3 - Trial

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FORMAT 1

Submit original with signatures + 1 copy + electronic copy to Faculty Senate (Box 7500).

See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	**Institute of Marine Science**	**College/School**	**School of Fisheries and Ocean Sciences**
Prepared by	**Andrew McDonnell**	**Phone**	**474-7529**
Email Contact	**amcdonnell@alaska.edu**	**Faculty Contact**	**Andrew McDonnell**

1. ACTION DESIRED (CHECK ONE): Trial Course [X] New Course [ ]

2. COURSE IDENTIFICATION: Dept **MSL** Course # **694** No. of Credits **3**

Justify upper/lower division status & number of credits:

3. PROPOSED COURSE TITLE: Physical, Chemical, and Biological Interactions in the Oceans

4. To be CROSS LISTED? *YES/NO* **NO** If yes, Dept: [ ] Course # [ ]

(Requires approval of both departments and deans involved. Add lines at end of form for additional required signatures.)

5. To be STACKED? *YES/NO* **NO** If yes, Dept. [ ] Course # [ ]

Stacked course applications are reviewed by the (Undergraduate) Curricular Review Committee and by the Graduate Academic and Advising Committee. Creating two different syllabi—undergraduate and graduate versions—will help emphasize the different qualities of what are supposed to be two different courses. The committees will determine: 1) whether the two versions are sufficiently different (i.e. is there undergraduate and graduate level content being offered); 2) are undergraduates being overtaxed?; 3) are graduate students being undertaxed? In this context, the committees are looking out for the interests of the students taking the course. Typically, if either committee has qualms, they both do. More info online – see URL at top of this page.

6. FREQUENCY OF OFFERING: **Trial Course, but eventually I would like to offer it in odd-numbered years**

Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (AY2013-14 if approved by 3/1/2013; otherwise AY2014-15) **Fall 2013**

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply)	[ ]	*1*	[ ]	*2*	[ ]	*3*	[ ]	*4*	[ ]	*5*	[X] *6 weeks to full semester*
OTHER FORMAT (specify)											
Mode of delivery (specify lecture, field trips, labs, etc)	**Lectures, in-class discussions, and student presentations**										

9. CONTACT HOURS PER WEEK: [3] LECTURE hours/weeks [ ] LAB hours /week [ ] PRACTICUM hours /week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/guidelines-for-computing-/ for more information on number of credits.

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

Example of a complete description:

FISH F487 W, O Fisheries Management
3 Credits Offered Spring
Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. *Prerequisites: COMM F131X or COMM F141X; ENGL F111X; ENGL F211X or ENGL F213X; ENGL F414; FISH F425; or permission of instructor.* Cross-listed with NRM F487. (3+0)

MSL 694 Physical, Chemical, and Biological Interactions in the Oceans
3 Credits Offered Fall 2013
This course takes an interdisciplinary look at the interactions between physical, chemical and biological processes in the ocean. A wide range of spatial scales will be considered, ranging from the large ocean gyres down to the physiochemical scales on which individual bacteria, phytoplankton and zooplankton function. The course covers case studies that provide examples of the processes, connections, and feedbacks that control the biological, chemical, and physical variability throughout the oceans. Students will improve their interdisciplinary understanding and perception of oceanography and learn how to apply these concepts in their own research.
Prerequisites: Graduate standing and one of the following: MSL 620, MSL 650, or MSL 660; *or permission of instructor*

11. COURSE CLASSIFICATIONS: Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

H = Humanities		S = Social Sciences	

Will this course be used to fulfill a requirement for the baccalaureate core? **If YES, attach form.**	**YES:**		**NO:**	

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, **Format 6**		W = Writing Intensive, **Format 7**		Natural Science, **Format 8**	

11.A Is course content related to northern, arctic or circumpolar studies? If yes, a "snowflake" symbol will be added in the printed Catalog, and flagged in Banner.

YES		NO	

12. COURSE REPEATABILITY:

Is this course repeatable for credit?	**YES**		NO	X

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).	

How many times may the course be repeated for credit?		**TIMES**
If the course can be repeated for credit, what is the maximum number of credit hours that may be earned for this course?		**CREDITS**
If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?		**CREDITS**

13. GRADING SYSTEM: Specify only one. Note: Later changing the grading system for a course constitutes a Major Course Change.

LETTER:	X	**PASS/FAIL:**	

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES	Graduate standing and one of the following: MSL 620, MSL 650, or MSL 660; *or permission of instructor*

These will be *required* before the student is allowed to enroll in the course.

Reference the registration implications below due to Banner coding of these terms:
Prerequisite: Course completed and grade of "C" (2.0) or higher prior to registering for the course that requires it.
Concurrent: Course may be taken simultaneously (and allows for a course to have been previously completed).
Co-requisite: Courses MUST be taken simultaneously and does NOT allow for fact that a course was previously completed!

15. SPECIAL RESTRICTIONS, CONDITIONS | **none**

16. PROPOSED COURSE FEES | **$ 0**

Has a memo been submitted through your dean to the Provost for fee approval? **Yes/No**

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? **Yes/No** | **NO**

If yes, give semester, year, course #, etc.:

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

Course will require regular classroom space, and is part of the normal teaching workload of the instructor. Video conferencing equipment is requested in order to facilitate participation at the remote sites.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No		Yes	X	**11/9/12- Spoke with Karen Jensen and verified textbook held in the UAF BioSciences Library and is also available for students to check out through the Electronic Book Library. Journal articles will be available through the Library website or by in class distribution.**

20. IMPACTS ON PROGRAMS/DEPTS

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

Graduate Program in Marine Sciences and Limnology-discussed with Katrin Iken (GPMSL Program Head) on 10/3/2012
Fisheries Division (e-mailed Trent Sutton on Dec. 6, 2012)

21. POSITIVE AND NEGATIVE IMPACTS

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

This course will build off of lessons learned in the core oceanography classes. This has the positive effect of reinforcing those lessons learned, and synthesizing this information in a way that allows students to make important connections between the different sub disciplines of oceanography. The course content and format is well aligned with GPMSL's stated Goals and Intended Outcomes Statements for M.S. and Ph.D. students (e.g. http://www.sfos.uaf.edu/academics/degrees/grad/oceanography/oceanphd.html). The course will also give students in GPMSL an additional choice of graduate level electives necessary to complete their degree. Currently there are no similar courses offered, so it does not create any conflicts with existing courses. Potential overlap with the MSL 650 Biological Oceanography course was discussed with the instructors.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

I am proposing to offer this course because it fills a need within the GPMSL curriculum of focusing on integrating interdisciplinary knowledge. Oceanography is an interdisciplinary field, and this course is designed to specifically encourage students to build causal linkages between the disciplines of chemical, physical, and biological oceanography. As such, it will enhance the quality and breadth of a UAF education. The course is designed to draw on my own strengths as a researcher and scholar to convey some of those conceptual fundamentals and practical skills on to the students by including practical research examples and an experimental design project. The learning objectives of this class communicate the emphasis not just on encouraging student mastery of the course subject matter, but also on synthesizing these concepts to design oceanographic experiments that incorporate interdisciplinary research approaches. The course content and format is well aligned with GPMSL's stated Goals and Intended Outcomes Statements for M.S. and Ph.D. students, and as such will serve an important role in the program. Because it reaches across several disciplines, it has the potential to attract a larger class size than is typical for many graduate level oceanography electives. In doing so, students from different disciplines will also learn to work together and collaborate on interdisciplinary research questions.

APPROVALS: Add additional signature lines as needed.

	Date	12/11/12
Signature, Chair, Program/Department of:	GPMSL	
	Date	12/12/12
Signature, Chair, College/School Curriculum Council for:	SFOS	
	Date	Dec 16, 2012
Signature, Dean, College/School of:	SFOS	

Offerings above the level of approved programs must be approved in advance by the Provost.

	Date	

Signature of Provost (if above level of approved programs)

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	

Signature, Chair
Faculty Senate Review Committee: ___Curriculum Review ___GAAC

___Core Review ___SADAC

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

	Date	
Signature, Chair, Program/Department of:		
	Date	
Signature, Chair, College/School Curriculum Council for:		
	Date	
Signature, Dean, College/School of:		

ATTACH COMPLETE SYLLABUS (as part of this application). The guidelines are online:
http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/uaf-syllabus-requirements/
The Faculty Senate curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course (or changes to it) may be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. **Course information:**
   ❑Title, ❑ number, ❑credits, ❑prerequisites, ❑ location, ❑ meeting time
   (make sure that contact hours are in line with credits).
2. **Instructor (and if applicable, Teaching Assistant) information:**
   ❑ Name, ❑ office location, ❑ office hours, ❑ telephone, ❑ email address.
3. **Course readings/materials:**
   ❑ Course textbook title, ❑ author, ❑ edition/publisher.
   ❑ Supplementary readings (indicate whether ❑ required or ❑ recommended) and
   ❑ any supplies required.
4. **Course description:**
   ❑ Content of the course and how it fits into the broader curriculum;
   ❑ Expected proficiencies required to undertake the course, if applicable.
   ❑ Inclusion of catalog description is *strongly* recommended, and
   ❑ Description in syllabus must be consistent with catalog course description.
5. ❑ **Course Goals (general), and (see #6)**
6. ❑ **Student Learning Outcomes (more specific)**
7. **Instructional methods:**
   ❑ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).
8. **Course calendar:**
   ❑ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.
9. **Course policies:**
   ❑ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.
10. **Evaluation:**
    ❑ Specify how students will be evaluated, ❑ what factors will be included, ❑ their relative value, and ❑ how they will be tabulated into grades (on a curve, absolute scores, etc.) ❑ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but may be a convenient way to publicize this.) Faculty Senate Meeting #171:
    http://www.uaf.edu/uafgov/faculty-senate/meetings/2010-2011-meetings/#171
11. **Support Services:**
    ❑ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.
12. **Disabilities Services:** Note that the phone# and location have been **updated.**
    The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials.
    ❑ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655)to provide reasonable accommodation to students with disabilities.

Physical, Chemical, and Biological Interactions in the Oceans
MSL 694
Proposed Fall 2013 Syllabus

Instructor:
Dr. Andrew McDonnell
Assistant Professor of Oceanography
School of Fisheries and Ocean Sciences
231 Irving II
907-474-7529
amcdonnell@alaska.edu
Office Hours: TBD

Class meeting times: TBD
Location: TBD
Prerequisites: Graduate standing and completion of at least one of the following core oceanography courses: MSL 620 - Physical Oceanography, MSL 650 - Biological Oceanography, or MSL 660 - Chemical Oceanography; or permission of instructor.
3 credits

Course Description:

This course takes an interdisciplinary look at the interactions between physical, chemical and biological processes in the ocean. A wide range of spatial scales will be considered, ranging from the large ocean gyres down to the physiochemical scales on which individual bacteria, phytoplankton and zooplankton function. The course covers case studies that provide examples of the processes, connections, and feedbacks that control the biological, chemical, and physical variability throughout the oceans. Students will improve their interdisciplinary understanding and perception of oceanography and learn how to apply these concepts in their own research.

Course Goals

The goal of this course is to gain an understanding of the interactions (causes, effects, and feedbacks) between physical, chemical, and biological processes in the oceans, and apply these principles to modern research in oceanography.

Learning Objectives

- Understand the principles and examples of biological, chemical, and physical interactions in the oceans
- Develop the ability to search, read, analyze, and connect, and synthesize research results in the peer reviewed literature
- Learn how to leverage the knowledge and tools of other oceanographic disciplines to enhance understanding in your own field of study
- Apply the course concepts to the design of oceanographic studies
- Evaluate how global change might affect the physical, chemical, and biological features and processes in the ocean

Instructional methods

This course will consist of lectures intermixed with classroom discussions of the outside readings and literature searches. The course is centered around two textbooks, as well as specific journal articles that highlight case studies or serve as a comprehensive review of a specific course topic. Students will give two presentations during the semester. A Topical Review Paper and Experimental Design Project are designed to apply the concepts learned in this class to real problems in oceanographic research through individual and group activities.

Class Participation:

Attendance, participation in class sessions, discussions, and presentations is required and factors into the overall course grade. Each class session is worth up to 5 points.

Course Readings/Homework:

The assigned course readings are all required and essential to meeting the course learning objectives. Please pay attention to the syllabus and keep up with the reading assignments. Homework assignments are associated with each assigned journal article and will typically involve three components: 1) Create a concept map of the process interactions (See notes from Lecture 1 about Concept Maps) 2) Perform a literature search that brings in a related study to each topic to inform our learning on the subject. Be prepared to give a short 3-5 minute summary of the related study that you found. 3) Identify an unknown aspect in this area of study and write a paragraph explaining a possible experiment that could address these outstanding questions. Each homework assignment is worth 10 points.

In this manner, the readings, your written homeworks, and your participation in class discussions all factor into your grade in the course.

Topical Review Paper

Students will choose a specific oceanographic topic that highlights the interactions between physical, biological, and chemical processes in the ocean. The paper will involve conducting literature searches, reading the relevant papers, formulating a conceptual understanding of the processes, and writing a 10-12 page review paper (plus bibliography). Students will deliver a 15 minute presentation on their findings. 100 points.

Experimental Design Project

This is a collaborative project with a group size of 2-3 students. This collaboration will be initiated during the Experimental Design Project Simulation (see calendar). Students will partner with other students from a different oceanographic discipline from their own, and play the roles of senior scientists/professors to identify an interesting problem, and devise a scientific study to address the interactions between biological, physical and chemical processes. Through the course of the project, students will review the relevant background information related to the project, list the hypotheses that will be tested, describe the objectives of the proposed research, describe the methodology that will be used, and discuss how the proposed research will test these hypotheses and accomplish the proposed objectives. The proposed study will be summarized in a brief report and presented to the class (20 minute presentation + discussion/questions). 100 points.

Final Exam

A written final exam will be administered during the assigned final exam period. It will focus on evaluating your conceptual understanding of the various processes and interactions discussed in the course. The exam is closed book. 100 points.

Grade Weighting

Points from each of the following categories will be weighted according to the following scale in order to obtain an overall percentage course grade.

10%	Class Participation
20%	Reading and Homework Assignments
25%	Topical Review Paper
20%	Experimental Design Project
25%	Final Exam

Grading Scale

After weighting the total scores from each category according to the weights specified above, total grade percentages will be rounded to the nearest whole percentage point and letter grades will be assigned according to the following scale (no plus or minus grading):

A: >90%
B: 80-89%
C: 70-79%
D: 60-69%
F: <59%

Course Policies

Attendance to class is required and it is expected that each student contribute questions, comments, and analyses of the topic being covered. This attendance and involvement is factored into the course grade ("Class Participation" category). If a student must miss a class due to required field work or conferences, please meet with the instructor ahead of time to discuss options for making up points from missed attendance. All students are expected to adhere to the Code of Conduct and other policies described in the University of Alaska Fairbanks Catalogue.

Support Services

Students are encouraged to visit the instructor's office hours for additional help with course concepts, assignments, and exam preparation.

Disability Services:

At UAF, the Office of Disability Services (203 WHIT; 474-5655; TTY 474-1827; fydso@uaf.edu) ensures that students with physical or learning disabilities have equal access to the campus and course materials. If you have specialized needs, please contact this office or the instructor to make arrangements.

Course Schedule

Class Session	Date	Topic	Reading
1		Course Introduction and Concept Mapping	Syllabus
2		Boundary Layers and phytoplankton	Mann and Lazier, Ch. 2
3		Zooplankton in a viscous environment	Mann and Lazier, Ch. 2
4-5		Ecosystem Engineers: Biology Shaping the Physical/Chemical Environment	Brietburg et al, 2010
6		Plankton Patchiness	Martin 2003
7-8		Vertical Structure of the open ocean: mixed layer dynamics	Mann and Lazier, Chpt. 3; Dewar et al 2006
9-10		Coastal Upwelling	Mann and Lazier, Ch. 5;
11-12		Fronts, Jets, and Squirts	Mann and Lazier, Ch. 6
13-14		Dispersal of particles, plankton, and larvae	Williams and Follows Ch. 3; Largier 2003; Gilg et al 2003; Morgan & Fisher 2010
15-16		Eddies, nutrient supply, and production	Williams and Follows Ch. 9; Ladd et al 2009, McGillicuddy et al 2007, Gruber et al 2011
17-18		**Topical Review Presentations**	
19		**Experimental Design Project Simulation**	
20-21		Ocean Gyres and biogeography	Williams and Follows Ch. 8, 11
22-23		Overturning circulation and nutrient cycling	Williams and Follows Ch. 12; Deutsch et al 2007
24-25		Climate Variability and Biological Forcing	Mann and Lazier, Ch. 10
26-27		**Experimental Design Presentations**	
28		Review Session	
	During the Scheduled Final Exam Period	**Final Exam**	

Course Materials:

Textbooks

The following texts can be purchased online or checked out through the UAF Electronic Book Library: Dynamics of Marine Ecosystems : Biological-Physical Interactions in the Oceans - 3rd Edition (2006), by K. Mann and J. Lazier. Blackwell Publishing.

Ocean dynamics and the carbon cycle: principles and mechanisms, (2011) Williams, R. G., & Follows, M. J. Cambridge University Press.

Journal Articles (To be distributed in class or on Blackboard one week prior to assignment due date)

Breitburg, D. L., Crump, B. C., Dabiri, J. O., & Gallegos, C. L. (2010). Ecosystem engineers in the pelagic realm: alteration of habitat by species ranging from microbes to jellyfish. *Integrative and Comparative Biology*, *50*(2), 188-200.

Deutsch, C., Sarmiento, J. L., Sigman, D. M., Gruber, N., & Dunne, J. P. (2007). Spatial coupling of nitrogen inputs and losses in the ocean. *Nature*, *445*(7124), 163-167.

Dewar, W. K., Bingham, R., Iverson, R., Nowacek, D. P., St Laurent, L. C., & Wiebe, P. H. (2006). Does the marine biosphere mix the ocean? *Journal of Marine Research*, *64*(4), 541-561.

Gilg, M. R., & Hilbish, T. J. (2003). The geography of marine larval dispersal: coupling genetics with fine-scale physical oceanography. *Ecology*, *84*(11), 2989-2998.

Graham, W. M., & Largier, J. L. (1997). Upwelling shadows as nearshore retention sites: the example of northern Monterey Bay. *Continental Shelf Research*, *17*(5), 509-532.

Gruber, N., Lachkar, Z., Frenzel, H., Marchesiello, P., Münnich, M., McWilliams, J. C., et al. (2011). Eddy-induced reduction of biological production in eastern boundary upwelling systems. *Nature Geoscience*.

Ladd, C., Crawford, W. R., Harpold, C. E., Johnson, W. K., Kachel, N. B., Stabeno, P. J., et al. (2009). A synoptic survey of young mesoscale eddies in the Eastern Gulf of Alaska. *Deep Sea Research Part II: Topical Studies in Oceanography*, *56*(24), 2460-2473.

Largier, J. L. (2003). Considerations in estimating larval dispersal distances from oceanographic data. *Ecological Applications*, *13*(sp1), 71-89.

Martin, A. (2003). Phytoplankton patchiness: the role of lateral stirring and mixing. *Progress in Oceanography*, *57*(2), 125-174.

McGillicuddy, D. J., Anderson, L. A., Bates, N. R., Bibby, T., Buesseler, K. O., Carlson, C. A., et al. (2007). Eddy/ wind interactions stimulate extraordinary mid-ocean plankton blooms. *Science*, *316*(5827), 1021-1026.