

# FLORIDA ATLANTIC UNIVERSITY™

## Graduate Programs—NEW COURSE PROPOSAL<sup>1</sup>

UGPC APPROVAL \_\_\_\_\_  
 UFS APPROVAL \_\_\_\_\_  
 SCNS SUBMITTAL \_\_\_\_\_  
 CONFIRMED \_\_\_\_\_  
 BANNER POSTED \_\_\_\_\_  
 CATALOG \_\_\_\_\_

DEPARTMENT: BIOLOGICAL SCIENCES

COLLEGE: COLLEGE OF SCIENCE

**RECOMMENDED COURSE IDENTIFICATION:**

PREFIX   BSC   COURSE NUMBER   6346   LAB CODE (L or C)       

(TO OBTAIN A COURSE NUMBER, CONTACT [MJENNING@FAU.EDU](mailto:MJENNING@FAU.EDU))

COMPLETE COURSE TITLE: **Introduction to Marine Biotechnology**

**EFFECTIVE DATE**

(first term course will be offered)  
**FALL 2014**

CREDITS<sup>2</sup>: **3**

TEXTBOOK INFORMATION: There is no required textbook. Reading assignments related to the topics under discussion will be drawn from the current scientific literature and will form the basis of homework assignments. A listing of these assignments will be provided by each Instructor.

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR   X   SATISFACTORY/UNSATISFACTORY       

**COURSE DESCRIPTION, NO MORE THAN THREE LINES:**

An introduction to the principles and practices of Marine Biotechnology & its commercial applications: (1) the cultivation and genetic manipulation of marine microorganisms, invertebrates and vertebrates; (2) disease impacts in aquaculture systems; (3) the discovery and production of commercially relevant products; and (4) policy related to the commercial development of marine resources.

PREREQUISITES\*: Graduate Status

COREQUISITES\*:

REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)\*:

\* PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE: PH.D. IN THE RELEVANT FIELD

Faculty contact, email and complete phone number:  
 Dr. Peter McCarthy  
[pmccart5@hboi.fau.edu](mailto:pmccart5@hboi.fau.edu)  
 (772) 242-2632

Please consult and list departments that might be affected by the new course and attach comments.<sup>3</sup>

**Approved by:**

Department Chair: *[Signature]*  
 College Curriculum Chair: *[Signature]*  
 College Dean: *[Signature]*  
 UGPC Chair: *[Signature]*  
 Graduate College Dean: *[Signature]*  
 UFS President: \_\_\_\_\_  
 Provost: \_\_\_\_\_

**Date:**

3.10.14  
02.12.14  
3/13/14  
3/24/14  
3/24/14  
 \_\_\_\_\_  
 \_\_\_\_\_

1. Syllabus must be attached; see guidelines for requirements: [www.fau.edu/provost/files/course\\_syllabus.2011.pdf](http://www.fau.edu/provost/files/course_syllabus.2011.pdf)
2. Review Provost Memorandum: **Definition of a Credit Hour** [www.fau.edu/provost/files/Definition\\_Credit\\_Hour\\_Memo\\_2012.pdf](http://www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf)
3. Consent from affected departments (attach if necessary)

Email this form and syllabus to [UGPC@fau.edu](mailto:UGPC@fau.edu) one week before the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

## Course Syllabus for Introduction to Marine Biotechnology

### 1. Course title/number, number of credit hours

**BSC 6346: Introduction to Marine Biotechnology, 3 credit hours**

### 2. Course prerequisites

a. Graduate Status

### 3. Course logistics

a. Fall 2014

b. Notation if online course – N/A

c. Class location and time (if classroom-based course) – To be determined

### 4. Instructor contact information

Lead Instructor:

Dr. Peter McCarthy (772-242-2632) pmccart5@hboi.fau.edu,  
FAU Marine Science Building Room #147

Dr. Amy Wright	(772-242-2459)	awrigh33@hboi.fau.edu
Dr Esther Guzman	(772-242-2452)	eguzman9@hboi.fau.edu
Dr. Susan Laramore	(772-242-2525)	slaramo1@hboi.fau.edu
Dr. John Scarpa	(772-242-2404)	jscarpa1@hboi.fau.edu
Dr. Paul Wills	(772-242-2454)	pwills2@hboi.fau.edu
Dr. Shirley Pomponi	(772-242-2449)	spomponi@hboi.fau.edu

Instructor Office Hours:

McCarthy: Tues 9-10am, Thurs 9-10am and by appointment

All other instructors by appointment

### 5. TA contact information (if applicable)

N/A

### 6. Course description

An introduction to the principles and practices of Marine Biotechnology and its commercial applications. The course focuses on: (1) the cultivation and genetic manipulation of marine microorganisms, invertebrates and vertebrates; (2) disease impacts in aquaculture systems; (3) the discovery and production of commercially relevant products; and (4) policy related to the commercial development of marine resources.

### 7. Course objectives/student learning outcomes

This course aims to introduce students to the concepts of Marine Biotechnology

Students will understand the commercialization of marine products, the issues involved in identification of potential products, the techniques used in commercial production and regulatory control.

## 8. Course evaluation method

There will be graded homework assignments accounting for 20% of the student's cumulative performance, a midterm exam, accounting for 40% of the student's cumulative performance, and a final exam that accounts for 40% of the cumulative performance. The overall grade in the course is derived from the cumulative performance according to the following table.

## 9. Course grading scale (optional)

Cumulative Performance	Grade
>94%	A
>90% - 94%	A-
>87% - 90%	B+
>83% - 87%	B
>80% - 83%	B-
>75% - 80%	C+
>65% - 75%	C
>60% - 65%	C-
>57% - 60%	D+
>53% - 57%	D
>50% - 53%	D-
<50%	F

**10. Attendance Policy:** Attendance for exams and lectures is required. If a student cannot attend an exam on time due to circumstances beyond their control then the instructor may assign appropriate make-up work. Students will not be penalized for absences due to participation in University-approved activities, including athletic or scholastics teams, musical and theatrical performances, and debate activities. These students will be allowed to make up missed work without any reduction in the student's final course grade. Reasonable accommodation will also be made for students participating in a religious observance.

**11. Incomplete Grade:** A grade of Incomplete ("I") is reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances. A grade of "I" will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student must show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate. As per university policy, an incomplete grade will only be given to a student who fulfills all of the following criteria:

- a. misses multiple exams or the final examination due to a legitimately documented emergency as defined by the FAU Academic Policies and Regulations:  
[http://www.fau.edu/academic/registrar/09-10\\_catalog/academics.html](http://www.fau.edu/academic/registrar/09-10_catalog/academics.html)
- b. has a grade of C or better
- c. submits evidence of the emergency and signs an incomplete agreement.

## 12. Special course requirements (if applicable): N/A

**13. Classroom Etiquette Policy:** University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions." You may be asked to leave the class session for noncompliance.

**14. Student Honor Policy:** Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 at [http://www.fau.edu/ctl/4.001\\_Code\\_of\\_Academic\\_Integrity.pdf](http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf)

**Cheating is a serious offense. If you are caught cheating, you will receive an F in the course. In addition, you will be referred to the Dean of Student Services and charged with an academic crime. Test procedures and rules will be stated at the beginning of each exam.**

**15. Disabilities Policy:** In compliance with the Americans with Disabilities Act (ADA), students who require special accommodation due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) -- in Boca Raton, SU 133 (561-297-3880); in Davie, MOD 1 (954-236-1222); in Jupiter, SR 117 (561-799-8585) and follow all OSD procedures.

## 16. Required texts/readings

There is no required textbook.

Reading assignments related to the topics under discussion will be drawn from the current scientific literature and will form the basis of homework assignments. A listing of these assignments will be provided by each Instructor. Examples follow:

Akinbowale, O.L., H. Peng and M.D. Barton. *Diversity of tetracycline resistance genes in bacteria from aquaculture sources in Australia*. J. App. Microbiol. 103:2016-2025 (2007).

Beaz-Hidalgo, R., S. Balboa, J.L. Romalde and M.J. Figueras. *Diversity and pathogenicity of Vibrio species in cultured bivalve molluscs*. Env. Microbiol. Reports, 2:34-43 (2-10).

Freitas, A.C., D. Rodrigues, T.A.P. Rocha-Santos, A.M.P. Gomes and A.C. Duarte. *Marine biotechnology advances towards applications in new functional foods*. Biotechnology Advances 30:1506-1515 (2012).

Gjedrem, T., N. Robinson, and M. Rye. *The importance of selective breeding in aquaculture to meet future demands for animal protein: a review*. Aquaculture 350-353:117-129 (2012).

Grasela, J.J., S.A. Pomponi, B. Rinkevich and J. Grima. *Efforts to develop a cultured sponge cell line: revisiting an intractable problem*. In Vitro Cell. Dev. Biol. – Animal 48:12-20 (2012).

- Hentschel, U., J. Piel, S. Degnan, M. Taylor *Genomic insights into the marine sponge microbiome* Nat. Rev. Microbiol. 10:641-654 (2012).
- Ishii, S., T. Kanako and K. Senoo. Single-cell analysis and isolation for microbiology and biotechnology: methods and applications. *Appl. Microbiol. Biotechnol.* 86:1281-1292 (2010).
- Lasken, R.S., *Genomic sequencing of uncultured microorganisms from single cells.* Nature Reviews Microbiol. 10:631-640 (2012).
- Leal, M.C., J. Puga, J. Serodio, N.C.M. Gomes, and R. Calado. *Trends in the discovery of new marine natural products from invertebrates over the last two decades – Where and what are we bioprospecting?* PLoS one 7(1): e30580. doi:10.1371/journal.pone.0030580 (2012).
- Leal, M.C., R. Calado, C. Sheridan, A. Alimonti and R. Osinga. *Coral aquaculture to support drug discovery.* Trends in Biotechnology 31:555-561 (2013).
- McAndrew B., and J. Napier. *Application of genetics and genomics to aquaculture development: current and future directions.* Journal of Agricultural Science 149:143-151 (2011).
- Molinski T; Dalisay D., Lievens S. and Saludes J *Drug development from marine natural products* Nature Reviews Drug Discovery 8, 69-85 (January 2009) | doi:10.1038/nrd2487
- Murray, P.M., et al. *Sustainable production of biologically active molecules of marine based origin.* New Biotechnology 30:839-850 (2013)
- Page, M.J., P. Northcote, V.L. Webb, S. Mackey and S.J. Handley. *Aquaculture trials for the production of biologically active metabolites in the New Zealand sponge Mycale hentscheli (Demospongia: Poecilosclerida).* Aquaculture 250:256-269 (2005).
- Peraza-Gomez, V., A. Luna-Gonzalez, A.I. Campa-Cordova, M. Lopez-Meyer, J. A. Fierro-Coronado and P. Alvarez-Ruiz. *Probiotic microorganisms and antiviral plants reduce mortality and prevalence of WSSV in shrimp (Litopenaeus vannamei) cultured under laboratory conditions.* Aquaculture Research 40: 1481-1489 (2009).
- Piferrer, F., A. Beaumont, J. Falguiere, M. Flajshans, P. Haffray, and L. Colombo. *Polyploid fish and shellfish: production, biology and applications to aquaculture for performance improvement and genetic containment.* Aquaculture 293:125-156 (2009).
- Ritchie, R.J., K. Guy and J.C. Phelp. *Policy to support marine biotechnology-based solutions to global challenges.* Trends Biotechnol. 31:128-131 (2013).
- Seo, S.W., J. Yang, B.E. Min, S. Jang, J.H. Lim, S.C. Kim, J.H. Jeong, and G.Y. Jung. *Synthetic Biology: Tools to design microbes for the production of chemicals and fuels.* Biotechnology Advances 31:811-817 (2013).
- Waters, A.L., R.T. Hill, A.R. Place and M.T. Hamann. *The expanding role of marine microbes in pharmaceutical development.* Curr. Opinion Biotech. 21 780-786 (2010).
- Wilson, M.C., J. Piel *Metagenomic Approaches for Exploiting Uncultivated Bacteria as Resource for Novel Biosynthetic Enzymology* Chem. Biol. 20:636-647 (2013).
- Xu, Y., R. D. Kersten, S.-J. Nam, L. Lu, A. M. Al-Suwailem, H. Zheng, W. Fenical, P. C. Dorrestein, B. S. Moore, and P.-Y. Qian, *Bacterial biosynthesis and maturation of the didemnin anticancer agents,* J. Am. Chem. Soc., 134:8625-8632 (2012).

## 17. Supplementary/recommended readings (optional)

## 18. Course topical outline

Week	Topic	Homework
1	Introduction to Biotechnology; The Tools of Biotechnology	Reading Assignment: Freitas et al (2012); Murray et al (2013)
2	Marine Microorganisms: Production and Genetic Manipulation	Reading Assignment: Ishii et al (2010)
3	Marine Invertebrates: Biology and Production	Reading Assignment: Page et al (2005); Leal et al (2013)
4	Marine Invertebrates: Genetic Manipulation and Cell Culture	Reading Assignment: Grasela et al
5	Marine Fin Fish: Production and Genetic Manipulation	Reading Assignment: McAndrew and Napier (2011); Piferrer et al (2009); Gjedrem et al (2012)
6	Disease Issues in Aquaculture Systems	Reading Assignment: Beaz-Hidalgo et al (2010); Peraza-Gomez et al (2009); Akinbowale et al (2007)
7	Exam I	
8	Secondary Metabolism in Marine Microorganisms; The Sponge Microbiome	Reading Assignment: Hentschel et al
9	Secondary Metabolism in Marine Invertebrates	Reading Assignment: Leal et al (2012)
10	Molecular Techniques in Drug Discovery	Reading Assignment: Lasken et al (2012)
11	Natural Products Discovery: anticancer agents; anti-infective agents	Reading Assignment: Waters et al (2010)
12	Commercial Development of Natural Products	Reading Assignment: Molinski et al
13	Biosynthesis: Genes to Drugs	Reading Assignment: Xu et al (2012); Wilson et al (2013)
14	Marine Organisms in White Biotechnology and Diagnostics	Reading Assignment: Seo et al (2013)
15	Public Policy: Genetically Modified Organisms; Natural Resources	Reading Assignment: Ritchie et al (2013)
16	Exam II	