

Submit original with signatures + 1 copy + electronic copy to UAF Governance.
See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department		College/School	
Prepared by	Laura Conner	Phone	(907) 474-6950
Email Contact	ldconner@alaska.edu cneumann@alaska.edu	Faculty Contact	Laura Conner

1. ACTION DESIRED

(CHECK ONE):

Trial Course

☒

New Course

2. COURSE IDENTIFICATION:

Dept

BIOL

Course #

694

No. of Credits

2

Justify upper/lower division status & number of credits:

The course will meet for 120 mins./week for 14 weeks for a total of 1680 minutes. The course is a graduate level course, similar to those taught at 20 other universities.

3. PROPOSED COURSE TITLE:

Communicating Science

4. CROSS LISTED?

YES/NO

Yes

If yes,

MSL

Course #

694

Dept:

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

5. STACKED?

YES/NO

NO

If yes,

Dept.

Course #

6. FREQUENCY OF OFFERING:

Every spring. The course is part of a larger training program for GK-12 fellows (although additional graduate students are encouraged to enroll). These fellowships place graduate students in K-12 classrooms for the period of one school year in order to improve graduate student skill at communicating and teaching science. The fellows are selected in November each year, and start their year-long fellowship in June. Their first classroom teaching experience begins in August. The fellows must take this course in the spring, prior to the start of their fellowship, in order to be prepared to enter the classroom the following fall year.

(Every or Alternate) Fall, Spring, Summer – or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (if approved)

Spring, 2011

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 one)

1

2

3

4

5

☒

6 weeks to full semester

OTHER FORMAT
(specify)

Mode of delivery
(specify lecture,
field trips, labs,
etc)

Lecture

RECEIVED

OCT 15 2010

Dean's Office

College of Natural Science & Mathematics

9. CONTACT HOURS PER WEEK:☒ 2LECTURE
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/cd/credits.html> for more information on number of credits.

OTHER HOURS (specify
type)**10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):**

BIOL 694/ MSL 694 Communicating Science 2 credits

Course description

This highly interactive course allows students to gain hands-on experience with teaching and communicating science to public audiences. Over the course of the semester, students will lead programs in K-12 schools and/or museum settings, develop a podcast and present their own science to peers. Students will also explore pedagogical theory, and learning how to use active and inquiry-based teaching strategies.

11. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities

☐N = Natural
Science☐

S = Social Sciences

☐Will this course be used to fulfill a requirement for the
baccalaureate core?☐

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☐**12. COURSE REPEATABILITY:**Is this course repeatable for
credit?☐

YES

☒

NO

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 with variable credit, what is the
maximum number of credit hours that may be earned for this course?

CREDITS

13. GRADING SYSTEM:

LETTER:

☒ X

PASS/FAIL:

☐

RESTRICTIONS ON ENROLLMENT (if any)**14. PREREQUISITES**

instructor permission

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

RECOMMENDED

Classes, etc. that student is strongly encouraged to complete prior to this course.

15. SPECIAL RESTRICTIONS, CONDITIONS

None

16. PROPOSED COURSE FEES

\$

Has a memo been submitted through your dean to the Provost & VCAS 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.**

No budget impact is anticipated; course costs will be paid out of the NSF-funded GK-12 CASE program and a NSF grant for the Alaska Center for Ocean Science Education Excellence. The costs are limited to faculty salaries and minimal administrative costs (copying, etc.)

A classroom with videoconferencing capabilities is required for 2 hours/week in Fairbanks and Juneau for the first 10 weeks of the course.

The GK-12 and COSEE grants will cover course costs for 5 years. We hope to institutionalize the course over time. We envision that the pedagogical content would be consistent but that the scientific theme may change yearly after the conclusion of the grants. The scientific examples used will be tailored according to the student population that enrolls for the course. If made a permanent course, funds will need to be identified to cover faculty salary to teach the course (after the first five years).

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (ffklj@uaf.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

6/7/2010 The UAF libraries provide access to a broad array of materials related to marine science, including books, research journals, and databases useful for identifying primary literature as well as other types of materials of potential relevance to students in this course. In addition, the libraries also subscribe to similar resources in the field of education, for example, Education Abstracts and Education Complete, which would provide information for students regarding teaching methods and preparing presentations and outreach activities for a K-12 audience.

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)

We are proposing to add a course with the overall theme of communicating science to K-12 audiences and the broader public. Despite an increasing and well-documented need for scientists to effectively communicate their science to the public, traditional scientific training typically has not prepared scientists to be effective communicators outside of academia. It also generally fails to offer explicit training in teaching methods. Such a course is needed in order to prepare science graduate students for these activities. In addition, NSF and other funding agencies are increasingly placing emphasis on "Broader Impacts" of scientific research. This course will prepare graduate students to engage meaningfully with the public, suggesting many avenues for future broader impacts throughout their careers as scientists.

The courses are cross-listed between MSL and BIOL, as the scientific emphases for the course in the first year

(e.g., guest lecture topics) will focus on the themes of climate change and ocean sciences. We anticipate that many enrollees will come from these departments. However, we will advertise the courses widely and hope that UAF students from many science departments will enroll in the course.

Programs/departments contacted about the program to date:

Michael Castellini, Interim Dean, has been involved in course planning as a P.I. on the COSEE Alaska grant via in-person meetings, emails, and conference calls.

Rich Boone, Associate Dean of CNSM, is aware of the course and has facilitated approval of the course with the Dean.

The UA Museum of the North has committed staff time and facilities. Carol Diebel, the Museum Director, has approved the commitments via an in-person meeting and emails.

The Alaska State Museum has been contacted and has indicated that they are excited to work with the course instructors.

NSF-funded GK-12 students from multiple departments will be required to take the course. Laura Conner is both the course instructor and the Co- P.I. on the GK-12 grant and she has recruited and selected graduate students as participants in the GK-12 program in coordination with their respective departments.

21. POSITIVE AND NEGATIVE IMPACTS

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

While the Communications department and the Biology & Wildlife department offer courses concerning scientific writing for public and other audiences, there is currently no course aimed at science graduate students that specifically prepares them to be better science teachers and communicators. This course is unique in offering hands-on experience in presenting science content to public and K-12 audiences. The Department of Biology & Wildlife, SFOS, and other science departments will gain the capability to better prepare their graduate students for careers in science.

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.

The course will be adapted from one developed by a team of scientists and marine education specialists at the Lawrence Hall of Science and the University of California Berkeley. Versions of the course are taught at more than 20 colleges and universities. Lawrence Hall of Science educators will provide a 2 ½ day training session for the course instructors to ensure the academic quality of the course as the content is adapted to include Alaska-relevant science content and integration of Alaska Native knowledge. The instructors will be involved in the training to ensure consistency of the course content and teaching methods.

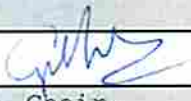

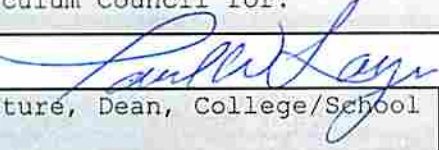
Dr. Laura Conner will be taking the lead on the course adaptations. Dr. Conner holds a Ph.D. in Evolutionary Biology, and currently serves as a Research Assistant Professor of Science Education through the College of Natural Sciences at UAF and as the Director of Public Programs at the University of Alaska Museum of the North. She has taught science and science education courses at the K-12 and college levels for over 7 years. She also has extensive experience in communicating science to the public through her current position and through past positions as a science journalist, and Director of the Insect Discovery outreach program at the University of Arizona. In her current position at UAMN, Dr. Conner directs outreach programs with an emphasis on integrating Native knowledge with Western science for classroom and museum programs. Conner is also one of project P.I.'s for the recently launched GK-12 program, which has an emphasis on Climate Change and a subfocus on integrating Native Ways of Knowing.

Communicating Science is primarily about how to teach and communicate science, using principles of ocean literacy and climate change as the specific scientific focus during the first year (scientific focus may change in future years). Scientific lectures given on these topics will model active teaching methods. The course provides students with an introduction to the inquiry-based pedagogy used in theoretically grounded science education reform and builds on their interest in and knowledge of ocean sciences. Scientists provide the models initially and then students are provided opportunities to practice new skills. We are proposing TWO SECTIONS in order to maximize enrollment, yet keep class size small. A course of this nature can accommodate a maximum of 12 students per section.

The course would take advantage of several complementary UAF resources – research expertise in ocean sciences in SFOS, research expertise in climate change across several departments, the UA Museum of the North as an informal science education venue, existing partnerships with local schools, the Center for Cross-Cultural Studies and its expertise in instructional strategies for K-12 audiences in rural and Native Alaska communities, and two interdisciplinary NSF grant programs that emphasize improving science communication and instructional skills - the Center for Ocean Science Education Excellence program and the GK12 program, each of which will provide multi-year funding to support the course as a critical element of grant activities. The grant programs will also support in-depth evaluation of the success of the course.

The course will improve the quality of UAF instruction by addressing two critical needs: 1) helping scientists to more effectively communicate their subject; and 2) creating a greater awareness among future scientists about how to effectively carry out outreach activities. UAF currently lacks this type of course for science graduate students. Without the awareness and skills that the course will provide, students will be at a competitive disadvantage in future competitions for NSF and other federal research funding that emphasizes broader impacts of their research.

APPROVALS:

	Date	Oct 14, 2010
Signature, Chair, Program/Department of: <u>Biology and Wildlife</u>		
	Date	10/18/2010
Signature, Chair, College/School Curriculum Council for: <u>CNSM</u>		
	Date	10/20/10
Signature, Dean, College/School of: <u>CNSM</u>		
	Date	
Signature of Provost (if applicable)		
Offerings above the level of approved programs must be approved in advance by the Provost.		

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

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		

Communicating Science, BIOL/ MSL 694, 2 credits

Meeting times:

Section 1: Wednesdays, 9:15 AM-11:15 AM

Section 2: Fridays, 9:30 AM-11:30 AM

Meeting place:

Section 1: Museum 151

Section 2: TBA

Prerequisites: permission of instructor

Instructor:

Dr. Laura Carsten Conner
907-474-6950
ldconner@alaska.edu
UA Museum of the North 132
University of Alaska Fairbanks
Fairbanks

Marilyn Sigman
907-274-9612
msigman@alaska.edu
Alaska Sea Grant/
Marine Advisory Program
1007 W. Third St. – Suite 100
Anchorage

Office hours: TBA

COURSE SYLLABUS

Course description

This highly interactive course allows students to gain hands-on experience with teaching and communicating science to public audiences. Over the course of the semester, students will lead programs in K-12 schools and/or museum settings, develop a podcast and present their own science to peers. Students will also explore pedagogical theory, and learn how to use active and inquiry-based teaching strategies.

Course purpose and objectives

There is an increasing and well-documented need for scientists to effectively communicate their science to the public. This course aims to build communication and teaching skills among GK-12 graduate student fellows. In addition to gaining skills specific to presenting to public audiences, graduate students will also observe instructors and guest lecturers using inquiry-based and active learning techniques that have been shown to enhance learning in the university classroom. These presentations will occur in the first four weeks of the course. Topics will rotate, but will emphasize the ocean sciences and climate change.

The overall goals of this course are:

- to increase graduate student skill in communicating science to different audiences, using a variety of media and methods
- to introduce future scientists to the importance of K-12 education, public outreach, and the broader impact of their work
- to increase graduate student skill in addressing cultural differences
- to familiarize graduate students familiar with teaching techniques for K12 and college audiences, especially inquiry-based approaches

Student learning objectives

Upon completion of the course, students will be able to do the following:

- Develop and deliver science lessons to K-12 children
- Present science concepts to audiences of all ages through a variety of media
- Integrate science concepts into interpretive programs
- Successfully lead inquiry-based classroom experiences

Required Textbook

S. Michaels, A. W. Shouse, and H.A. Schweingruber. 2008 *Ready, Set, Science: putting research to work in K-8 classrooms*. National Academies Press.

M. Freichel and H.A. Schweingruber. 2010. *Surrounded by Science: learning science in informal settings*. National Academies Press.

Recommended Textbooks

R. Barnhardt and A.O. Kawagley. 2010. *Alaska Native Education: views from within*. Alaska Native Knowledge Network. UAF.

J. Branson et. al. 2000. *How People Learn: brain, mind, experience, and school*. National Academies Press.

Supplemental Readings

Kawagley, Angayuqaq Oscar, and Roger and Delena Norris-Tull
1998 The Indigenous Worldview of Yupiaq Culture: Its Scientific: Nature and Relevance to the Practice and Teaching of Science. *Journal of Research in Science Teaching*, Vol. 35, #2.
<http://ankn.uaf.edu/Curriculum/Articles/KawagleyNorrisTull/YupiaqCulture.html>

Other readings may be assigned.

Assignments and Grading

In this class, we will use both *formative* and *summative* assessment techniques. We hope that you will model these techniques in your own teaching career. Formative assessment is the

process of gaining feedback and making mid-course corrections, while summative evaluations typically measure the end outcome. For example, a summative assessment tool might be an exam or an end of course term paper, while formative assessments might take many forms, such as quick five-minute writes, clicker questions, or feedback on drafts of a paper. In this class, we will model many formative assessment techniques that enable instructors to assess how well the class is gaining concept mastery *before* high-stakes assignments are complete. Summative assessment measures are described below.

Class presentation

Students will develop one 15-minute presentation for a public audience based on their own research. Students will present their talk to their classmates. The presentation should incorporate inquiry-based and active learning techniques.

Public and School Presentations

The final four sessions of the class will be dedicated to application of the skills learned over the course of the class. Students will have the opportunity to develop and practice a lesson for the public during the week of April 12th. The following week, students will present this lesson to a live public audience in the University of Alaska Museum of the North. Students will have the opportunity to develop and practice a lesson for a K-12 audience during the week of April 26th. The following week, students will deliver this lesson to a live audience in a local K-12 school.

Final project

During the course, students will receive basic training on development of podcasts. Students will develop a basic podcast (1-3 minutes in length) related to their own research topic and present it to their peers during the final exam period.

Point breakdown

Assignment/Exam	Points	Due Date
Class presentation	50	varies
Public presentation	50	April 19 or 20 (depending on section)
School presentation	100	May 3 or 4 (depending on section)
Final project	100	TBA
Participation	100	
TOTAL	400	

Grades will be calculated as a percentage of the 400 points possible in the course. Rubrics will be distributed that describe specific scoring procedures for each assignment.

90-100% = A
80-89% = B
70-79% = C
60-69% = D
Below 60 = F

Attendance Policy

We expect you to attend class and participate. Science education research has demonstrated that students who take an active role in their learning learn more and retain that knowledge longer. In other words, participation will help you get the most out of the course.

Due to the nature of the audience, missed presentations for the public and for schools cannot be rescheduled. All scheduled presentations must be given on the day that they are scheduled. If you have a documented illness or emergency that causes you to miss a public or school presentation, please speak with the instructors about making up points through alternate activities.

Plagiarism/Academic Honesty

Disciplinary action may be initiated in cases of plagiarism, cheating, and/or academic dishonesty. Please refer to the student code of conduct:

http://www.uaf.edu/catalog/current/academics/regs3.html#Student_Rights

Student Support

Students with special needs or concerns can contact Student Support Services (474-6844). Please let us know at the beginning of the semester if you will require accommodations due to a documented disability, and we will work with you in conjunction with the Office of Disability Services (203 WHIT, 474-7043).

COURSE SCHEDULE

Week of:	Lecture topic	Reading Assignment
26-Jan	Why communicate science to the public? SCIENCE GUEST LECTURE (topic TBA but in area of ocean and climate change science)	
2-Feb	Ways of knowing SCIENCE GUEST LECTURE (topic TBA but in area of ocean and climate change science)	Kawagley handout Freichel & Schweingruber Ch. 2 & 7
9-Feb	Identifying audience SCIENCE GUEST LECTURE (topic TBA but in area of ocean and climate change science)	Freichel & Schweingruber Ch. 1
16-Feb	Inquiry-based teaching SCIENCE GUEST LECTURE (topic TBA but in area of ocean and climate change science)	Michaels et al. Ch. 1 & 2 Freichel & Schweingruber Ch. 3
23-Feb	Learning and misconceptions STUDENT SCIENCE PRESENTATIONS	Michaels et al. Ch. 3 Freichel & Schweingruber Ch. 4 & 5
2-Mar	Assessment/Standards STUDENT SCIENCE PRESENTATIONS	Freichel & Schweingruber Ch. 6
9-Mar	Questioning strategies, leading discussions STUDENT SCIENCE PRESENTATIONS	Michaels et al. Ch 5
16-Mar	SPRING BREAK, NO CLASS	
23-Mar	Developing lessons for formal and informal audiences STUDENT SCIENCE PRESENTATIONS	Michaels et al. Ch 4 & 7 Freichel & Schweingruber Ch. 3
30-Mar	Podcasts and other media STUDENT SCIENCE PRESENTATIONS	
6-Apr	Presenting science in action: Field trip to museum	Freichel & Schweingruber Ch. 9
13-Apr	Public presentation: development	
20-Apr	Public presentation	
27-Apr	School presentation: development	
4-May	School presentation	
	FINAL EXAM (Field Trip to Creamer's Field)	