COURSE SYLLABUS

Seminar: Current Topics in Scientific Teaching
STO 692, 1 credit
[DRAFT]

Meeting times: TBA [1.5 hours per week]
Meeting place: TBA
Prerequisites: Graduate standing in a science or engineering; STO 666 (Scientific Teaching) or STO 6XX (Communicating Science) recommended

Instructor:
Dr. Christa Mulder, cpmulder@alaska.edu, Irving I rm 212, 474-5493.
Office hours: M & Wed 10:30-11:30 or by appointment

Course overview:
This graduate seminar course explores current trends in science education at the pre-college and college levels. Topics may include diversity, technology, active learning, and others. The course will rely on readings from the primary literature (research articles) and discussion.

This course is designed for students enrolled in the Graduate Certificate in Science Teaching and Outreach, and it is therefore expected that students will either be actively engaged in teaching science at some level, or plan to do so in the near future. Therefore, topics selected will be driven in part by students' interests.

Course goals:
Most scientists are very familiar with the scientific literature in their own field of research endeavor, but few are aware of the large literature that exists on best practices in teaching science. Yet many of the questions that science teachers face daily (e.g., "Should I give out notes prior to class?" "What should the composition of project groups be based on?") have been addressed by science educators. The primary goal of this course is to familiarize students with this literature so that they will be able to take advantage of information produced by studies in science education to improve their own teaching.A second goal is to make students aware of major national and international trends in science education. These goals will be achieved by reading and discussing science education literature, particularly topics of direct relevance to students' own experiences or interests in teaching.

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

1) Describe current trends in science teaching and their relevance to their own teaching goals
2) Discuss approaches to classroom teaching issues such as diversity (including background, education, and gender), use of active learning techniques, use of new technologies, and trends in formative and summative assessment, and how they apply to their own current or intended teaching activities
3) Examine, observe, analyze, and reflect on current trends in the literature
4) Effectively lead a group discussion

Course structure
This course will use readings from the primary literature (research articles) to explore current trends in science teaching. Students are expected to read 2-4 articles per week on a given topic. Participation in discussion is critical and will comprise a large percentage of the final grade. Participation will be judged

based on number and quality of questions and comments. Students are required to lead one class period per semester (see details below).

Readings
There is no textbook for the course. Readings will be drawn from the primary literature and/or book chapters. A full list is not provided, because many topics and readings will be student-selected. Example readings might include:

Coil, D., M.P. Wnderoth, M. Cunningham, and C. Dirks. 2010. Teaching the process of science: faculty perceptions and an effective methodology. CBE-Life Sciences Education 9: 524-535.

Clark, I.E., R. Romero-Calderón, J. M. Olson, L. Jaworski, D. Lopatto, U. Banerjee. 2009. "Desconstructing" scientific research: a practical and scalable pedagogical tool to provide evidence-based science instruction. PLoS Biology 7 (12): e1000264

Ehrlinger, J., K. Johnson, M. Banner, D. Dunning, and J. Kruger. 2008. Why the unskilled are unaware: further explorations of (absent) self-insight among the incompetent. Organizational Behavior and Human Decision Processes 105: 98-121.

Felder, R.M., and R. Brent. 2004. The intellectual development of Science and Engineering Students. Part 2: Teaching to Promote Growth. Journal of Engineering Education 93: 279-291.

Gaffney, J. D. H., Richards, E., Kustusch, M. B., Ding, L., and Beichner, R., 2008. Scaling Up Educational Reform. *Journal of College Science Teaching* 37: 48-53.

Gobeaud, Karleen, 2006. Assessment practices in college science: trends from the National Study of post-secondary faculty. In: Handbook of College Science teaching, eds. J.Mintzes and W.J. Leonard. NSTA, Washington, D.C.

Hill, C., Corbett, C, St. Rose, A, 2010. Why so Few? Women in Science, Engineering, Technology, and Mathematics. AAUW, Washington, D.C.

Mannix, E., and M.A. Neale. 2005. What differences make a difference? The promise and reality of diverse teams in organizations. Psychological Science in the Public Interest 6(2): 31-55.

Miyake, A., Kost-Smith, L.E., Finkelstein, N.D., Pollock, S.J., Cohen, G.L., and Ito, T.A. 2010. Reducing the gender achievement gap in college science: A classroom study of values affirmation. *Science* 330:1234-1237.

Morgan, C.H., J.D. Lilley and N.C. Boreham. 1988. Learning from lectures: the effect of varying the detail in lecture handouts on note-taking and recall. Applied Cognitive Psychology 2: 115-122.

Titsworth, B.S., and K.A. Kiewra. 2004. Spoken organizational lecture cues and student notetaking as facilitators of student learning. Contemporary Education Psychology 29: 447-461.

Leading discussions
Each student will be responsible for one class period. The discussion leader will select 2-4 articles focused a topic of his or her choice and verify them with the instructor at least one week prior to the class period that they lead in order to give other students time to read the materials. The discussion leader is

expected to read additional articles to gain a broader understanding of the topic. He or she will give a short presentation (5-10 minutes) introducing the topic and its context, and then lead the group discussion. He or she is expected to come prepared with a set of questions to stimulate discussion, and actively encourage participation by all group members.

Grading
Grading is pass/fail (a pass requires a score of ≥80%). See rubrics at the end of this document for more details.

Item	Portion of Final Grade
Active participation in and preparation for weekly discussions	50%
Student presentation	50%

Attendance Policy
Since this course is based on class discussion, I expect you to attend EVERY class. If you cannot participate in a class for a legitimate reason (e.g., illness, emergency) I expect you to contact me beforehand. If you cannot do so (e.g., because you were in a car crash) please email or call me as soon as possible. **In order to pass the course, a student can have no more than one unapproved absence.**

Plagiarism/Academic Honesty Disciplinary action may be initiated in cases of plagiarism, cheating, and/or academic dishonesty. This includes providing false information in order to obtain an excused absence. Dishonesty will result in a failing grade. 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).

Sample Course schedule
[Note: these are examples only; actual topics will be driven by student interest]

Date	**Topic**
Sept. 6	Introduction
Sept. 13	Diversity1: background, education, life experiences
Sept. 20	Diversity 2: gender issues, learning styles
Sept. 27	Trends in assessment: formative
Oct. 4	Trends in assessment: summative
Oct. 11	Active Learning: classroom activities
Oct. 18	Active Learning: learning from lectures
Oct. 25	Metacognition
Nov. 1	Teaching the process of science
Nov. 8	Technology in the classroom
Nov. 15	"Big ideas" in science
Nov. 22	*No class, Thanksgiving*
Nov. 29	Promoting intellectual curiosity
Dec. 6	Educational Reform

Rubric for participation in discussion. Each higher level includes all of the activities from lower levels.

Score	**Level of participation**
0	The student is absent
3	The student is present, but does not appear to have read the papers
5	The student is present and has read the papers but does not actively participate beyond making one or two comments or answering a question
6-7	The student has read the papers and makes multiple contributions to the discussion. He or she is able to answer questions posed by the discussion leader and participates in, for example, explaining tables or figures.
8	The student has read and thought about the papers and makes multiple contributions to the discussion. He or she contributes actively by, for example, providing links to earlier topics covered in the course, recalling external experiences, etc.
9-10	The student provides new insights into the topic and synthesizes information across multiple papers or topics.

Components for discussion leaders.

Component	Excellent (10)	Adequate (7)	Poor (4)
Papers selected are relevant and engaging			
Papers selected have a clear central theme			
Introduction gives a clear overview of the topic			
Introduction puts topic into context of other course topics			
Introduction shows evidence of additional reading			
Discussion leader has prepared relevant and engaging questions			
Discussion leader has thoroughly read the papers			
Discussion leader is an effective moderator (e.g., engages students who speak little)			
Discussion leader show respect for different viewpoints			