

## Writing Course Review Form (12/1/08)

I. General Education Review – Writing Course			
Dept/Program Subject	Physics and Astronomy	Course # (i.e. ENEX 200)	Phys 330
Course Title	Methods of Communicating Physics		
II. Endorsement/Approvals			
Complete the form and obtain signatures before submitting to Faculty Senate Office.			
	Please type / print name	<b>Signature</b>	<b>Date</b>
Instructor	Brad Halfpap		
Phone / Email	243-2061 bradford.halfpap@umontana.edu		
Program Chair	Andrew Ware		
III Overview of the Course Purpose/ Description: Provides an introduction to the subject matter and explains course content and learning goals.			
<p>The focus of this course is learning to read journal articles, synthesize their content, and then write original thought in a variety of formats aimed at a variety of audiences. The first two thirds of the course examine aspects of physics education ( primarily at the university level ) and the last third is devoted to topics of the students choosing from articles written in the more accessible physics journals ( such as The American Journal of Physics or Physics Today ).</p> <p>In-class time is divided between guided discussions of the selected articles, discussions of composition, and analysis of student writing. The assignments are all out-of-class written pieces except for one group led discussion of an article. The written assignments fall into two categories. There are 8 one page criticism papers of the various articles. These provide the basis for much of our class discussion. Half of them are rewritten after evaluation by the instructor and the corresponding class discussion. There are three longer papers. Two are on assigned questions that arise from the physics education/learning theory papers the students have considered. They are each about 6 pages long. The final paper is about 12 pages long and concerns a topic chosen by the student in consultation with the instructor.</p> <p>The papers all go through a substantial writing process. Students bring detailed outlines to class and discuss them in small groups. Then drafts of initial pages are brought in and discussed in the same small groups. Complete first drafts are submitted to the instructor and comments are returned. Finally, finished drafts are graded by the instructor. The papers are graded on the basis of mechanical correctness, organization and composition, and intellectual content.</p> <p>The course grade is 70% derived from the written work and 30% derived from the oral participation and presentation.</p>			
IV Learning Outcomes: Explain how each of the following learning outcomes will be achieved.			
<b>Student learning outcomes :</b> Use writing to learn and synthesize new concepts		This is accomplished through the written work as described above.	

Formulate and express opinions and ideas in writing	The students <u>always</u> write their opinions! The hard part is getting them to formulate and write good, logical arguments based in what they have read.
Compose written documents that are appropriate for a given audience or purpose	Each of the papers is composed with an explicit audience in mind. These vary from paper to paper and student to student. Some students write for a technical audience of physicists. Other times the audience might be readers of the NYT science page. I have had students write sections for imagined textbooks to be used in middle school.
Revise written work based on constructive feedback	as outlined above
Find, evaluate, and use information effectively (see <a href="http://www.lib.umt.edu/informationliteracy/">http://www.lib.umt.edu/informationliteracy/</a> )	<p>The students are sometimes required to find the papers from the library journal stacks. During the last third of the course they must seek out their own articles and then the class as a whole decides what to read.</p> <p>The evaluation of the material is the primary concern of our class discussions and is frequently the object of their written critiques.</p> <p>Their papers are based in what they have learned from reading these ( and perhaps other ) papers. I insist that arguments be well formed and supported.</p>
Begin to use discipline-specific writing conventions	This does come about in a natural way as they write in the context of the articles that the class is reading.
Demonstrate appropriate English language usage	If they do not, I mark it on their papers and they fix it.
<b>V. Writing Course Requirements Check list</b>	
Is enrollment capped at 25 students? If not, list maximum course enrollment. Explain how outcomes will be adequately met for this number of students. Justify the request for variance.	Yes
Are outcomes listed in the course syllabus? If not, how will students be informed of course expectations?	Yes
Are expectations for Information Literacy listed in the course syllabus? If not, how will students be informed of course expectations?	No In the course of the classroom discussions and in the feedback I give them they work on these issues. I do not have any part of the course grade explicitly based in the information literacy standards.

Are detailed requirements for all written assignments included in the course syllabus? If not how and when will students be informed of written assignments?	No The final paper is discussed in class. The topics are chosen and the format is selected on a student by student basis.
What instructional methods will be used to teach students to write for specific audiences, purposes, and genres?	The students see examples, write their papers in a similar style, get feedback from others in the class as well as the instructor, and then rewrite their papers.
Will written assignments include an opportunity for revision? If not, then explain how students will receive and use feedback to improve their writing ability.	Yes
<b>VI. Writing Assignments:</b> Please describe course assignments. Students should be required to individually compose at least 16 pages of writing for assessment. At least 50% of the course grade should be based on students' performance on writing assignments. Clear expression, quality, and accuracy of content are considered an integral part of the grade on any writing assignment.	
Formal Graded Assignments	as described above
Informal Ungraded Assignments	as described above
<b>VII. Syllabus:</b> Paste syllabus below or attach and send digital copy with form. ↓↓ The syllabus should clearly describe how the above criteria are satisfied. For assistance on syllabus preparation see: <a href="http://teaching.berkeley.edu/bgd/syllabus.html">http://teaching.berkeley.edu/bgd/syllabus.html</a>	

Paste syllabus here.

Physics 395  
Spring 2008  
Course Syllabus and Schedule

Instructor	Brad Halfpap
Office	Room 227 - Science Complex 243-2061 <a href="mailto:bradford.halfpap@umontana.edu">bradford.halfpap@umontana.edu</a>
Office Hours	Monday, Wednesday, and Friday 11:00 to 12:00 and 1:00 to 2:00
Text	None - The textual matter for the course will consist primarily of journal articles that will be found in the library or online.

Assignments

There will be two midterm written papers and one end-of-term written paper. In addition there will be 8 critiques of articles and a group oral presentation. Finally, there will be nearly daily discussions of articles and critiques of articles. These will be weighted as follows:

Midterm papers	15% each
Final paper	20%
Group Presentation	15%
Article Critiques	20%
Discussion Participation	15%

- All written work will be typed and polished presentations. The papers will undergo a critiquing and reworking process before submission.
- Discussions of the sort we will have in this class only work if everyone is prepared. This means reading and thinking about the material prior to class. Unprepared participation will be discounted as equivalent to either an absence or no participation.

## Course Outline and Schedule

### I. Introduction to Physics Education and its Literature. ( Four weeks )

Date	Material to be read for class	Written Material Due	Comments
Jan. 22		None	Discuss course expectations and initial writing assignments.
Jan. 24	Papers 1 and 2	Critique of paper 1 or 2	Discuss papers 1 and 2.
Jan. 29	Papers 3 and 4	Each person will critique one of these four papers. At least two critiques per paper. Due the day of discussion. Turn in revision of critique for paper 1 or 2.	Discuss papers 3 and 4. Discuss 1 <sup>st</sup> critique.
Jan. 31	Papers 5 and 6		Discuss papers 5 and 6.
Feb. 5	Papers 7 and 8	Revision of second critique.	Discuss papers 7 and 8
Feb. 7	Papers 9 and 10	A one page analysis of papers 5 – 8. This counts as critique number 3.	Discuss papers 9 and 10. Talk about the 1 <sup>st</sup> midterm paper
Feb. 12	Paper 11	Outline of first midterm paper	Discuss outlines in small groups Short discussion of paper 11.
Feb. 14		First Draft of paper	Discuss 1 <sup>st</sup> page of each draft in small groups

#### *A. Articles that address the Force Concept Inventory*

1. D. Griffiths, "Millikan Lecture 1997: Is there a text in this Class?," Am. J. Phys. **65**, 1141-1143 (1997).
2. D. Hestenes, "Who needs physics education research!?" Am. J. Phys. **66**, 465-467 (1998).
3. The Force Concept Inventory
4. I. A. Halloun and D. Hestenes, "The initial knowledge state of college physics students," Am. J. of Phys. **53**, 1043-1055 (1985).
5. I. A. Halloun and D. Hestenes, "Common sense concepts about motion," Am. J. of Phys. **53**, 1056-1065 (1985).
6. D. Hestenes, M. Wells, and G. Swackhamer, "Force Concept Inventory," Phys. Teach. **30**, 141-158 (1992).
7. D. Huffman and P. Heller, "What does the Force Concept Inventory Actually Measure?," Phys. Teach. **33**, 138-143 (1995).

8. D. Hestenes and I. Halloun, "Interpreting the Force Concept Inventory," Phys. Teach. **33**, 502-506 (1995).
9. D. Huffman and P. Heller, "Interpreting the Force Concept Inventory. A Reply to Hestenes and Halloun" Phys. Teach. **33**, 507-511 (1995).
10. I. Halloun and D. Hestenes, "The Search for Conceptual Coherence in FCI Data," unpublished
11. K. Cummings et al., "Evaluating Innovation in Studio Physics," Am. J. Phys. Supp. **67**, S38-S44 (1999)

B. *First Paper* Write a formal recommendation to a hypothetical physics departmental committee on undergraduate curriculum, explaining and evaluating the FCI as a curriculum element for introductory undergraduate physics courses. The paper is to be six double spaced pages in length. Citations and figures are in addition to that.

II. **The Nature and Role of Learning Theories as Exemplified by Conceptual Change Theory.** ( Five weeks )

Date	Material to be read for class	Written Material Due	Comments
Feb. 19	None	None	Writing Exercise
Feb. 21	None	Revision of Paper #1 if you wish to turn in another.	Lecture on Learning Theories
Feb. 26	None	Final Draft of Paper 1	Lecture on Learning Theories
Feb. 28	Paper 12	None	Discuss Sister Hennessey's Classroom
Mar. 4	Papers 13 and 14	Each person critiques one of the four. Due on the day of discussion ( Critique number 4 )	Discuss papers 13 and 14
Mar 6	Papers 15 and 16		Discuss papers 15 and 16
Mar 11	Paper 17  You may restrict your reading to pages 234 through 251 if you wish.	Pick some single lesson that you take from the Karen episode and explain it. This should be no more than 1 page long. You are working on a coherent account here. ( Critique 5 )	Discuss paper 17 and discuss written work to date.
Mar. 13	Papers 18 and 19	Papers 20 and 21 to be distributed. Select topic paper for midterm paper number 2.	Discuss papers 18 and 19
Mar. 18	None	Outline for midterm paper number 2	Discuss outlines
Mar. 21	Paper 20	Group One hands out summary/critique	Group One leads discussion
	Paper 21	Group Two hands out summary/critique  First Draft of paper number 2	Group Two leads discussion

*A. Articles that address Conceptual Change Theory*

- Beeth, M. E. and P. W. Hewson (1999). "Learning goals in an Exemplary Science Teacher's Practice: Cognitive and Social Factors in Teaching for Conceptual Change." Science Education **83**: 738-760.

13. Posner, G. J., K. A. Strike, et al. (1982). "Accommodation of a Scientific Conception: Toward a Theory of Conceptual Change." Science Education **66**: 211-227.
14. Hewson, M. G. and P. W. Hewson (1983). "Effect of Instruction Using Students' Prior Knowledge and Conceptual Change Strategies on Science Learning." Journal of Research in Science Teaching **20**: 731-743.
15. Strike, K. A. and G. J. Posner (1985). A Conceptual Change View of Learning and Understanding. Cognitive Structure and Conceptual Change. L. a. P. West, L. Orlando, Academic Press: 259-266.
16. Hewson, P. W. and M. G. A. B. Hewson (1988). "An Appropriate Conception of Teaching Science: A View from Studies of Science Learning." Science Education **72**: 597-614.
17. Macbeth, D. (2000). "On an Actual Apparatus for Conceptual Change." Science Education **84**: 228 - 264.
18. Hynd, C., D. Alvermann, et al. (1997). "Preservice Elementary School Teachers' Conceptual Change about Projectile Motion: Refutation Text, Demonstration, Affective Factors, and Relevance." Science Education **81**: 1-27.
19. Trundle, K. C., R. K. Atwood, et al. (2002). "Preservice Elementary Teachers' Conceptions of Moon Phases before and After Instruction." Journal of Research in Science Teaching **39**: 633-658.
20. A paper describing the application of CCT to an actual teaching environment. This will be located and distributed by Group One no later than March 11.
21. Same as paper 20 but found by Group Two and also distributed no later than March 11.

*B. Group Projects*            The class will be divided into two groups. Each will locate and lead a discussion of a paper that illuminates or criticizes Conceptual Change Theory.

*C. Second Paper* Select the paper that we have read this semester about which you have the most serious and substantial complaints. Write a criticism of that paper illustrating the weaknesses and faults as you see them. You must base your arguments in evidence and reason; in short, give me good reason for adopting your point of view that the paper is seriously flawed. If you cannot find a paper to which you seriously object from those we have read you may find another in the science education literature. Show it to me before you begin to write. ( Six pages as before )



### III. Reading Physics Journals and Technical Writing ( Four weeks )

Date	Material to be read for class	Written Material Due	Comments
Apr. 1	None	Draft of Paper 2	We will be discussing the two papers that the class selected prior to break.
Apr. 3	Paper 22  The reverse water sprinkler 1989		Paper 22a  This is an update of paper 22 that you may read if you are interested.  Our discussion will focus on how to read the paper and what it means. I am expecting that you may have some trouble despite the not-too-advanced nature of the paper
Apr. 8	Paper 23  There may be much that is beyond you – work at getting what you can.	I will return comments on paper 2 no later than today.	We will be trying to put into practice some of the ideas and techniques of paper reading that were discussed on April 3. Come prepared to discuss paper 23 in that light.
Apr. 10		Bring some ideas for potential final paper topics with you to class.	Finish talking about papers 22 and 23. Discuss the final paper and potential topics.
Apr. 15	Paper 24  I want you to see a Phys. Rev. article. Do not sweat the details. Go for the big ideas. Look at the pictures and make connections to the thermodynamic s concepts you already have.	Turn in final draft of paper 2.  Find one article that you would like the class to read. Bring title and abstract.	Discuss paper 24. Select paper 25.
Apr. 17		Have your topic chosen for	Small group discussions of final

		the final paper. Write a short description of the paper, where it would appear, and the target audience. Hand this in to me.	paper.
Apr. 22		Final paper outline	Discuss outlines
Apr. 24		One good page of final paper.	Discuss first page of final paper
Apr. 29	Paper 25	1 <sup>st</sup> draft of final paper due by 3pm.	Discuss paper 25  I will email copies of my comments to you by Saturday night. The final draft is due by Wednesday of finals week at 3pm.
May 1			Wrap up and evaluation

A. *Physics articles*

22. Richard Berg and Michael Collier, “The Feynman inverse sprinkler problem: a demonstration and quantitative analysis.” *American Journal of Physics* **57**, 654-657 (1989).
23. V. G. Gueorguiev, A. R. P. Rau, and J. P. Dyaayer, “Confined one-dimensional harmonic oscillator as a two mode system.” *American Journal of Physics* **74** 394-403 (2006).
24. Richard P. Stephens, “Intrinsic low-temperature thermal properties of glasses.” *Physical Review B* **13** 852-865 (1975).
25. To be chosen by the class

B. *Final Paper* For your final paper you will pick a topic and a target audience for your paper. This will be a substantial effort that will be 10 to 12 pages in length and will be based upon at least 3 papers you have read. The topics will vary widely but they must all satisfy the following criteria.

- *You must be interested in the topic.*
- *The topic must be based in the science of your major or in science education.*
- *The topic must be narrow enough so that you can develop your thoughts at length.*
- *Your points must be supported by evidence and argument.*

## Standard Syllabus Material

Students are expected, when selecting and registering for their courses, to make informed choices and to regard those choices as semester long commitments and obligations. After registering and through the **first fifteen (15) instructional days of the semester**, students may use the internet (<http://cyberbear.umt.edu>) to drop and add courses or change sections and credits. Fees are reassessed on the fifteenth day of the term. Added courses and credits may result in additional fees. For courses dropped by the fifteenth instructional day, no fees are charged and courses are not recorded. (For deadlines and refund policy for withdrawal from all courses, see the Withdrawal sections of this catalog.) An instructor may specify that drop/add is not allowed on the internet. A drop/add form is used to make changes in these courses, if approved by the instructor. After adding a course, the credit/no credit grading option or auditor status may be elected on the internet or on a form available at the Registration Counter in Griz Central in the Lommasson Center. These options are not allowed for some courses as identified in the Class Schedule. Change of grading option to audit is not allowed after the 15th instructional day. Beginning the **sixteenth (16) instructional day of the semester through the thirtieth (30) instructional day**, students use paper forms to drop, add, and make changes of section, grading option, or credit. The drop/add form must be signed by the instructor of the course and the student's advisor. The signed drop/add form must be returned to the Registration Counter (or the Registrar's Office at the College of Technology) no later than the thirtieth instructional day. A \$10.00 processing fee is charged for each drop/add form. Added courses and credits may result in additional fees. There are no refunds or reductions of fees for courses dropped and grades of W (withdrew) are recorded. Beginning the thirty first (31) instructional day of the semester through the last day of instruction before scheduled final examinations, students must petition to drop, add, and make changes of section, grading option, or credit. The petition form must be signed by the instructor of the course and the student's advisor and, in the case of drops only, by the dean of the student's major. A \$10.00 processing fee is charged for each petition. Added courses and credits may result in additional fees. There are no refunds or reductions of fees for courses dropped, and the instructor assigns a grade of WP (withdrew/passing) if the student's course work has been passing or a WF (withdrew/failing) if the course work has been failing. These grades do not affect grade averages but they are recorded on students' transcripts. Documented justification is required for dropping courses by petition. Some examples of documented circumstances that may merit approval are: registration errors, accident or illness, emergency, change in work schedule, no assessment of performance in class until after this deadline, or other circumstances beyond the student's control. The opportunity to drop a course for the current term or alter grading option for such a course ends on the last day of instruction before scheduled final exams. Dropping a course taken in a previous term or altering grading option or audit status for such a course is not allowed. The only exceptions are for students who have received a grade of NF (never attended) or new students unfamiliar with the drop process who have ceased attendance before the sixteenth day of instruction and can provide to the Registrar's Office instructor verification of non-attendance.

### Class Attendance/Absence Policy

Students who are registered for a course but do not attend the first two class meetings may be required by the instructor to drop the course. This rule allows for early identification of class vacancies to permit other students to add classes. **Students not allowed to remain must complete a drop form or drop the course on the internet (<http://cyberbear.umt.edu>) to avoid receiving a failing grade.** Students who know they will be absent should contact the instructor in advance. Students are expected to attend all class meetings and complete all assignments for courses in which they are enrolled. Instructors may excuse brief and occasional absences for reasons of illness, injury, emergency, or participation in a University sponsored activity. (University sponsored activities include for example, field trips, ASUM service, music or drama performances, and intercollegiate athletics.) Instructors shall excuse absences for reasons of military service or mandatory public service. Instructors may establish absence policies to conform to the educational goals and requirements of their courses. Such policies will ordinarily be set out in the course syllabus. Customarily, course syllabi will describe the procedures for giving timely notice of absences, explain how work missed because of an excused absence may be made up, and stipulate any penalty to be assessed for absences.

### Spring Semester, 2006

January 18-20 (Wed-Fri) . . . . . Semester Begins;Orientation& Registration  
January 23 (Monday) . . . . .Classes Begin  
February 20 (Monday). . . . .Washington-Lincoln Day, Holiday  
March 27-31 (Monday-Friday). . . . .Spring Vacation  
April 17-28 . . . . . Autumn 2006 Registration Begins  
May 6-7 (Saturday-Sunday). . . . .Study Days  
May 8-12 (Monday-Friday). . . . . Final Examination

### Academic Honesty

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the university.

All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VPSA/index.cfm/page/1321>.