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FORMAT 1

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	**Faculty Contact**	Laura Conner

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

2. COURSE IDENTIFICATION: Dept STO Course # 601 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* NO If yes, Dept: Course #

(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 currently part of a larger training program for GK-12 fellows, so it must be offered in spring. 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 year.

At the conclusion of the GK-12 program it may be possible to move the course to Fall semester.

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

RECEIVED SEP 14 2012 Dean's Office College of Natural Science & Mathematics

7. SEMESTER & YEAR OF FIRST OFFERING (if approved) Spring ~~2013~~ 2014 (as permanent course)

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* [X] *6 weeks to full semester*

OTHER FORMAT (specify)

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

9. CONTACT HOURS PER WEEK: [2] 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/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):

Governance 9/26/12 TLP

STO 601 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 out-of-school settings, develop a presentation and present their own science to peers. Students will also explore pedagogical theory, and learn 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** [X] **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** [X] **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 **Graduate standing or 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

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** **Yes**

If yes, give semester, year, course #, etc.: The course was offered Spring Semesters of 2010 and 2011,as BIOL/MSL694. We are asking to make the course permanent and convert the course to a STO designator, in line with its inclusion in the proposed Graduate Certificate in Scientific Teaching and Outreach.

18. ESTIMATED IMPACT

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

No budget impact is anticipated; the costs are limited to faculty salaries and minimal administrative costs (copying, etc.). Laura Conner, the Director of CNSM Outreach, will teach the course as part of her regular workload. No impacts on facilities and/or space is anticipated.

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)

This course will be open to all science and engineering graduate students, and is envisioned as a required course for the proposed Scientific Teaching and Outreach Program. Any science or engineering graduate student can take the course, regardless of whether or not they are enrolled in the certificate program.

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. 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 has been offered twice as a trails course at the time of this submission. Enrollments have been 16 in year 1 and 13 in Year 2. A survey of graduate students indicates that many would have taken the course even if they were not GK-12 fellows.

Dr. Laura Conner will teach the course. Dr. Conner holds a Ph.D. in Evolutionary Biology, and currently serves as a Research Assistant Professor of Science Education through the ESTES at UAF and as the Director of Outreach for CNSM. 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. Conner is also one of project P.I.'s for the recently launched GK-12 program.

Communicating Science is primarily about how to teach and communicate science. The course provides students with an introduction to the principles of communicating science to the public and with inquiry-based pedagogy. 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. Prior to the launch of this trials course, UAF lacked 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:

	Signature, Chair, Program/Department of: Biology + Wildlife	Date	Sept 14, 2012
	Signature, Chair, College/School Curriculum Council for: CNSM	Date	9/25/2012
	Signature, Dean, College/School of: CNSM	Date	9/25/12
	Signature of Provost (if applicable)	Date	

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

	Signature, Chair, UAF Faculty Senate Curriculum Review Committee	Date	

ADDITIONAL SIGNATURES: (If required)

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

COURSE SYLLABUS

Communicating Science, STO 6xx, 2 credits

Meeting times: Thursdays, 6-8 PM

Meeting place: Irving 1 201

Prerequisites: Graduate standing in the sciences (advanced undergraduates may take the course with instructor permission)

Instructor:

Dr. Laura Carsten Conner
907-474-6950
ldconner@alaska.edu
Bunnell 305A

Office hours: Tues 12-2 or by appt.

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 out-of-school settings, develop a presentation 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 graduate students. In this way, individuals will be more effective science communicators throughout their careers. In addition to gaining skills specific to presenting to public audiences, graduate students will also observe instructors using inquiry-based and active learning techniques that have been shown to enhance learning in the university classroom.

The overall goals of this course are:

- to increase graduate student skill in communicating science to different audiences
- 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 diversity issues

- to familiarize graduate students 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
- Effectively present science concepts to audiences of all ages
- Know and use pedagogical theory to communicate science
- Successfully lead inquiry-based classroom experiences

Required Textbooks

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

R. Olson. 2009. Don't be *such* a scientist. Washington: Island Press.

Recommended Textbooks

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

Supplemental Readings

AAAS website, "Communication 101."
http://communicatingscience.aaas.org/comm101/define_audience.shtml

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

Feynman, RP 1985. Surely You're Joking, Mr. Feynman! Adventures of a curious character. W.W. Norton Company, Inc. NY, NY.

Leiserowitz, A, Maibach, E, & Light, A. 2009. Global Warming's Six Americas; an Audience Segmentation Analysis. A Center for American Progress report.
http://www.americanprogress.org/issues/2009/05/pdf/6americas.pdf

Rutherford, F.J, and Ahlgren, A. 1991. *The Nature of Science*. In: Science for All Americans, AAAS, 272 pp. http://www.project2061.org/publications/sfaa/online/sfaatoc.htm

Other readings may be assigned throughout the semester, and will be posted on Blackboard at least 1 week prior to the due date.

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.

K-12 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 present lessons to a live K-12 audience during the last four weeks of the class, either at the University of Alaska Museum of the North or in local K-12 schools. Students will use pre-prepared presentations during the first three weeks, and will use a presentation that they develop over the course of the semester during the last week. Students will deliver lessons in pairs or groups, depending on class size.

Peer and teacher reviews
Students will provide peer reviews of their partner's lessons during the school presentations described above. The review will be based on an instructor-developed rubric. Teachers will also provide feedback about lessons delivered in K-12 classrooms.

Fireside chat
You will provide 1 ten-minute PowerPoint presentation to the class about your own science, or a topic closely related to your area of expertise. The presentation should be given in a "fireside chat" style appropriate for a public audience that may not be familiar with your research. The presentation should include hands-on "props" or other engagement strategies. A rubric will be distributed in class that describes how presentations will be graded.

Point breakdown

Assignment	**Points**
4 lesson presentations in the K-12 classroom	200
Written lesson plan developed during semester	100
Peer reviews of teaching	50
Fireside chat	100
Participation	100
TOTAL	**550**

Grades will be calculated as a percentage of the 550 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. Your attendance will be part of your participation grade.

Due to the nature of the audience, missed presentations cannot be rescheduled. All scheduled presentations must be given on the day that they are scheduled. Failure to present 1 scheduled school presentation will result in a one letter grade deduction. Failure to present 2 or more scheduled school presentations will result in a failing grade for the class. However, if you have a documented illness or emergency that causes you to miss a 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. Pleas 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

Date	Topic	Readings and Assignments
17-Jan	Communicating Science: why and how	Feynman article
24-Jan	Audience and Developing a Theme	Michaels Chap. 4, Olson Chap. 1
31-Jan	Science Translation	Olson Chap. 2 and 3
7-Feb	Science for Kids	Olson Chap. 4 and 5
14-Feb	Teaching Approaches/Engagement	Michaels Chap. 1 and 2
21-Feb	Prior Knowledge and Formative Assessment	Michaels Chap. 3 **Due: Fireside Chat topic and theme**
28-Feb	Ways of Knowing	Kawagley; Rutherford
7-Mar	Questioning strategies, leading discussions Fireside Chats	Michaels Chap. 5
14-Mar	**Spring Break—no class**	
21-Mar	Fireside Chats	
28-Mar	Classroom Observations	**Due: Draft written lesson plan**
4-Apr	K-12 presentations	
11-Apr	K-12 presentations	
18-Apr	K-12 presentations	**Due: Final written lesson plan**
25-Apr	K-12 presentations	
2-May	Fireside chats	
9-May	Final Exam (Fireside chats)	