UMBC UGC Instructions for New Course Request Form (revised 4/2016)

Course number & title: Enter the number and title of the course at the top of the page. Contact the Registrar's Office to confirm that the desired course number is available.

Date submitted: The date that the form will be submitted to the UGC.

Effective date: The semester the new course is in effect, if approved.

Contact information: Provide the contact information of the Chair or UPD of the department or program housing the course. If the course is not housed in a department or program, then provide the same information for the head of the appropriate academic unit. (See UGC Procedures) If another faculty member should also be contacted for questions about the request and be notified about UGC actions on the request, include that person's contact information on the second line.

Course number: For cross-listed courses, provide all the numbers for the new course.

Transcript title: Limited to 30 characters, including spaces.

Recommended Course Preparation: ***Please note that all 300 and 400 level courses should have either recommended course preparation(s) or prerequisite(s) and that 100 or 200 level courses may have them.***
Here fill in what previous course(s) a student should have taken to succeed in the course. These recommendations will NOT be enforced by the registration system. Please explain your choices in the "rationale" (discussed below).

Prerequisite: ***Please note that all 300 and 400 level courses should have either recommended course preparation(s) or prerequisite(s)*** Here fill in course(s) students need to have taken before they enroll in this course. These prerequisites will be enforced through the registration system. Please explain your choices in the "rationale" (discussed below).

NOTE: Please use the words "AND" and "OR", along with parentheses as appropriate, in the lists of prerequisites and recommended preparation so that the requirements specified will be interpreted unambiguously.

NOTE: Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.

# of credits: To determine the appropriate number of credits to assign to a course please refer to the UMBC Credit Hour Policy which articulates the standards for assignment and application of credit hours to all courses and programs of study at UMBC regardless of degree level, teaching and learning formats, and mode of instruction.

Maximum total credits: This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.

Grading method(s): Please review the grading methods document (this link can be found on the UGC forms page) before selecting a grading option. Please do not select all three grading options by default.

Proposed catalog description: Provide the exact wording of the course description as it will appear in the next undergraduate catalog. Course proposals should be a) no longer than 75 words, b) stated in declarative sentences in language accessible to students, and c) avoid reference to specific details that may not always pertain (e.g., dates, events, etc.). Course descriptions should not repeat information about prerequisites (which are always listed alongside the course description)."

Rationale: Please explain the following:
a) Why is there a need for this course at this time?
b) How often is the course likely to be taught?
c) How does this course fit into your department's curriculum?
d) What primary student population will the course serve?
e) Why is the course offered at the level (ie. 100, 200, 300, or 400 level) chosen?
f) Explain the appropriateness of the recommended course preparation(s) and prerequisite(s).
g) Explain the reasoning behind the P/F or regular grading method.
h) Provide a justification for the repeatability of the course.

Cross-listed courses: Requests to create cross-listed courses must be accompanied by letters of support via email from all involved department chairs. Proposals for new courses or the addition of a cross-listing to an existing course must include as a part of the rationale the specific reason why cross-listing is appropriate. Email from all involved department chairs is also required when cross-listing is removed and when a cross-listed course is discontinued. Please note that Special
Topics courses cannot be cross-listed.

Course Outline: Provide a syllabus with main topics and a weekly assignment schedule which includes complete citations for readings with page numbers as appropriate. Explain how students' knowledge and skills will be assessed.
Note: the UGC form is a Microsoft Word form. You should be able to enter most of the information by tabbing through the fields. The document is protected. In the rare case that you need to unprotect the document, use the password 'ugcform'. Beware that you will lose all the data entered in the form's fields if you unlock and lock the document.

UMBC UGC New Course Request: MBIO 478 Marine and Environmental Biotechnology

Date Submitted: October 15, 2019 Proposed Effective Date: Spring 2020

	Name	Email	Phone	Dept
Dept Chair or UPD	Yonathan Zohar (chair)	zohar@umbc.edu	410-234-8803	Marine Biotechnology
Other Contact	Colleen Burge/J. Sook Chung	colleenb@umbc.edu; chung@umces.edu	410-234-8834	Marine Biotechnology

COURSE INFORMATION:

Course Number(s)	MBIO 478
Formal Title	Marine and Environmental Biotechnology
Transcript Title (≤30c)	Mar and Env Biotechnology
Recommended Course Preparation	N/A
Prerequisite **NOTE:** Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.	BIOL 141, BIOL 142, CHEM 101, CHEM 102, CHEM 102L, BIO 300L and BIOL 302. All prerequisites must be completed with a grade of 'C' or better.
# of Credits Must adhere to the UMBC Credit Hour Policy	3
Repeatable for additional credit?	___Yes X No
Max. Total Credits	3 This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.
Grading Method(s)	X Reg (A-F) ___ Audit ___ Pass-Fail

PROPOSED CATALOG DESCRIPTION (Approximately 75 words in length. Please use full sentences.**):**

This course covers the use of molecular techniques to address questions in marine and environmental sciences, toxicology and sustainability, as well their use in discovering and developing useful products from marine systems. Students will discuss current environmental challenges and will address these issues using molecular tools and management and policy. Representative topics include: bioremediation, discovery of bioproducts from marine organisms, sustainable aquaculture, development of biofuels, and the role of marine microbes in global carbon cycling.

RATIONALE FOR NEW COURSE:

MBIO 478 will provide an elective course for students interested in marine biology. Students will learn to apply biotechnology in marine and environmental management and how to translate finding from scientific research into solving environmental issues and start-up businesses. The course will be taught once a year or ad hoc as we gauge interest; this course is cross-listed as MEES 698T. This course will be taught in the Department of Marine Biotechnology, under the new acronym, MBIO. This course pairs with the recently approved laboratory course "Sustainable Aquaculture Laboratory" (MBIO 361L) as it broadens understanding of use of biotechnology in both aquaculture and natural systems. Similar to the MBIO 361L, this course explores areas of strength within the department. We expect the course to serve as an elective for students majoring in Biology, in particular students who are interested in marine or aquatic biology. The material covered is advanced and relies on the student to have experience in laboratory classes as well as foundational principles (BIO 141, BIO 142). The course is designed with the standard A-F grading scale, with appropriate emphasis on exams, homework, a proposal, and a presentation.

MBIO 478: Marine and Environmental Biotechnology
Course Syllabus

Instructors:

Dr. Colleen Burge
Department: Marine Biotechnology
Institute of Marine and Environmental Technology (IMET)
Phone: 410-234-8834
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Dr. Sook Chung
University of Maryland Center for Environmental Sciences
Institute of Marine and Environmental Technology (IMET)
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Time and Locations:

IVN room at UMBC (Burge) and at IMET (Chung); cross-listed as MEES 498T/698T at University of Maryland College Park (Chung)
MW (80 minutes)

Course description: This course covers the use of molecular techniques to address questions in marine and environmental sciences, toxicology and sustainability, as well their use in discovering and developing useful products from marine systems. Students will discuss current environmental challenges and will address these issues using molecular tools and management and policy. Students will study biodiversity, bioremediation, food chains, discovery of drugs and enzymes from marine microbes and macroorganisms, sustainable aquaculture (and use of genetically modified organisms, GMO), development of biofuels, the role of marine microbes in global carbon cycling, and genomics of marine organisms.

Course objectives: In this course, you will learn to implement and interpret many marine biotechnology techniques used in research and environmental management. By the end of this course you will be able to: 1) understand the principles and theory behind marine biotechnology, 2) identify the most useful techniques involved in analyses in marine biotechnology, and 3) translate knowledge gained in marine biotechnology to writing an original research proposal.

Prerequisites: You must have completed BIOL 141, BIOL 142, CHEM 101, CHEM 102, CHEM 102, BIOL 300L, and BIOL 302 or by permission of instructor. All prerequisites must be completed with a grade of 'C' or better.

Week	Unit	Topic	Reading
1	Introduction	Environmental Policy & Management	Long et al 2015
		Major Issues Affecting Marine Systems*	Doney et al. 2012

2		Bioflims	Belas, 2014
	Energy & Biodiversity	Marine biofouling	
3		Thermophiles and Biotechnology	
		Halophiles and Biotechnology	Dasarma et al 2013
4		Microbial Diversity and Carbon Sequestration	
		Aquatic Photosynthesis and Algal Bio-Refinery	Radakovits et al 2010
5		Aquatic Biology and Biotechnology	
		Exam 1	
6	Food	Seafood Safety and Food Biosecurity	
		Fish Molecular Reproductive Endocrinology: Spawning in captivity	
7		Sterile Fish Technology	Wong & Zohar 2015
		Genetic Modification: GMOs	
8		Developing better fish diets	Cao et al 2015
		Environmentally Sustainable Aquaculture	Schreier et al 2010
9		Current Status of Shellfish Aquaculture	
		Disease and Detection	Lafferty et al 2015
10		Disease and Protection	Dadar et al 2017
		Exam 2	
11	Water	Clean Water and Waste Water Treatment	
		Ballast Water Treatment	
12		HAB-Toxins and solutions	Paerl et al 2018
		Bioremediation 1	Ghosh et al 2011
13		Bioremediation 2	Sowers & May 2013
	Natural Products	Symbiosis in Marine Organisms	Wong 2015
14		Bioproducts from Marine Organisms/Marine Pharmaceuticals 1	
		Bioproducts from Marine Organisms/Marine Pharmaceuticals 2	Shpilka et al 2015
15		Bench to Business	

*Discussion

Required Materials:
Reading: as suggested in the syllabus and also the text book as a complementary source of information:

Grand Challenges in Marine Biotechnology; Editors: Rampelotto, P & Tricone, A.
https://www.springer.com/us/book/9783319690742?gclid=EAIaIQobChMIuJyEnZ7m3QIVllqGCh0j2AcAEAQYAyABEgL6KPD_BwE

Assessment

Assessment	% Final Grade
Homework	10%
Participation	10%
Exam 1	20%
Exam 2	20%
Proposal/Presentation	40%

Lecture - The lecture will cover key principles and ideas from the reading. It will not substitute for the students reading the paper, as the lecture will be broad and may incorporate information from other journal papers.

Homework - (10% of final grade) The homework will be based off of the reading, and will measure students' comprehension of the material. Homework will be due at the start of each class period where the corresponding paper will be discussed, which ensures that the students read the paper and are prepared for the day's discussion. The homework will assess their critical reading and writing ability in addition to their comprehension of the concepts presented in the reading. An answer key/rubric will be made available for homework.

Exams - (each worth 20% of final grade) Two exams will be given during the course. Exams will be given during Week 5 and Week 10. Exams will not to be cumulative and will focus on materials presented/discussed in class since the last exam. Exams are meant to test the student's synthesis of concepts from diverse sources (readings, lecture, discussion). The exams will be short written answer format. An answer key/rubric will be made available for exams.

Proposal/Presentation - (40% of final grade) Students will write an NSF Graduate Research Proposal (specifically the Graduate Research Plan Statement) for a research topic of choice relating to the course following guidelines provided by NSF (https://www.nsf.gov/pubs/2019/nsf19590/nsf19590.pdf). The proposal will be due in the last week of class (TBD). During the final exam period, each student will give an approximately 5-minute proposal pitch.

Please consider the following guide/rubric in writing your proposal:

Formatting (2 points)

- Please follow formatting requested by NSF

Introduction/Background (5 points)

- Is context provided for the study? Why is the study important?
- Any prior data collected by the student should be presented here (but will not be graded).

Objectives/Hypotheses (5 points)

- Are the hypotheses stated clearly and well-justified?

Experimental Approach (5 points)

- What is your basic experimental design? What basic methods will you use? The experimental approach should be written for non-experts in the field.
- Results interpretation: please interpret potential results and how they relate to the hypotheses.
- Study location/resources: if field research will be used, include a study site.

NSF Merit Criterium (10 points) *: see NSF's guide

- Intellectual Merit: encompasses the potential to advance knowledge
    - Intellectual merit includes study novelty, creativity, and interdisciplinarity
- Broader Impacts: encompasses the potential to benefit society and contribute to the achievement of specific, desired outcomes.
    - Broader impacts include potential outreach or education

References (3 points)

- Please include references as appropriate and take care to appropriately cite references and avoid plagiarism in text

*As a note, these are the primary criterion that NSF proposals are judged by.

Please consider the following guide/rubric in writing your presentation:

Each student will be required to give a 5-minute powerpoint presentation/pitch during the final exam period. The presentation format should follow the format of the proposal and include: Introduction/Background; Objectives/Hypotheses; Experimental Approach; Intellectual Merit Broader Impacts; References