Science Education 201: Matter and Energy in Physical Systems
Western Washington University, Winter 2016

Class meetings: MWF 10:00 – 11:50 A.M. in SL240
Instructor: Dr. Marc N. Muniz (CB 244, 650-4645, marc.muniz@wwu.edu)
Instructor office hours: M 1:00 – 2:00 P.M., R 10:00 – 11:00 AM, F 1:00 – 3:00 P.M.
TA: Michael Merrifield (SMATE Slesnick Resource Center, mmerrifield2@gmail.com)
TA office hours: TBA
Text: “Physics and Everyday Thinking” available at the campus bookstore.

Course Overview and Learning Goals
This is a student-centered, lab-based physics course intended primarily for students pursuing a career in K-8 teaching. The course has four major learning goals:

1) **Physics content.** Students develop deep understanding of basic physics concepts and reasoning in order to explain everyday phenomena. Topics include those that are covered in the elementary school science curriculum, with a focus on the concepts of energy and force.

2) **Learning about learning.** Students develop awareness of how their own ideas change and develop, and how the structure of the learning environment and curriculum facilitates these changes.

3) **Elementary students’ ideas.** Students analyze the thinking of elementary students who are engaged in scientific inquiry, in order to become familiar with common ways of thinking, productive learning resources, conceptual difficulties, etc. that are present in these young students.

4) **Nature of science.** Students develop understanding of the nature of scientific knowledge, including how knowledge is generated within a scientific community, the role of creativity to generate explanations, and the use of evidence to test explanations.

What to expect during class meetings
This is a lab-based course in which students alternate between working through guided activities in small groups and participating in full class discussions. During the small group work, you will make predictions, conduct experiments, complete exercises, and work with computer simulations. During all of these activities, you are expected to discuss your ideas with your partners. The full class discussions will allow you to check, verify, and perhaps modify the ideas from your small group work. Learning is thus student directed, and achieved through collaboration and consensus. There is *little or no lecturing.* Instead, the instructor will act as a “learning coach,” providing guidance and facilitating your work. The curriculum is designed for you to take charge of your own learning. I hope that you, as a learner, are excited about this approach, but recognize that it may also be unnerving and/or frustrating at first. I hope you will find that many of the learning and teaching strategies employed in this course are valuable and appropriate for you to use when you begin your teaching career.

General course policies
1) **Internet usage.** Many of the HW assignments require access to the Internet. The instructor will use email and Canvas to communicate with the class; you are expected to check your WWU e-mail account and the Canvas site daily.

2) **On-time attendance and missed classes.** Due to the collaborative nature of this class, it is important to attend all class meetings and arrive on time, prepared to begin at 10:00 A.M. Your learning depends on being here and participating. In addition, your partners are depending on you. A missed class
cannot simply be made up by getting the notes from another student. On-time attendance is required and is worth course credit.

For an absence to be considered excused, you must have a valid reason and contact the instructor prior to class. Valid reasons are: illness, family or personal emergency, or a school related trip (for example, if you are on a Viking sports team that is traveling to a match). Absences that will not be counted as excused include: scheduled dentist or doctor appointments, scheduled family vacations, attending office hours for another class, or registering for classes for next quarter. A pattern of repeated late arrivals will negatively impact your grade, with a loss of up to 10% of the points for the class. The first unexcused absence will drop your course grade by 2%, the second by an additional 4%, and the third by an additional 6%. More than three unexcused absences will prevent a student from receiving credit for the course.

3) Cell phones. Please keep cell phones on silent and put away during class. Repeated cell phone use during class will result in deduction of participation credit.

Course work
Participation. Since you will be generating your own knowledge and understanding in this course, active engagement is essential, both during small group work and during full class discussions. Active engagement includes asking questions, responding to the questions of other students, and offering your own ideas. Participation credit is assigned on the basis of contributions of these types. Some other ways that participation credit will be assigned include: self and peer evaluations of the level of participation during in-class work, completing surveys and questionnaires, and spot checks during the quarter of the workbook for being complete and up to date.

Homework. Written homework will be assigned after most class periods. Assignments will involve applying the concepts and reasoning developed in class to new situations, or extending those concepts. Due dates will be announced in class. All assignments are due at the beginning of class. Late work will not be accepted. Homework will be graded with written feedback and returned (details TBA).

Learning Commentaries. At the close of each Chapter, students will write a short reflection paper. The purpose is to retrace what you learned and how you learned it. For each paper, you will be asked to select a specific concept from the chapter that was challenging. The papers will be graded on clear identification and discussion of your initial ideas about that concept, your current understanding of that concept, and the “trigger experiences” that led you to modify your thinking. Students will be required to document these three elements by referring to their written work from the workbook and/or homework. Some credit will also be awarded for spelling and grammar. Note: The last learning commentary paper will be due on the date of the final exam (Monday, March 14th at 10:30 A.M.).

Chapter quizzes. All quizzes are closed book. Since the course is largely self-paced, dates of quizzes cannot be announced in the syllabus. Quiz dates will be announced ahead of time in class. Note: The last chapter quiz will be administered during finals week, on Monday, March 14th, at 10:30 A.M. Quizzes cannot be made up; students must be present to take the quiz and receive credit.

Reasonable Accommodation
Reasonable accommodation for persons with documented disabilities should be established within the first week of class and arranged through Disability Resources for Students: telephone 650-3083; email drs@wwu.edu; and on the web at http://www.wwu.edu/depts/drs/
Student Services
Western encourages students to seek assistance and support at the onset of an illness, difficulty, or crisis. In the case of a medical concern or question, please contact the Health Center: 650-3400 or www.edu/chw/student_health. In the case of an emotional or psychological concern or question, please contact the Counseling Center: 650-3400 or www.edu/chw. In the case of a health and safety concern, please contact the University Police: 650-3555 or www.ps.wwu.edu/. In the case of a family or personal crisis or emergency, please contact the Dean of Students: 650-3775 or www.edu/dos/contact_us.shtml.

Integrity
As a community, Western is committed to integrity in all aspects of academic and campus life. An excellent resource for guiding students is Western’s Integrity website. (See Integrity.) This site is a clearinghouse of resources that encourages and educates about integrity. Besides covering more common problems related to academic integrity, such as plagiarism and cheating on exams, it also addresses ambiguous areas, such as collaborative work, the use of language translators, and submitting the same paper in different classes. In addition to this site, the University Catalog in Appendix D—Academic Honesty Policy and Procedure—delineates rights and responsibilities. (See Appendix D.)

Course grades
You final grade will be based on the following components and weighting:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Participation</td>
<td>20%</td>
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<tr>
<td>Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Learning commentaries</td>
<td>20%</td>
</tr>
<tr>
<td>Chapter Quizzes</td>
<td>30%</td>
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</tbody>
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The scale is as follows:
- 93% A
- 83% B
- 73% C
- 63% D
- 90% A-
- 80% B-
- 70% C-
- 60% D-
- 87% B+
- 77% C+
- 67% D+
- < 60% Fail

Final comment
The emphasis of this course is learning through collaboration and consensus—a method proven effective by extensive research and the way we hope you will teach. The approach may be different than science courses you have taken previously. Importantly, mutual respect for everyone is a key to ensuring a safe learning environment in which all students can thrive. If you aren’t sure why I am doing what I am doing, or have concerns about anything related to the course, don’t hesitate to ask! I am interested in talking to you about physics concepts, the nature of learning and teaching, and your personal experience in the course.

This syllabus is subject to change. Changes, if any, will be announced in class. Students will be held responsible for all changes announced in class.