FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department Marine Science and Oceanography

College Science

*(To obtain a course number, contact **erudolph@fau.edu**)*

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

Prefix OCB **Number** 6567	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code**	**Type of Course** Lecture	**Course Title** Marine Plankton Ecology and Physiology

Credits *(Review Provost Memorandum)*: 3

Effective Date *(TERM & YEAR)*: Fall 2018

Grading *(Select One Option)*: Regular (●) Sat/UnSat ( )

Course Description *(Syllabus must be attached; see Guidelines)*

Marine Plankton Ecology and Physiology will explore the ecological and physiological dynamics of the major plankton groups (phytoplankton and zooplankton) that form the base of oceanic food chains. While this course will focus on plankton from marine environments, some discussion of freshwater groups will be included.

Prerequisites	**Corequisites**	**Registration Controls** *(Major, College, Level)*
Graduate standing, OCE 6057 or permission of instructor		

Prerequisites, Corequisites and Registration Controls are enforced for all sections of course

Minimum qualifications needed to teach course:	**List textbook information in syllabus or here**
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)	
Faculty Contact/Email/Phone Dr. Jim Sullivan, jsullivan@fau.edu, 772-242-2404	**List/Attach comments from departments affected by new course**

Approved by	***Date***
Department Chair	3/5/18
College Curriculum Chair	3-8-18
College Dean	3-8-18
UGPC Chair	
UGC Chair	
Graduate College Dean	
UFS President	
Provost	

Email this form and syllabus to UGPC@fau.edu one week before the UGPC meeting.

Course Syllabus

Title: Marine Plankton Ecology and Physiology - OCB 6567, 3 credits

Prerequisites:
Required: Graduate standing, OCE 6057 or permission of instructor.

Lectures: course will be offered every Spring term, classes will be given once per week (time TBD).

Course Location: MC 209, Johnson Education Center, Harbor Branch Oceanographic Institute at Florida Atlantic University, Fort Pierce

Instructor:

Jim Sullivan, Ph.D.; Room 231, Lab II Building, HBOI-FAU
Phone: (772) 242-2404, E-mail: jsullivan@fau.edu

Office hours: Friday 11 a.m.; also available in the classroom 15 minutes before and after each class and by appointment

TA Contact Information: None

Course Description: Marine Plankton Ecology and Physiology will explore the ecological and physiological dynamics of the major plankton groups (phytoplankton and zooplankton) that form the base of oceanic food chains. While this course will focus on plankton from marine environments, some discussion of freshwater groups will be included.

Course Objectives/Student Learning Outcomes

This course aims to expose students to both the ecological and physiological dynamics of marine plankton groups. After completing this course, students should be able to:

a. Understand how the properties of different ecosystems affect the ecology and physiology of major plankton groups.
b. Be familiar with the composition and structure of major plankton groups.
c. Understand the underlying principles that drive plankton growth and community structure.
d. Understand the natural and anthropogenic environmental factors and processes that control the abundances and distributions of plankton groups in space and time.
e. Appreciate the major problems and challenges in studies of plankton ecology
f. Understand how climate change and other large scale environmental phenomena could affect plankton dynamics.
g. Understand the methods and techniques used to study plankton.

Course Evaluation Methods

Final grades will be determined by averaging together grades for four activities:

Short Class Tests (30 min., 2 each @ 50 points = 100 points)	25%
Mid-Term Exam (100 points)	25%
Final Exam (100 points)	25%
Student Project* (100 points)	25%

* The student project will consist of a short presentation and report to the class on a topic of interest related to the course content

Course Grading Scale

Percentage Score:	Grade:	Percentage Score:	Grade:
92% - 100%	A	72% - 77%	C
90% - 91%	A-	70% - 71%	C-
88% - 89%	B^+	68% - 69%	D^+
82% - 87%	B	62% - 67%	D
80% - 81%	B-	60% - 61%	D-
78% - 79%	C^+	0% - 59%	F

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:

1. 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
2. Has a grade of C or better
3. Submits evidence of the emergency and signs an incomplete agreement.

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.

Attendance Policy Statement:
Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University approved activities. Examples of University-approved

reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Disability Policy Statement: In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) — in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 117 (561-799-8585) — and follow all SAS procedures

Code of Academic Integrity Statement: Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty 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: http://www.fau.edu/ctl/4.001 Code of Academic_Integrity.pdf

Recommended Text/Readings

Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction.*

Mann, K.H. and Lazier, J.R., 2013. *Dynamics of marine ecosystems: biological-physical interactions in the oceans*. John Wiley & Sons.

Students will also be assigned selected readings from texts and/or peer-reviewed publications before lectures.

Supplementary/recommended Readings

Miller, C.B. and P.A. Wheeler. 2012. *Biological Oceanography*, 2nd edition, Wiley-Blackwell, New York.

Falkowski, P.G. and Raven, J.A., 2013. *Aquatic photosynthesis*. Princeton University Press.

Steidinger, K.A. and Walker, L.M., 1984. *Marine plankton life cycle strategies*. CRC Press.

Harris, G., 2012. *Phytoplankton ecology: structure, function and fluctuation*. Springer Science & Business Media.

Kirk, J.T., 2011. *Light and photosynthesis in aquatic ecosystems*. Third Edition. Cambridge university press.

Taylor F.J.R. 1987. *The Biology of Dinoflagellates*. Botanical Monographs 21.

Round, F.E., Crawford, R.M. and Mann, D.G., 1990. *Diatoms: biology and morphology of the genera*. Cambridge University Press.

Makoto, O., & Tsutomu, I., 1984. *Methods in marine zooplankton ecology*. Wiley, New York.

Course Topical Outline (subject to modification)

Note: PowerPoint presentations of class lectures will be provided as PDFs.

Lecture 1:

1. Course overview and introduction
2. Review of fundamental aspects of the marine environment (seawater, ocean basins, currents)
3. Review of fundamental aspects of marine ecology (habitats, light, nutrients, organisms)

   Reading:

   Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction*. Chapters 1 & 2.

Lecture 2:

1. Major phytoplankton species groups (taxonomy, form and function)
2. Photosynthesis/respiration and primary production

   Reading:

   Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction*. Chapter 3.

   Kirk, J.T. 2011. *Light and photosynthesis in aquatic ecosystems*. Third Edition. Chapters 8 & 9.

Lecture 3:

1. Phytoplankton nutrient uptake and growth dynamics
2. Phytoplankton bloom cycles (spatial and temporal processes)

   Reading:

   Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction*. Chapter 4.

Lecture 4:

1. Major zooplankton species groups (taxonomy, form and function)
2. **Quiz #1 (30 min)**

   Reading:

   Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction*. Chapter 5.

Lecture 5:

1. Zooplankton feeding strategies and growth dynamics

   Reading:

   Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction*. Chapter 7.

Lecture 6:

1. Microzooplankton, microbial loop and the relation to plankton dynamics

   Reading:

   Lalli, C.M. and T. R. Parsons. 1997. *Biological Oceanography: an introduction*. Chapter 8.

Calbet, A. (2008). The trophic roles of microzooplankton in marine systems. *ICES Journal of Marine Science, 65*(3), 325-331.

Lecture 7:

1. Introduction to ecosystem structure and plankton dynamics

Readings:

Mann, K.H. and Lazier, J.R., 2013. *Dynamics of marine ecosystems: biological-physical interactions in the oceans*. Chapter 3.

Mid-Term Exam (1-1/2 hrs.)

Lecture 8:

1. Coastal and open-ocean plankton dynamics
2. Benthic plankton dynamics

Readings:

Mann, K.H. and Lazier, J.R., 2013. *Dynamics of marine ecosystems: biological-physical interactions in the oceans*. Chapter 4 & 5.

Lecture 9:

1. Plankton evolution, adaptations, life cycles

Reading:

Sournia, A. (1982). Form and function in marine phytoplankton. Biol. Rev., 57, 347-394.

Fogg, G.E. (1991). Tansley Review No. 30. The Phytoplanktonic Ways of Life. New Phytologist, 118(2), 191-232

Lecture 10:

1. Critical topics I: The effects of climate change (ocean acidification, ocean warming, and ocean circulation) and marine pollution on plankton dynamics.
2. **Quiz #2 (30 min.)**

Reading:

Walther, G. R., Post, E., Convey, P., Menzel, A., Parmesan, C., Beebee, T. J. & Bairlein, F. (2002). Ecological responses to recent climate change. *Nature, 416*(6879), 389-395.

Derraik, J. G. (2002). The pollution of the marine environment by plastic debris: a review. *Marine pollution bulletin, 44*(9), 842-852.

Lecture 11:

1. Critical topics II: harmful algal blooms, harmful zooplankton blooms, etc.

Reading:

McManus, M. A., Kudela, R. M., Silver, M. W., Steward, G. F., Donaghay, P. L., & Sullivan, J. M. (2008). Cryptic blooms: Are thin layers the missing connection? *Estuaries and Coasts, 31*(2), 396-401.

Berdalet, E., McManus, M. A., Ross, O. N., Burchard, H., Chavez, F. P., Jaffe, I. R. Jenkinson, R.Kudela, I. Lips, U. Lips, A. Lucas, D. Rivas, M. C. Ruiz-de la Torre, J. Ryan, J. M. Sullivan & H. Yamazaki (2014). Understanding harmful algae in stratified systems: Review of progress and future directions. *Deep Sea Research Part II: Topical*

Studies in Oceanography, 101, 4-20.

Lecture 12:

1. Special topics: biophysical interactions and class suggestions
   Reading:
   Mann, K.H. and Lazier, J.R., 2013. *Dynamics of marine ecosystems: biological-physical interactions in the oceans*. Chapter 9 & 10.

Lecture 13:

1. Plankton data collection and methods
2. Instrumentation used in the study of plankton (including HBOI lab visit and equipment demonstrations)
   Reading:
   Review website for instrumentation: **http://www.whoi.edu/science/instruments/**

Lecture 14:

1. Student project presentations and class review

Final Exam TBD