Shippensburg University
Marine Science Minor Advising Worksheet

Why a Marine Science Minor? Some facts…

- The world ocean is the **single most important feature of our planet**! It exists at the nexus of the Earth's complex systems and it is critical that we understand its role on our planet.
- Oceans regulate climate, circulate massive quantities of water, gases, and heat around the globe, and **produce upwards of 85% of the oxygen we breathe**. Oceans also absorb many of the pollutants we emit including greenhouse gases and moderate our climate. Their vast biodiversity offers a frontier for novel medicines, and oceans provide the primary food supply for more than 1.5 billion people globally.
- The **world's oceans are Earth's most valuable asset**, contributing $70 trillion dollars in production annually and an additional $30 trillion in ecosystem services that benefit humanity.
- In the U.S. $1.5 trillion in cargo moves through U.S. seaports and only 14% of coastal counties produce more that 45% of U.S. GDP.
- More than **3 million U.S. jobs are dependent on oceans** and Great Lakes resources and 3.2 billion people live and work within 60 miles of the sea.
- NOAA ***reported employment growth in the ocean economy by 2.7% relative*** to the 1.7% rate found nationally in six job sectors dependent on natural ocean resources. These include: 1) living resources, 2) marine transportation, 3) marine engineering and construction, 4) mineral extraction, 5) ship and boat building, and 6) recreation and tourism.
- The oceans and Great Lakes are critical to Pennsylvania's economy. PA has 3 major ports that provide $50 billion dollars to the Commonwealth's economy.
- ***Our students should have every opportunity to not only take part in this workforce, but to graduate prepared to lead the way*** in delivering and managing more sustainable, multi-disciplinary solutions to the challenges we face from climate change, biologic and natural resources, natural hazards, and other contemporary issues.

Who should minor in Marine Science?

- The Marine Science Minor is designed to complement the liberal arts training of Shippensburg University students, especially those majoring in STEAM fields.
- The minor provides an ***opportunity for any Shippensburg student*** to obtain an interdisciplinary education in Marine Science that will complement their major.

What can you do with the minor?

- When combined with another major, the minor will provide students an excellent foundation for the workforce or graduate school.
- Graduates are uniquely positioned to work in geoenvironmental and biological sciences, coastal development, land use and resource management, environmental engineering, marine research, education, international relations, aquariums, aquaculture and fisheries, and more.
- Workforce projection data indicate that jobs will be available in a growing number of industries, governmental agencies, educational organizations, non-profits, and within both commercial industries and consulting arenas.

What about the curriculum?

- The interdisciplinary program focuses on ocean and coastal environments, their natural resources, biology, hazards, and contemporary geoenvironmental and conservation issues.
- The curriculum provides a foundation in ocean sciences focusing on content, technologies, and skills that enable students to investigate problems in marine science including natural systems evolution, ecology, resources, hazards, sustainability, resource management, and resiliency.

What will you learn?

- Upon completion of the Marine Science minor, students will be able to demonstrate:
    - content knowledge of foundational concepts and contemporary issues in marine sciences and how these impact humans and are impacted by human activities;
    - knowledge of the geography and physiography of marine, coastal, and marginal seas, and associated natural resources;
    - knowledge of the biological diversity of marine, coastal, and marginal seas, their ecology and ecosystem services, and how biodiversity responds to environmental change and human exploitation through time;
    - proficiency in the use of the scientific method and common laboratory, field techniques and equipment used to solve marine science related problems pertinent to resource and sustainable management of ocean assets.

Program Advising Checksheet

19 Credit Marine Science Minor

To declare the minor: students need to have 30 credits earned and a GPA of 2.0 or higher.

Minor students must:

- successfully complete at least 19 credits
- complete at least 6 credits in 300 or higher level coursework
- complete at least 6 credits at the Chincoteague Bay Field Station (or in other marine-coastal field-based courses by advisement)
- complete a capstone from the three options below

Note:

* indicates courses taught at Chincoteague Bay Field Station in summer programs!

Required Courses:	7 Credits	When?	Pre-requisites?
BIO 162 Principles of Biology	4 cr	Fall or Spring	NO
ESS 220 Oceanography	3 cr	Fall Only	ESS 110/210 or any Chemistry
Foundations of Marine Science Courses (select 2)	**6 Credits**		
ESS 212 – Historical Geology	3 cr	Spring Only	ESS 110/210
ESS 190 – Selected Topics	3 cr	Summer (primarily)	NO
ESS 340 – Marine Geology*	3 cr	Summer	ESS 110/210
BIO 190 – Selected Topics	3 cr	On occasion	By advisement
BIO 205 – Marine Biology*	3 cr	Summer	BIO 162
BIO 245 – Marine Ecology*	3 cr	Summer	BIO 162
Advanced Marine Geoscience / Marine Biology Courses (select 1)	**3 Credits**		
GEO 332 – Field Methods in Oceanography*	3 cr	BIO 401 – Coral Reef Ecology*	3 cr
GEO 336 – Coastal Geomorphology*	3 cr	BIO 402 – Marine Evolution & Ecology*	3 cr
GEO 360 – Internship (by advisement)	3 cr	BIO 413 – Marine Ichthyology*	3 cr
GEO 450 – Regional Geography / Geology Field Study	3 cr	BIO 417 – Coastal Herpetology*	3 cr
ESS 397- Intro to Research (by advis)	3 cr	BIO XXX – Marine Mammals*	3 cr
ESS 404 – Applied Meteorology & Climatology – or GEO 203 Climatology	3 cr	BIO XXX – Marine Botany*	3 cr
ESS 410 – Sedimentary Geology & Paleoenv.	3 cr	BIO XXX – Marine Ichthyology*	3 cr
ESS 490 – Special Topics (by advis.)	3 cr	BIO 442 – Aquatic Ecology	3 cr
BIO 315 – Marine Invertebrates*	3 cr	BIO 444 – Conservation Biol*	3 cr
BIO 393 – Special Topics (by advis)	3 cr	BIO 462 – Invertebrate Zoo.	3 cr
BIO 391 or 392 – Internship (by advis)	3 cr	BIO 463 – Vertebrate Zoo.	3 cr
BIO 397/8 – Intro. to Research (by advis)	3 cr		
Marine Science Capstone (select 1)	**3 Credits**		
Option A: Course-based capstone – ESS 451 or GEO 450 or BIO 401 or BIO 547 or by advis.			3 cr
Option B: Research-based capstone – ESS 397 OR ESS 475 OR BIO 397 OR BIO 398			3 cr
Option A: Internship-based capstone – GEO 360 OR BIO 391 OR BIO 392			3 cr

Special thanks to our partner:

Chincoteague Bay Field Station of the Marine Science Consortium