission:

1. If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.

³ National Academies of Sciences, Engineering, and Medicine 2018. Graduate STEM Education for the 21st Century. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25038>.

Not applicable.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

1. **Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.**
2. **Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.**

Not applicable.