

MEMORANDUM

TO: Fort Wayne Senate
FROM: Shannon Johnson, Chair
Curriculum Review Subcommittee
DATE: February 9, 2023
SUBJ: Marine Biology Concentration

The Curriculum Review Subcommittee approved on February 9, 2023 the attached documents regarding the Marine Biology Concentration
The committee finds that the proposed program requires no Senate review.

Shannon Johnson, MLS
Chair, Curriculum Review Subcommittee
Walter E. Helmke Library

Approving:
Lee Roberts
Behin Elahi
Teri Hogg
Xiaoguang Tian
Shannon Johnson

Not Approving:

Abstain:

Absent:
Laurel Campbell

Degree/Certificate/Major/Minor/Concentration Cover Sheet

Date:

Institution: Purdue

Campus: Fort Wayne

School or College:

Department:

Location: 80% or more online: Yes No

County:

Type:

Program name:

Graduate/Undergraduate:

Degree Code:

Brief Description:

Rationale for new or terminated program:

CIP Code:

Name of Person who Submitted Proposal:

Contact Information (phone or email):



Undergraduate Academic Program Memo

Date: 10/21/22

From: Ben Dattilo

To: Terri Swim

Re: Marine Biology Concentration

Brief description of the program:

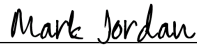


The Marine Biology concentration includes a core of general marine biology courses with a range of electives that reflect the diversity of subdisciplines within marine biology

Brief rationale for program request:

We have a steady and constant demand for our Marine Biology related course and now have an Academic Center of Excellence in Marine Conservation and Biology housed in the Biology Department. This area of concentration would serve Biology as well as EAPS students who plan to further their education in marine biology or oceanography and apply their BS degree in Biology towards a multitude of different directions including applying to graduate school or seeking employment. Furthermore, this program will equip our students with the field and wet lab experiences and knowledge that is crucial to many of the jobs in Marine Biology, Climatology, Environmental Science, Conservation, and Oceanography.

CIP Code: 26.0101

For completion by Office of Academic Affairs

| | |
|--|-----------|
| <small>DocuSigned by:</small>  <small>428B162D4EE74D7...</small> <i>Department Chair Signature</i> | 11/7/2022 |
| <small>DocuSigned by:</small>  <small>4017A582972D4AC...</small> <i>School Dean Signature</i> | 11/7/2022 |
| <small>DocuSigned by:</small>  <small>27109142004745C...</small> <i>Vice Chancellor for Academic Affairs Signature</i> | 11/7/2022 |

PLEASE NOTE: The Office of Academic Affairs will collect electronic signatures from the Chair, Dean, and Vice Chancellor for Academic Affairs after the form has been filled out and submitted to the Associate Vice Chancellor for Academic Programs with the rest of the program proposal.

- I. Name of proposed major, or concentration

Marine Biology Concentration

- II. Title of degree to be conferred

Bachelor of Science in Biology

- III. Field of study, department, and college involved

Biological Sciences, Department of Biological Sciences, College of Science

- IV. Objectives of the proposed major or concentration

Upon completion of the B.S. in Biology, students will demonstrate:

a level of competency for understanding core principles of evolution, organismal diversity, ecology, biological structure, biological function, molecular biology, and genetics.

the ability to locate and critically evaluate scientific information to help develop relevant questions and hypotheses, interpret the results of investigation, and synthesize and apply new and existing knowledge.

the ability to design studies to test biological hypotheses using laboratory, field, or computational methods that meet professional ethical standards.

the ability to effectively communicate the results of scientific research verbally and in writing.

the ability to learn independently, analyze data, interpret results, synthesize information, and to critically evaluate the significance of research results and new knowledge.

an awareness of the relevance of biological knowledge to human health and welfare in local, national and international communities

When students complete the Marine Biology concentration, they will also demonstrate:

a particular knowledge of the marine environment, marine life and ecology, and the conservation of marine life.

- V. Proposed Date of Initiation

Fall 2023

- VI. Describe the relationship of the proposed major or concentration to the mission of the campus or the department

The concentration in Marine Biology supports the campus mission and department statements by “cultivating learning [and] discovery” and providing “a diverse array of courses for majors,” respectively. Specifically, this concentration adds to the diversity of biological specializations, allowing us to address current knowledge in this branch of the life sciences. In

addition, students can become involved in a thriving marine biology research program which enhances their career and graduate studies opportunities (department statements).

Reference department statements

The Department of Biology is committed to offering high quality undergraduate and graduate educational opportunities that foster current knowledge and methodology in the life sciences. The Department of Biology provides a diverse array of courses for majors and for the general student body of the University. The faculty work diligently to develop in students biological knowledge and important skills for critical thinking, analytical reasoning, and effective communication. They engage students in original research, and encourage free and open inquiry. The Bachelor's and Master's degrees provide students with the education and training needed to enhance their career opportunities, or to pursue further graduate studies. Faculty engage in and publish on original research and other creative endeavors, and serve as a resource of expertise in the biological sciences for local and regional communities.

VII. Describe any relationship to existing programs within the campus

The Marine Biology Concentration is a natural outgrowth of our new Academic Center of Excellence in Marine Conservation and Biology housed in the Department of Biological Sciences. The center is, in turn, an outgrowth of Frank Paladino's longstanding, ongoing, and globally recognized work with engaging a multitude of graduate students in the study of marine conservation.

This program is a well-known and high profile program with generations of successful MS students in conservation. The exposure to high-profile conservation efforts helps make connections in conservation biology whether in a marine or non-marine setting; and leads to more successful employment.

VIII. Describe any cooperative endeavors explored and/or intended with other institutions or organizations

The two marine biology courses have been taught at two different marine stations for decades: the Gerace Research Centre (College of the Bahamas) on San Salvador Island, Bahamas (which has hosted a Purdue Fort Wayne marine biology course since at least the 90s), and the Leatherback Trust, Playa Grande, Costa Rica, which has had a close association with Purdue Fort Wayne Biology since its inception and has hosted marine biology students for decades. Further cooperative arrangements are in the works with IVY Tech Biology, which conducts a field trip to Florida and utilizes facilities owned by Goshen College.

IX. Describe the need for the major or concentration

We have a steady and constant demand for our Marine Biology related courses, as the table below shows. This data represents an interest in the exotic and novel exciting marine environment (from the perspective of a typical PFW student), and these ecologically diverse environments on earth (objectively from anyone's point of view) spur engagement in learning the foundational principles of biology. This learning applies back to the home base: in the words of TS Elliot: *We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time.*

| Marine Biology Enrollments 2011-2022 | | | |
|---|-------------------------------|--------------------------|-----------------|
| Year | 43400 | 14000 | Combined |
| 2023 | 14 (Combined Costa Rica) | 1 (Combined Costa Rica) | 15 |
| 2022 | 18 (Costa Rica) | 0 | 18 |
| 2021 | 8 (Combined No Trip) | 2 (Combined No Trip) | 10 |
| 2020 | 8 | 1 | 9 |
| 2019 | 5 (Combined Costa Rica) | 15 (Combined Costa Rica) | 20 |
| 2018 | 2 (Combined Costa Rica) | 4 (Combined Costa Rica) | 6 |
| 2016 | 2 (Combined Costa Rica) | 16 (Combined Costa Rica) | 18 |
| 2015 | 10 (Bahamas + 9 GEOL 331/420) | 15 (Costa Rica) | 35 (44) |
| 2013 | 15 (Bahamas + 3 GEOL 331) | 13 (Costa Rica) | 28 (31) |
| 2011 | 20 (Bahamas) | 25 (Costa Rica) | 45 |

In addition to enrollments, new Marine Biology student club was established in the Fall of 2022. Attendance for this club is between 20 and 30 students. Most of these students also express interest in the Marine Biology concentration, and they mostly have been in the Evolution/Ecology concentration. It is likely that the new concentration will draw students from this established concentration but we also believe that this new concentration has the potential to attract some students to PFW.

However, it is important to understand that the Marine Biology Concentration does not make a student a marine biologist. It can serve as a springboard for further education and a career in marine conservation. Current and past students in the biology program are employed in a number of professions, both those that require further education, and those that can be done with a bachelor degree. In addition to graduate programs in conservation and marine biology, the concentration is excellent preparation for traditional graduate programs (pre-medicine, pre dental, and pre veterinary). It is also good for employment that does not require graduate degrees such as secondary education, medical laboratory technician, wildlife management, and environmental work.

- X. Describe the resources required over and above current levels to implement the proposed major or concentration*

The Marine Biology Concentration requires no resources over and above courses already offered in the Department of Biological Sciences

- XI. A Liaison Library Memo

Attached

XII. Proposed curriculum

The BS in Biology is a 120 credit degree that currently has three (3) concentrations. Each existing concentration range between 15 and 19 credits. The proposed concentration in Marine Biology is 22 credits and will consist of required courses and elective courses.

Required courses (10 cr):

BIOL 14000 Marine Biology (3)

EAPS 21000 Physical Oceanography (3)

BIOL 43400 Marine Community Ecology (3)

And either

BIOL 1400x Marine Biology Field Lab (1) OR BIOL 43401 Marine Community Ecology Field Lab (1)

Elective courses (12 cr):

This list is drawn from upper level Biology electives with relevance to the field of Marine Biology. List is annotated to explain how the course connects to the concentration topic.

BIOL 33500 - Animal Behavior, Cr. 3

Animal behavior is an important component of marine biology. Examples include whale "culture" and "language", the migration of sea turtles and whales, and the breeding of commercially important fishes.

BIOL 34500 - Vertebrate Biology, Cr. 4

Most vertebrates are marine, including sharks, many bony fishes, some reptiles, and some mammals. Vertebrates are a major part of the marine ecosystem, constitute a major portion of marine based food production for humans, and include some of the most iconic animals in the oceans.

BIOL 43700 – General Microbiology, Cr. 4

Marine microbiology is an important aspect of marine biology. Microbes are major producers, and of course are essential for nutrient cycling as they are on land.

BIOL 44500 - Aquatic Biology, Cr. 3

Aquatic biology is largely focused on fresh water systems. There is significant similarity between marine and freshwater environments in physical, chemical, and biological characteristics. Furthermore, the boundary between the freshwater and saltwater systems is complex and ecologically critical, for example as nutrient sources for the oceans, and as "nurseries" for many species that spend their adult life in more purely marine environments.

BIOL 50200 - Conservation Biology, Cr. 3

BIOL 50401 – Mammalogy, Cr. 3

Some of the most iconic critters in the sea are mammals: Whales, seals, sea lions, manatees and sea otters. Marine mammalogy is definitely a thing.

BIOL 50500 - Biology of Invertebrate Animals, Cr. 3

All invertebrate phyla of animals have marine representatives. Many are mostly marine, some are exclusively marine.

BIOL 52000 – Contemporary Parasitology, Cr. 3

If we go too far into the subject of marine parasitology, you might not want to eat sushi again. Do you really want to go there? Take this class. Parasites are everywhere. Some marine parasites are super amazing AND super gross which makes them cool.

BIOL 53901 – Microbiome, Cr. 3

Microbiomes, like the one in the human gut, are associated with a wide variety of animals in a wide variety of environments. One marine microbiome that has been studied extensively is the variety of microbiomes found in sponges. That is just one.

BIOL 54110 – Invasion Biology, Cr. 3

There are marine invasives that have major ecological and economic impacts. This is an important part of marine conservation.

BIOL 54210 – Biometry, Cr. 3

Statistical analysis of biological data is widely applied in marine biology, and the techniques are overlapping

BIOL 54300 - Population Ecology, Cr. 3

Population ecology is critical to the management of marine species for both conservation and fisheries management

BIOL 55600 - Physiology I, Cr. 3

The study of physiology can be applied to any organism. All living things “function”. The physiology of marine organisms is particularly interesting and it is an important area of focus at PFW.

BIOL 55900 – Endocrinology, Cr. 3

Like physiology, marine animals also have endocrine systems, and the study of the endocrinology of species for conservation or for commercial management is a viable path

BIOL 58000 – Evolution, Cr. 3

Evolution is a universal trait of life. Furthermore the oceans play an important part in the evolutionary history of all life.

BIOL 58200 – Ecotoxicology, Cr. 3

Human-generated pollutants in the ocean and “natural” red tide: both fall under the category of “ecotoxicology”. Marine ecotoxicology is pretty critical.

BIOL 58610 - Topics in Behavior & Ecology, Cr. 3

Variable title course, can take when applicable to marine biology.

FNR 50500 – Molecular Ecology and Evolution, Cr. 3

This can be applied to marine organisms and is particularly useful for marine conservation and fisheries management

FNR 52300 – Aquaculture, Cr. 3

Aquaculture is an increasingly important method applied to the use of marine organisms for food.

Liaison Librarian Memo

Date:

From:

To:

Re:

Describe availability of library resources to support proposed new program:

Comments:



11/2/22

Liaison Librarian Signature

Date