December 19, 2017

The Curriculum Review Committee of the Faculty Senate has approved the following:

UNDERGRADUATE PROGRAM REQUEST:

SUBMITTED BY THE COLLEGE OF Fisheries and Ocean Sciences
(Submitted by MSL)

2-Utrial: Trial Course: MSL F494 - Field Techniques in Ocean Acidification Research, 3 credits (10+16+14 noted on form), prerequisites include MSL F211 and MSL F212 and CHEM F105, or permission of instructor, letter graded; to be offered Maymester, first offering Maymester 2018 upon approval.

Effective: Maymester 2018 upon approval.

Rationale: See request attached.

APPROVED: _____ DATE: 12/20/17
Chancellor's / Provost's Office

DISAPPROVED: _____ DATE: _____
Chancellor's / Provost's Office

2-Utrial Updated 12/19/17

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
(Attach copy of syllabus)

SUBMITTED BY:

Department	GPMSL	**College/School**	CFOS
Prepared by	Amanda L. Kelley	**Phone**	(907) 474-2474
Email Contact	alkelley@alaska,edu	**Faculty Contact**	Amanda Kelley

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

2. COURSE IDENTIFICATION: Dept: MSL/Marine Biology | Course #: 494 | No. of Credits: 3

Justify upper/lower division status & number of credits: This is an upper division course that will build on knowledge gained from lower division courses (listed as prerequisites- MSL 211and 212 and CHEM 105). Students will be required to apply what they learn in lecture during laboratory activities including spectraphotometric assays, water sampling techniques, learn specialized seawater carbonate chemistry software.

3. PROPOSED COURSE TITLE: 'Field techniques in ocean acidification research'

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

NOTE: Cross-listing 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 #:

How will the two course levels differ from each other? How will each be taught at the appropriate level?:

* Use only one Format 1 form for the stacked course (not one for each level of the course!) and attach syllabi. 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: Maymester

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

7. SEMESTER & YEAR OF FIRST OFFERING (Effective AY2015-16 if approved by 3/31/2015; otherwise AY2016-17): Maymester AY 2017-2018

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*	[X] *2*	[ ] *3*	[ ] *4*	[ ] *5*	[ ] *6 weeks to full semester*
OTHER FORMAT (specify)						
Mode of delivery (specify lecture, field trips, labs, etc)	Lecture, labs, field trip activities					

9. CONTACT HOURS PER WEEK: 10 LECTURE hours/weeks | 16 LAB hours /week | 14 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.

OTHER HOURS (specify type) **Maymester- 20 hours total lecture, 32 hours total lab hours, 28 total practicum hours**

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 F494 Marine Biology
3 credits Offered Maymester
An introduction to the design and fabrication of experimental ocean acidification systems and oceanographic pH and pCO2 sensors for the study ocean acidification. This course will require extra fees to cover laboratory activities, room and board, and travel for students to Kasitsna Bay Lab.
***Prerequisites: MSL 211 and 212 and CHEM 105; or permission of instructor.* (10+16+14)**

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:**	X

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

O = Oral Intensive, **Format 6**		W = Writing Intensive, **Format 7**		X = Baccalaureate Core	

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	X	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: Changing the grading system for a course later on constitutes a Major Course Change – Format 2 form.

LETTER:	X	**PASS/FAIL:**	

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

This course will be part of my teaching workload. I do not intend to offer this course by distance delivery. My lab currently has all of the necessary equipment for all of the various activities for this course. A few reagents will need to be purchased. The course will occur at the Kasitsna Bay lab.

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	**I have contacted the library development officer regarding the needs for this course (spoke on the phone 8/17/2017).**

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)

The Fisheries and Ocean Sciences undergraduate program will be positively impacted as the proposed course is completely unique to the UA system, thus increasing the availability of such applied coursework to both graduate and undergraduate students. Graduate students in the marine and fisheries sciences may also benefit from the unique training provided by this course.

21. POSITIVE AND NEGATIVE IMPACTS

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

This is a specialized course that is designed specifically for fisheries and/or marine science students (although open to anyone who has met the prerequisites) who are interested in learning about the techniques and equipment necessary to study ocean acidification. The suite of topics covered are not currently being offered by any other class at UAF. Because this course is unique, and is geared specifically to marine science students, there shouldn't be any negative impacts to other courses that may be offered during Maymester. This course will positively affect degree programs in Fisheries and Ocean Sciences by providing greater breadth of elective course offerings, and provides more diversity of applied course offerings in particular. Students may also use the field component of this course to conduct their own original research projects, which can be used in fulfillment of the capstone requirement for the Fisheries and Ocean Sciences BS degree.

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.

Ocean acidification- OA, the reduction in ocean pH resulting from the absorption of human-produced carbon dioxide by the world's oceans, has already been detected in Alaskan waters. There is a critical need to train future scientists will the skills, tools and techniques used in the field of OA research, particularly in

the state of Alaska. This course will review the current state of knowledge regarding the techniques and systems used to conduct experiments that expose marine organisms to current and future pCO_2 conditions projected by the Intergovernmental Panel on Climate Change. We will build, from the ground up, a flow-through seawater aquarium system and learn how to adjust he carbonate chemistry conditions and to measure the experimental seawater parameters using the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011). A second focus of this course will be to train students how to use, calibrate, and conduct proper quality control and assurance protocols for oceanographic sensors used in ocean acidification research. We will also review how to conduct minor time-series analyses from the data the sensors collect during the deployment. The skills learned from this course could be incorporated into the capstone project that is required for the Ocean Science concentration in the Fisheries BS degree.

APPROVALS: Add additional signature lines as needed.

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

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	12/19/17

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). This list is online at:
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 is a convenient way to publicize this.) Link to PDF summary of grading policy for "C":
http://www.uaf.edu/files/uafgov/Info-to-Publicize-C_Grading-Policy-UPDATED-May-2013.pdf

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.** http://www.uaf.edu/disability/ 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.

5/21/2013

Syllabus

MSL 494: Field techniques in ocean acidification research 3 Credits

Class Schedule: M-F, 9 am - 6 pm, 5/14-5/25 Prerequisites: MSL 211, 212; CHEM 105

Instructor: Dr. Amanda Kelley Class location: Kasitsna Bay Lab

School of Fisheries and Ocean Sciences
Office: Irving II rm 331
Phone: (907) 474-2474
Email: alkelley@alaska.edu

Office hours: TBD

Course Description: An introduction to the design and fabrication of experimental ocean acidification systems to conduct comparative biological experiments on marine species; application and use of *in situ* oceanographic pH and pCO_2 sensors for the study ocean acidification. This two week course is held at the Kasistna Bay lab and includes a combination of lectures and labs, field seawater sampling and seawater sample analysis.

Course Goals: This course is designed to give students the tools, techniques and analytical skills necessary to conduct ocean acidification research. We will: 1) review the current state-of-knowledge regarding the techniques and systems used to conduct experiments that expose marine organisms to current and future pCO_2 (acidified) conditions projected by the Intergovernmental Panel on Climate Change; 2) build, from the ground up, a flow-through seawater aquarium system and learn how to adjust the carbonate chemistry conditions that reflect different target treatment exposures; 3) learn to measure the experimental seawater carbonate parameters following the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011); 4) learn how to use, calibrate, deploy, and conduct proper quality control and assurance protocols for oceanographic sensors used to measure pH and pCO_2 *in situ*; 5) review relevant approaches for conducting time-series carbonate chemistry data analysis.

Specific Learning Objectives:

(1) Understand the role of anthropogenic carbon dioxide in the regulation of seawater carbonate chemistry and ocean acidification.
(2) Review the impacts to biological systems- why is studying ocean acidification important?
(3) Learn the specific components used in the fabrication of the experimental ocean acidification system- i.e. mass flow control valves, CO_2 and H_2O scrubbers, header tanks, gas valves, etc. and understand their functional role.
(4) Assemble, from the ground up, the flow-through seawater experimental ocean acidification system.
(5) Learn to sample seawater from the experimental system and calculate the carbonate parameters using CO2calc, following the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011). This includes measuring seawater pH (spectrophotometric), total alkalinity (TA), salinity, and temperature and using these values to calculate pCO_2 and aragonite saturation state.
(6) Learn the different types of oceanographic sensors used in ocean acidification monitoring.
(7) Gain hands-on experience using the seaFET pH sensor and the SAMI CO_2 sensor, including sensor conditioning, deployment, calibration sample collection, and data quality control and assurance.
(8) Review *basic* time-series analysis of ensuing sensor data.

Instructional method:

This class will use multiple modes of learning, including: lecture, lab hands-on activities, readings, field sampling and exams.

Course reading (required):

Text book: Ocean Acidification, edited Jean-Pierre Gattuso, Lina Hansson, published peer-review scientific literature and instrument manuals.

Class Evaluation:

Lecture participation and engagement.....5 points
Laboratory participation and engagement.....5 points
Keeping a lab/note book.....10 points
Exam 1: OA experimental system.....40 points
Exam 2: Oceanographic pH/ pCO_2 sensors.....40 points
Total.....100 points

Participation and engagement include: actively interacting with the instructor and class during lecture by asking questions, and participating in class discussions. For the laboratory portion, actively participating in the hands-on activities, including working with peers building the experimental system and learning to use the various analytical equipment that will be presented in the class.

Grading:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
< 59%	F

Course Schedule: 2 weeks

Week 1:

Readings:

- Text book: Ocean Acidification, edited by Jean-Pierre Gattuso, Lina Hansson
    - Chapter 1: Ocean acidification: background and history
    - Chapter 2: Past changes in carbonate chemistry
    - Chapter 3: Recent and future changes in carbonate chemistry
    - Chapter 5: Effects of ocean acidification on the diversity and activity of heterotrophic marine microorganisms
    - Chapter 6: Effects of ocean acidification on organisms and ecosystems
    - Chapter 10: Effects of ocean acidification on marine biodiversity and ecosystem function
    - Chapter 12: Biogeochemical consequences of ocean acidification and feedbacks to the earth system
- Riebesell, Ulf, et al. Guide to best practices for ocean acidification research and data reporting. Office for Official Publications of the European Communities, 2011.

Videos:

- Introduction to CO_2 Chemistry in Seawater Part 1: Presented by Dr. Andrew Dickson, Scripps Institution of Oceanography.
- Introduction to CO_2 Chemistry in Seawater Part 2: Presented by Dr. Andrew Dickson, Scripps Institution of Oceanography.

Lectures:

- History of seawater carbonate chemistry; understand the relationship between pH, pCO_2 and aragonite saturation state.
- Background of ocean acidification: climate change and anthropogenic atmospheric CO_2

- Using the Intergovernmental Panel on Climate Change report projections as a framework for determining "future-level" ocean acidification experimental conditions
- The OA system: a breakdown of all the system parts required for assembly of the experimental flow-through ocean acidification system
- Step-by-step review of the assembly of the experimental OA system
- How to measure the carbonate chemistry parameters of the experimental OA system using the "Guide to best practices for ocean acidification research and data reporting"

Exam 1: OA experimental system, end of week 1.

Week 2:

Readings:

- Hofmann, Gretchen E., et al. "High-frequency dynamics of ocean pH: a multi-ecosystem comparison." PloS one 6.12 (2011): e28983.
- Martz, Todd et al. Testing the Honeywell Durafet® for seawater pH applications. Limnology and Oceanography: Methods 8.5 (2010): 172-184.
- Gray, Sarah E. Cullison, et al. "Applications of in situ pH measurements for inorganic carbon calculations." Marine Chemistry 125.1 (2011): 82-90.
- SeaFET 2.0 Manual
- Satlantic SeaFET Ocean pH Sensor Verification Report, Project # 3021
- Thesis: An Evaluation of the Performance of an ISFET pH Sensor (Honeywell Durafet) in a Dynamic Estuarine System, Gonski, 2016.
- Seidel, Matthew, et al. A sensor for in situ indicator-based measurements of seawater pH. Marine chemistry 109.1 (2008): 18-28.
- SAMI Ocean pH Sensor Manual
- Dickson, Andrew, et al. "Guide to best practices for ocean CO_2 measurements." (2007): OceanBestPractices

Lectures:

- Overview: SeaFET Ocean pH sensor
- Overview: SAMI Ocean pH sensor
- Oceanographic pH sensor considerations: deployment, sampling regime, data quality control and assurance, and calibration sample collection
- Determination of seawater carbonate chemistry
- Overview: pH/pCO_2 time-series data analysis

Exam 2: Oceanographic pH/ pCO_2 sensors, end of week 2.

Lab and Recitation: Lab and recitation will occur daily after lecture. There we will review and put to use the objectives and techniques discussed in lecture. All of these activities will be carried out as a group.

Lab schedule week 1:

Review and learn how to use the various instruments that we will be using to measure seawater chemistry including auto titrator for measurements of total alkalinity; spectrophotometer for pH measurements; Ross electrode for pH measurements; systematically identify the major components of the experimental ocean acidification system.

Recitation schedule week 1:

Analytically measure various seawater samples for total alkalinity; measure pH spectrophotometrically and utilize the calculations reviewed in lecture to transform absorbance readings into pH measurements; Measure seawater pH with the Ross electrode and compare values to those derived from the spectrophotometric measurements; Apply the knowledge gained in lab-

learning all of the major components of experimental ocean acidification system- and fabricating it from scratch. Once built, we will collect seawater samples from the system and measure them using the above listed techniques.

Lab schedule week 2:
Dismantle and review all of the parts for the seaFET and SAMI pCO_2 sensor. Learn the software associated with both pH sensors. Lean how to program and deploy each sensor. Learn about the Niskin bottle and how to use it effectively for use in seawater collection. Introduction to time-series analysis using MATLAB.

Recitation week 2:
Reconstruct both seaFET and SAMI sensors. Use the sensor software to program and deploy each sensor at a given sampling frequency. Deploy the sensors off the dock at the Kasitsna Bay lab. Take multiple calibration water sample using the Niskin Bottle and measure the associated carbonate system parameters (learned in week 1). Collect the sensor and download the data, and use the measured seawater parameters to recalibrate the ensuing data. Conduct a basic time-series analysis of the resulting pH sensor data using MATLAB.

Daily schedule:
9-11 am: Lecture
11-12 pm: Lunch
12-3:15 pm: Lab
3:15-6 pm: Recitation

Course Location: Kasitsna Bay Laboratory

The main requirement for this course is access to seawater! Because of the need for this crucial element, this course will take place at the Kasitsna Bay Laboratory, located in beautiful Kachemak Bay. Much of the hands-on work will take place in the seawater workroom at the lab. The sensor work and seawater chemistry analysis will occur in an adjacent dry lab. Our field work will consist of sensor deployment and field sampling of seawater.

Course Policies:

(1) Attendance: Students are expected to attend all scheduled lectures and labs, and are responsible for all material presented in lecture and in the assigned readings. Students who miss either lecture or lab are welcome to ask to borrow the notes of their classmates; the instructor will not be responsible for providing notes. Please note that no in-class activities can be made up, regardless of the reason for missing class. Lectures will be presented using PowerPoint. It is important to realize that these PowerPoint slides represent only an outline of the material covered. Important details that will be covered in exams will be added by the instructor verbally in each lecture and slides not posted on Blackboard may be described in lecture. Thus attending class and taking detailed notes is the key to success in this course.
(2) Exams: Exams will be based on any material covered during lecture, lab and or from the assigned reading. This can include illustrations, films, Powerpoint slides, and actual lectures. Take notes! Make-up exams will only be available in cases of medical and/or family emergencies, or for official academic activities (in which case the instructor should be contacted a minimum of two weeks in advance). The student is responsible for scheduling timely make-up exams with the instructor.
(3) Support and Disability Services: The Office of Disability Services can be reached by phone- (907) 474-5655, or email- fydso@uaf.edu, and can be located in WHIT 203 on the UAF campus. The Office of Disability Services is available for students with physical or learning disabilities. If you feel that you are differently abled and need these services, please contact the office or ask the instructor to make arrangements.

(4) Courtesy: Please turn off all audible sounds to any electronic devices (phones, laptops, tablets etc.) while in lecture. Refrain from using your laptops for activities not related to lecture during class time, e.g. emailing or browsing the web. Use of these items is strictly prohibited during exams. Students are free to record lectures. You may bring food or drink in the classroom unless otherwise instructed, for example when shared computers are in use.

(5) Plagiarism and academic integrity: Plagiarism will not be tolerated in any way during this course. All assignments are expected to consist of students' original ideas and/or information from properly cited published sources. Students may seek assistance with proper referencing of scientific literature from the instructor as needed. Students are expected to conduct themselves according to the UAF Student Code of Conduct, which can be found in the course catalog. Failure to comply with these guidelines will result in a failing grade, and the student may face consequences at the university level, depending on the severity of the offense.

COLLEGE OF FISHERIES
AND OCEAN SCIENCES

University of Alaska Fairbanks
P.O. Box 757220, Fairbanks, Alaska 99775-7220

MEMORANDUM

TO: Dr. Susan Henrichs, Provost
University of Alaska Fairbanks
Approved SHenrichs 8/24/17

THRU: Dr. Trent Sutton, Associate Dean for Academic Programs
College of Fisheries and Ocean Sciences
DocuSigned by: 8688705E293D406...

FROM: Dr. Amanda Kelley, Assistant Professor
Department of Marine Biology
College of Fisheries and Ocean Sciences

DATE: August 18, 2017

SUBJECT: Proposed lab fee for *MSL/Marine Biology 394 Aquatic Invertebrate Zoology*

GPMSL requests to charge fees for a new course titled "Aquatic Invertebrate Zoology", *MSL/Marine Biology 394*. The requested fee will be used to cover the costs associated with laboratory section of this course, including the purchase and preparation of specimens and associated consumables. We propose a fee of $75, which is equal to the current charge issued for *BIO F305*, Invertebrate Zoology. Additionally, the proposed fee is equivalent to fees charged for other courses with lab sections, such as *FISH 315 Freshwater Fisheries Techniques* ($75) and *FISH 427 Ichthyology* ($70).

If you require any additional information, you can contact the class instructor Amanda Kelley (x2474). We appreciate your consideration of this request.

COLLEGE OF FISHERIES
AND OCEAN SCIENCES

University of Alaska Fairbanks
P.O. Box 757220, Fairbanks, Alaska 99775-7220

MEMORANDUM

TO: Dr. Susan Henrichs, Provost
University of Alaska Fairbanks
Approved Susan Henrichs 8/24/17

THRU: Dr. Trent Sutton, Associate Dean for Academic Programs
College of Fisheries and Ocean Sciences
DS
DocuSigned by:
8688705E293D406

FROM: Dr. Amanda Kelley, Assistant Professor
Department of Marine Biology
College of Fisheries and Ocean Sciences

DATE: August 18, 2017

SUBJECT: Proposed lab fee for *MSL/Marine Biology 494 Field techniques in ocean acidification research*

GPMSL requests to charge fees for a new field course titled "Field techniques in ocean acidification research", *MSL/Marine Biology 494*. This 2 week course will take place at the Kasitsna Bay Marine Laboratory during Maymester.

We request a fee of $640 to cover all student costs for this course. The requested fee will be used to cover room and board, laboratory space, insurance, and miscellaneous lab materials. A charge of $35 per day per person (14 days) for use of the facilities (dorm and lab) $490. The course fees will also cover $125 for food (students and instructors cook their own meal in a communal kitchen, but food needs to be provided for the class), and $25 for insurance and lab materials, such as consumables and reagents.

If you require any additional information, you can contact the class instructor Amanda Kelley (x2474). We appreciate your consideration of this request.

2-Utrial

Rec AUG 25 2017

Returned OCT 10 2017

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
(Attach copy of syllabus)

SUBMITTED BY:

Department	GPMSL	College/School	CFOS
Prepared by	Amanda L. Kelley	Phone	(907) 474-2474
Email Contact	alkelley@alaska,edu	Faculty Contact	Amanda Kelley

1. ***ACTION DESIRED (CHECK ONE):***	Trial Course	X	New Course		
2. ***COURSE IDENTIFICATION:***	Dept	MSL/Marine Biology	Course #	494	No. of Credits: 3
Justify upper/lower division status & number of credits:	This is an upper division course that will build on knowledge gained from lower division courses (listed as prerequisites- MSL 211and 212 and CHEM 105). Students will be required to apply what they learn in lecture during laboratory activities including spectraphotometric assays, water sampling techniques, learn specialized seawater carbonate chemistry software.				
3. ***PROPOSED COURSE TITLE:***	'Field techniques in ocean acidification research'				
4. ***To be CROSS LISTED?*** *YES/NO*	No	If yes, Dept:		Course #	
5. ***To be STACKED?**** *YES/NO*	No	If yes, Dept.		Course #	
How will the two course levels differ from each other? How will each be taught at the appropriate level?:					

NOTE: Cross-listing requires approval of both departments and deans involved. Add lines at end of form for additional required signatures.

* Use only one Format 1 form for the stacked course (not one for each level of the course!) and attach syllabi. 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:***	Maymester
	Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) – or As Demand Warrants
7. ***SEMESTER & YEAR OF FIRST OFFERING*** (Effective AY2015-16 if approved by 3/31/2015; otherwise AY2016-17)	Maymester AY 2017-2018

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*	X	*2*		*3*		*4*		*5*		*6 weeks to full semester*
OTHER FORMAT (specify)											
Mode of delivery (specify lecture, field trips, labs, etc)	Lecture, labs, field trip activities										

9. CONTACT HOURS PER WEEK:	10	LECTURE hours/weeks	16	LAB hours /week	14	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)	**Maymester- 20 hours total lecture, 32 hours total lab hours, 28 total practicum hours**

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 F494 Marine Biology
3 credits Offered Maymester
An introduction to the design and fabrication of experimental ocean acidification systems to conduct comparative biological experiments on marine species; application and use of *in situ* oceanographic pH and pCO2 sensors for the study ocean acidification. This two week course is held at the Kasitsna Bay lab and will include a combination of lectures and labs, field seawater sampling and seawater sample analysis. This course will require extra fees to cover laboratory activities, room and board, and travel for students to Kasitsna Bay.
***Prerequisites: MSL 211 and 212 and CHEM 105; or permission of instructor.* (10 + 16)**

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:	X

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

O = Oral Intensive, **Format 6**		W = Writing Intensive, **Format 7**		X = Baccalaureate Core	

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	X	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: Changing the grading system for a course later on constitutes a Major Course Change – Format 2 form.*

LETTER: X PASS/FAIL:

RESTRICTIONS ON ENROLLMENT (if any)

14. *PREREQUISITES* — MSL 211 and 212, and CHEM 105, or permission of instructor.

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

15. *SPECIAL RESTRICTIONS, CONDITIONS*

16. *PROPOSED COURSE FEES* — Yes

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

This course will be part of my teaching workload. I do not intend to offer this course by distance delivery. My lab currently has all of the necessary equipment for all of the various activities for this course. A few reagents will need to be purchased. The course will occur at the Kasitsna Bay lab.

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 — I have contacted the library development officer regarding the needs for this course (spoke on the phone 8/17/2017).

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)

The Fisheries and Ocean Sciences undergraduate program will be positively impacted as the proposed course is completely unique to the UA system, thus increasing the availability of such applied coursework to both graduate and undergraduate students. Graduate students in the marine and fisheries sciences may also benefit from the unique training provided by this course.

21. *POSITIVE AND NEGATIVE IMPACTS*

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

This is a specialized course that is designed specifically for fisheries and/or marine science students (although open to anyone who has met the prerequisites) who are interested in learning about the techniques and equipment necessary to study ocean acidification. The suite of topics covered are not currently being offered by any other class at UAF. Because this course is unique, and is geared specifically to marine science students, there shouldn't be any negative impacts to other courses that may be offered during Maymester. This course will positively affect degree programs in Fisheries and Ocean

Sciences by providing greater breadth of elective course offerings, and provides more diversity of applied course offerings in particular. Students may also use the field component of this course to conduct their own original research projects, which can be used in fulfillment of the capstone requirement for the Fisheries and Ocean Sciences BS degree.

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.

Ocean acidification- OA, the reduction in ocean pH resulting from the absorption of human-produced carbon dioxide by the world's oceans, has already been detected in Alaskan waters. There is a critical need to train future scientists will the skills, tools and techniques used in the field of OA research, particularly in the state of Alaska. This course will review the current state of knowledge regarding the techniques and systems used to conduct experiments that expose marine organisms to current and future pCO_2 conditions projected by the Intergovernmental Panel on Climate Change. We will build, from the ground up, a flow-through seawater aquarium system and learn how to adjust he carbonate chemistry conditions and to measure the experimental seawater parameters using the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011). A second focus of this course will be to train students how to use, calibrate, and conduct proper quality control and assurance protocols for oceanographic sensors used in ocean acidification research. We will also review how to conduct minor time-series analyses from the data the sensors collect during the deployment. The skills learned from this course could be incorporated into the capstone project that is required for the Ocean Science concentration in the Fisheries BS degree.

APPROVALS: Add additional signature lines as needed.

DocuSigned by: Matthew Wooller 01DDF970CA4547F...	Signature, Chair, Program/Department of:	Marine Biology	Date: 8/18/2017
DocuSigned by: 8688705E293D406...	Signature, Chair, College/School Curriculum Council for:	CFOS	Date: 8/18/2017
DocuSigned by: 8688705E293D406...	Signature, Dean, College/School of:	CFOS	Date: 8/18/2017

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

	Signature of Provost (if above level of approved programs)	Date:

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

	Signature, Chair Faculty Senate Review Committee: ___Curriculum Review ___GAAC ___Core Review ___SADAC	Date:

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). This list is online at: 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 is a convenient way to publicize this.) Link to PDF summary of grading policy for "C":
http://www.uaf.edu/files/uafgov/Info-to-Publicize-C_Grading-Policy-UPDATED-May-2013.pdf

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.** http://www.uaf.edu/disability/ 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.

5/21/2013

Syllabus

MSL 494: Field techniques in ocean acidification research 3 Credits

Class Schedule: Fairbanks- MSL 211, 212; CHEM 105

Instructor: Dr. Amanda Kelley Class location and time TBD

School of Fisheries and Ocean Sciences
Office: Irving II rm 331
Phone: (907) 474-2474
Email: alkelley@alaska.edu

Office hours: TBD

Course Description: An introduction to the design and fabrication of experimental ocean acidification systems to conduct comparative biological experiments on marine species; application and use of *in situ* oceanographic pH and pCO_2 sensors for the study ocean acidification. This two week course is held at the Kasistna Bay lab and includes a combination of lectures and labs, field seawater sampling and seawater sample analysis.

Course Goals: This course is designed to give students the tools, techniques and analytical skills necessary to conduct ocean acidification research. We will: 1) review the current state-of-knowledge regarding the techniques and systems used to conduct experiments that expose marine organisms to current and future pCO_2 (acidified) conditions projected by the Intergovernmental Panel on Climate Change; 2) build, from the ground up, a flow-through seawater aquarium system and learn how to adjust the carbonate chemistry conditions that reflect different target treatment exposures; 3) learn to measure the experimental seawater carbonate parameters following the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011); 4) learn how to use, calibrate, deploy, and conduct proper quality control and assurance protocols for oceanographic sensors used to measure pH and pCO_2 *in situ*; 5) review relevant approaches for conducting time-series carbonate chemistry data analysis.

Specific Learning Objectives:

(1) Understand the role of anthropogenic carbon dioxide in the regulation of seawater carbonate chemistry and ocean acidification.
(2) Review the impacts to biological systems- why is studying ocean acidification important?
(3) Learn the specific components used in the fabrication of the experimental ocean acidification system- i.e. mass flow control valves, CO_2 and H_2O scrubbers, header tanks, gas valves, etc. and understand their functional role.
(4) Assemble, from the ground up, the flow-through seawater experimental ocean acidification system.
(5) Learn to sample seawater from the experimental system and calculate the carbonate parameters using CO2calc, following the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011). This includes measuring seawater pH (spectrophotometric), total alkalinity (TA), salinity, and temperature and using these values to calculate pCO_2 and aragonite saturation state.
(6) Learn the different types of oceanographic sensors used in ocean acidification monitoring.
(7) Gain hands-on experience using the seaFET pH sensor and the SAMI CO_2 sensor, including sensor conditioning, deployment, calibration sample collection, and data quality control and assurance.

(8) Review *basic* time-series analysis of ensuing sensor data.

Instructional method:

This class will use multiple modes of learning, including: lecture, lab hands-on activities, readings, field sampling and exams.

Course reading (required):

Text book: Ocean Acidification, edited Jean-Pierre Gattuso, Lina Hansson, published peer-review scientific literature and instrument manuals.

Class Evaluation:

Lecture participation and engagement	30 points
Laboratory participation and engagement	40 points
Keeping a lab/note book	10 points
Exam 1: OA experimental system	10 points
Exam 2: Oceanographic pH/ pCO_2 sensors	10 points
Total	100 points

Grading:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
< 59%	F

Course Schedule: 2 weeks

Week 1:

Readings:

- Text book: Ocean Acidification, edited by Jean-Pierre Gattuso, Lina Hansson
    - Chapter 1: Ocean acidification: background and history
    - Chapter 2: Past changes in carbonate chemistry
    - Chapter 3: Recent and future changes in carbonate chemistry
    - Chapter 5: Effects of ocean acidification on the diversity and activity of heterotrophic marine microorganisms
    - Chapter 6: Effects of ocean acidification on organisms and ecosystems
    - Chapter 10: Effects of ocean acidification on marine biodiversity and ecosystem function
    - Chapter 12: Biogeochemical consequences of ocean acidification and feedbacks to the earth system
- Riebesell, Ulf, et al. Guide to best practices for ocean acidification research and data reporting. Office for Official Publications of the European Communities, 2011.

Videos:

- Introduction to CO_2 Chemistry in Seawater Part 1: Presented by Dr. Andrew Dickson, Scripps Institution of Oceanography.
- Introduction to CO_2 Chemistry in Seawater Part 2: Presented by Dr. Andrew Dickson, Scripps Institution of Oceanography.

Lectures:

- History of seawater carbonate chemistry; understand the relationship between pH, pCO_2 and aragonite saturation state.
- Background of ocean acidification: climate change and anthropogenic atmospheric CO_2
- Using the Intergovernmental Panel on Climate Change report projections as a framework for determining "future-level" ocean acidification experimental conditions
- The OA system: a breakdown of all the system parts required for assembly of the experimental flow-through ocean acidification system
- Step-by-step review of the assembly of the experimental OA system
- How to measure the carbonate chemistry parameters of the experimental OA system using the "Guide to best practices for ocean acidification research and data reporting"

Exam 1: OA experimental system, end of week 1.

Week 2:

Readings:

- Hofmann, Gretchen E., et al. "High-frequency dynamics of ocean pH: a multi-ecosystem comparison." PloS one 6.12 (2011): e28983.
- Martz, Todd et al. Testing the Honeywell Durafet® for seawater pH applications. Limnology and Oceanography: Methods 8.5 (2010): 172-184.
- Gray, Sarah E. Cullison, et al. "Applications of in situ pH measurements for inorganic carbon calculations." Marine Chemistry 125.1 (2011): 82-90.
- SeaFET 2.0 Manual
- Satlantic SeaFET Ocean pH Sensor Verification Report, Project # 3021
- Thesis: An Evaluation of the Performance of an ISFET pH Sensor (Honeywell Durafet) in a Dynamic Estuarine System, Gonski, 2016.
- Seidel, Matthew, et al. A sensor for in situ indicator-based measurements of seawater pH. Marine chemistry 109.1 (2008): 18-28.
- SAMI Ocean pH Sensor Manual
- Dickson, Andrew, et al. "Guide to best practices for ocean CO_2 measurements." (2007): OceanBestPractices

Lectures:

- Overview: SeaFET Ocean pH sensor
- Overview: SAMI Ocean pH sensor
- Oceanographic pH sensor considerations: deployment, sampling regime, data quality control and assurance, and calibration sample collection
- Determination of seawater carbonate chemistry
- Overview: pH/pCO_2 time-series data analysis

Exam 2: Oceanographic pH/ pCO_2 sensors, end of week 2.

Lab and Recitation: Lab and recitation will occur daily every afternoon after lecture. There we will review and put to use the objectives and techniques discussed in lecture. This course is designed to give students the tools, techniques and analytical skills necessary to conduct ocean acidification research. We will: 1) review the current state-of-knowledge regarding the techniques and systems used to conduct experiments that expose marine organisms to current and future pCO_2 (acidified) conditions projected by the Intergovernmental Panel on Climate Change; 2) build, from the ground up, a flow-through seawater aquarium system and learn how to adjust the carbonate chemistry conditions that reflect different target treatment exposures; 3) learn to measure the experimental seawater carbonate parameters following the "Guide to best practices for ocean acidification research and data reporting" (Riebesell et al. 2011); 4)

learn how to use, calibrate, deploy, and conduct proper quality control and assurance protocols for oceanographic sensors used to measure pH and pCO_2 *in situ*; 5) review relevant approaches for conducting time-series carbonate chemistry data analysis.

Course Location: Kasitsna Bay Laboratory

The main requirement for this course is access to seawater! Because of the need for this crucial element, this course will take place at the Kasitsna Bay Laboratory, located in beautiful Kachemak Bay. Much of the hands-on work will take place in the seawater workroom at the lab. The sensor work and seawater chemistry analysis will occur in an adjacent dry lab. Our field work will consist of sensor deployment and field sampling of seawater.

Course Policies:

(1) Attendance: Students are expected to attend all scheduled lectures and labs, and are responsible for all material presented in lecture and in the assigned readings. Students who miss either lecture or lab are welcome to ask to borrow the notes of their classmates; the instructor will not be responsible for providing notes. Please note that no in-class activities can be made up, regardless of the reason for missing class. Lectures will be presented using PowerPoint. It is important to realize that these PowerPoint slides represent only an outline of the material covered. Important details that will be covered in exams will be added by the instructor verbally in each lecture and slides not posted on Blackboard may be described in lecture. Thus attending class and taking detailed notes is the key to success in this course.

(2) Exams: Exams will be based on any material covered during lecture, lab and or from the assigned reading. This can include illustrations, films, Powerpoint slides, and actual lectures. Take notes! Make-up exams will only be available in cases of medical and/or family emergencies, or for official academic activities (in which case the instructor should be contacted a minimum of two weeks in advance). The student is responsible for scheduling timely make-up exams with the instructor.

(3) Support and Disability Services: The Office of Disability Services can be reached by phone- (907) 474-5655, or email- fydso@uaf.edu, and can be located in WHIT 203 on the UAF campus. The Office of Disability Services is available for students with physical or learning disabilities. If you feel that you are differently abled and need these services, please contact the office or ask the instructor to make arrangements.

(4) Courtesy: Please turn off all audible sounds to any electronic devices (phones, laptops, tablets etc.) while in lecture. Refrain from using your laptops for activities not related to lecture during class time, e.g. emailing or browsing the web. Use of these items is strictly prohibited during exams. Students are free to record lectures. You may bring food or drink in the classroom unless otherwise instructed, for example when shared computers are in use.

(5) Plagiarism and academic integrity: Plagiarism will not be tolerated in any way during this course. All assignments are expected to consist of students' original ideas and/or information from properly cited published sources. Students may seek assistance with proper referencing of scientific literature from the instructor as needed. Students are expected to conduct themselves according to the UAF Student Code of Conduct, which can be found in the course catalog. Failure to comply with these guidelines will result in a failing grade, and the student may face consequences at the university level, depending on the severity of the offense.

COLLEGE OF FISHERIES
AND OCEAN SCIENCES

University of Alaska Fairbanks
P.O. Box 757220, Fairbanks, Alaska 99775-7220

MEMORANDUM

TO: Dr. Susan Henrichs, Provost
University of Alaska Fairbanks

THRU: Dr. Trent Sutton, Associate Dean for Academic Programs
College of Fisheries and Ocean Sciences

DS

DocuSigned by:
8688705E293D406...

FROM: Dr. Amanda Kelley, Assistant Professor
Department of Marine Biology
College of Fisheries and Ocean Sciences

DATE: August 18, 2017

SUBJECT: Proposed lab fee for *MSL/Marine Biology 494 Field techniques in ocean acidification research*

GPMSL requests to charge fees for a new field course titled "Field techniques in ocean acidification research", *MSL/Marine Biology 494*. This 2 week course will take place at the Kasitsna Bay Marine Laboratory during Maymester.

We request a fee of $640 to cover all student costs for this course. The requested fee will be used to cover room and board, laboratory space, insurance, and miscellaneous lab materials. A charge of $35 per day per person (14 days) for use of the facilities (dorm and lab) $490. The course fees will also cover $125 for food (students and instructors cook their own meal in a communal kitchen, but food needs to be provided for the class), and $25 for insurance and lab materials, such as consumables and reagents.

If you require any additional information, you can contact the class instructor Amanda Kelley (x2474). We appreciate your consideration of this request.

SENT ORIGINAL TO PROVOST 8.21.17