FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—NEW COURSE PROPOSAL[1]

UGPC APPROVAL _____
UFS APPROVAL _____
SCNS SUBMITTAL _____
CONFIRMED _____
BANNER POSTED _____
CATALOG _____

DEPARTMENT: BIOLOGICAL SCIENCES

COLLEGE: COLLEGE OF SCIENCE

RECOMMENDED COURSE IDENTIFICATION:

PREFIX ____OCB____ COURSE NUMBER ____6673__ LAB CODE (L or C) _____

(TO OBTAIN A COURSE NUMBER, CONTACT MJENNING@FAU.EDU)

COMPLETE COURSE TITLE: **Data Processing and Modeling of Marine Systems**

EFFECTIVE DATE
(first term course will be offered)
SPRING 2015

CREDITS[2]: 3

TEXTBOOK INFORMATION: Data Analysis Methods in Physical Oceanography: Second and Revised Edition, Edition 2. W.J. Emery R.E. Thomson - April 3, 2001. Elsevier – Publisher - Modeling Methods for Marine Science, David M. Glover William J. Jenkins Scott C. Doney - June 2, 2011 - Cambridge University Press – Publisher - Introduction to the Modelling of Marine Ecosystems: (with MATLAB programs on accompanying CD-ROM) W. Fennel T. Neumann - August 24, 2004

GRADING *(SELECT ONLY ONE GRADING OPTION)*: REGULAR ____X__ SATISFACTORY/UNSATISFACTORY _____

COURSE DESCRIPTION, NO MORE THAN THREE LINES: This course provides tools, methods and numerical recipes to study ocean processes from in-situ observations and ocean numerical models. It also provides an overview of current ocean models, bio-physical and bio-geochemical models, and their applications.

PREREQUISITES *: MSC I & MSC II	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:
Laurent Cherubin and Mingshun Jiang
lcherubin@fau.edu, jiangm@fau.edu
(772) 2242-2314 (Cherubin), *(772) 242-2254 (Jiang)*

Please consult and list departments that might be affected by the new course and attach comments.[3]

Approved by:	*Date:*
Department Chair:	1/30/14
College Curriculum Chair:	2/10/14
College Dean:	2/10/14
UGPC Chair:	2/26/14
Graduate College Dean:	2/26/14
UFS President:	
Provost:	

1. **Syllabus** must be attached; see guidelines for requirements: *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*
3. **Consent** from affected departments (attach if necessary)

Email this form and syllabus to *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 Data Processing and Modeling of Marine Systems

1. **Course title/number, number of credit hours**
   Data Processing and Modeling of Marine Systems – OCB 6673 – 3 credits

2. **Course prerequisites**

   MSC I & MSC II

3. **Course logistics**
   a. Term – Spring 2015
   b. Notation if online course – N/A
   c. Class location and time (if classroom-based course):
   T/R - MC 209

4. **Instructor contact information**
   a. Instructor's name – Laurent Cherubin and Mingshun Jiang
   b. Office address – HBOI, Lab II, Room 204 & 203
   c. Office hours – To be determined
   d. Contact telephone number – office (772) 2242-2314 (Cherubin), (772) 242-2254 (Jiang), fax (772) 242-2412
   e. E-mail address – lcherubin@fau.edu, jiangm@fau.edu

5. **TA contact information (if applicable)**
   N/A

6. **Course description**
   Overview of marine data specific tools and methods for recording, processing, presentation, and four dimensional process oriented studies. Overview of visualization software such a Matlab, Ferret, VIS3D. Introduction to governing equations of geophysical flows, tides, barotropic dynamics and their numerical solutions. State of the art ocean models overview, with a focus on sigma-coordinate models. Introduction to bio-geochemical models, individual based models, physical biological interactions and modeling experiments.

7. **Course objectives/student learning outcomes**
   This course aims to introduce fundamental methods for marine processes studies. It also aims at providing fundamental software for process studies analysis, presentation and visualization. It aims to introduce the fundamental governing equations of geophysical flows and their declination for process oriented applications. Relevant numerical models will be studied and run with application to coupled bio-geochemical models and bio-physical modeling.

   Students will be conduct process studies order to assess the dynamics and achieve understanding of coupled physical, bio-geo chemical processes in marine systems.

They will be able to set-up and use numerical ocean or coupled models for a wide use of applications in marine systems.

8. **Course evaluation method**
There will be graded homework assignments accounting for 40% of the student's cumulative performance, a midterm exam, accounting for 30% of the student's cumulative performance, and a final exam that accounts for 30% 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. **Policy on makeup tests, late work, and incompletes**
If a student cannot attend an exam or hand in a homework project 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. Also, note that grades of Incomplete ("I") are 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.

11. **Special course requirements (if applicable)**
Computer Lab with Linux terminals

12. Classroom etiquette policy (if applicable)

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."

13. Disability policy statement

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); or at the Treasure Coast, CO 128 (772-873-3305) – and follow all OSD procedures.

14. Honor Code policy statement

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/regulations/chapter4/Reg_4.001_5-26-10_FINAL.pdf

15. Required texts/readings

Data Analysis Methods in Physical Oceanography: Second and Revised Edition, Edition 2. W.J. Emery R.E. Thomson - April 3, 2001. Elsevier – Publisher

Modeling Methods for Marine Science
David M. Glover William J. Jenkins Scott C. Doney - June 2, 2011
Cambridge University Press - Publisher

Introduction to the Modelling of Marine Ecosystems: (with MATLAB programs on accompanying CD-ROM)
W. Fennel T. Neumann - August 24, 2004
Elsevier - Publisher

16. Supplementary/recommended readings (optional)

N/A

17. Course topical outline

1. **Data acquisition and recording**
   Homework assignment: group study on marine observing systems

2. **Methods for process identification and visualization**
   Homework assignment: process identification in in-situ data

3. **Statistical Methods and Error Handling**
   Homework assignment: analysis of in-situ and model data

4. **Spatial analysis of Data fields**
   Homework assignment: analysis of remotely sensed data

5. **Temporal processes**
   Homework assignment: identification of processes in time series

6. **Programming and visualization languages**
   Homework: code development

7. **Governing equations in ocean dynamics**
   Homework assignment: derive their shallow water and quasi-geostrophic form

8. **Introduction to numerical solutions**
   Homework assignment: discretization of tracer advection equations

9. **Tide and tidal modeling**
   Homework assignment: harmonic analysis of tide gauge data

10. **Coastal dynamics and barotropic models**
    Homework assignment: wave models presentation

11. **Overview of ocean numerical models**
    Homework assignment: vertical layer systems

12. **Sigma-Coordinate regional and coastal models**
    Homework assignment: sigma coordinate examples for different types of applications

13. **Chemical biological models**
    Homework assignment: conceptual model for different types of marine ecosystems

14. **Individual Based models**
    Homework assignment: conceptual model for different types marine organisms

15. Physical-Biological interactions
Homework assignment: bio-physical conceptual model design

16. Modeling experiments and applications
Homework assignment: numerical simulation experiments