PS 122 - Physical Science for Teachers 2016 Spring … § 201 (4673)

Classes Meet: _T_R_ 10:00 – 11:50 am in Sci.179 … Final Exam: Tue.May.03 at 8am

Instructor: Dr. Curt Foltz office: Sci.159 email: foltzc@marshall.edu Phone: 696-2519
office hrs: M_W_ 9:30-11:30 … _T_R_ 1:30-3:30 … _W_ 2:30-4:30 … _F 10:30-12:30

Required Texts: C*onceptual Physics* by Hewitt (Pearson) … and PS 122 Workbook

Catalog Description: PS 122 is part of a 3 course sequence of Physical Science for K-9 Education majors. Includes a 2-hr, 1 credit lab. (*3 hours*)
… PreRequisite: MTH 121 or 127 or 130 or 132 or 140 or 229

Fuller Course Description: PS122 is a 1-semester introduction to physics, especially focused on content topics needed to teach the Next Generation Science Standards at the K-9 levels. The course is designed to show ways that this science can be related to mathematics topics and language arts projects in the classroom, and to the engineering design practices that are included in these new standards.

This course will model the type of inquiry-based, interactive learning environment expected from teachers by the NGSS. Lectures will be brief and interspersed with lab activities and investigations designed to foster higher-order learning and enhance critical thinking skills.

Grading:				
	Homework	10%	A	90 - 100
	Investigations	15%	B	80 - 89
	Journal	10%	C	70 - 79
	Tests (3)	45%	D	60 - 69
	Final Exam	20%	F	0 - 59

Course Web Site: **http://www.science.marshall.edu/foltzc/p122_16s.htm**

Homework: Homework will be scored online, by the textbook publisher's *Mastering Physics.* An access code is either bundled with the textbook, or may be purchased separately online. Our section's course ID # is PS122Foltz_4673 .

Please do the homework. Please allow enough time on the homework so that you can think about your responses and pay close attention to the questions. It is not intended to be mere busy work but is instead an important part of the learning experience. Education research consistently shows what might be obvious - students who do the homework for themselves (not copying off of someone else, or just finding answers online) not only earn higher grades in the course, but also feel better about the class.

I can't make you do the homework. I can't make sure that you always do it for yourself. But I can guarantee that you will severely lower your chances of getting a good grade, or even passing, if you don't do the homework. *So, please do the homework.*

Investigations: At least half the class will be devoted to hands-on, laboratory-style investigations; design or testing problems; and lecture tutorials. Many of these will be "open-ended" scenarios where the exact design and procedure of the investigation will be up to you. This is consistent with the letter and spirit of the NGSS, so you will have a chance in this course to practice what you will teach.

Journals: You will record your investigation efforts in a science journal. Include procedures and activities, results from those activities, and conclusions that result from these efforts. You will periodically reflect on your procedures, efforts, conclusions, *etc* … that is, your learning process. Journals will be usually be stored in the classroom

Unit Exams: A total of three (3) Unit Exams will be conducted throughout the semester. Material from the investigations *WILL* be included on each Exam.
Unit Exams may be 25% from hands-on activities similar to the investigations (but solo).

Final Exam: The final exam *WILL* be cumulative.

University Policies:

By enrolling in this course, you agree to the University Policies listed below. The full text of each policy is available on-line at http://www.marshall.edu/academic-affairs/?page id=802

Academic Dishonesty / Excused Absence Policy / Computing Services Acceptable Use / Inclement Weather / Dead Week / Students with Disabilities / Academic Forgiveness / Academic Probation and Suspension / Academic Rights and Responsibilities of Students / Affirmative Action / Sexual Harassment

Attendance Policy: Attending class is crucial to your success, as many of the class activities are interactive. Arriving on time for all class meetings is expected. Period. Excessive tardiness or absences - excused or not - may affect your ability to earn a passing grade.

Excused Absences - Students who miss interactive activities with an excused absence will be provided an alternative assignment to replace the activities in the missed class session.

Unexcused Absences

- If you miss two classes, expect an email from your instructor.
- If you miss a third class, your course grade will automatically be lowered by one letter.

– Mandatory meeting with instructor. At the instructor's discretion, you may develop a plan to improve; if you satisfy the improvement criteria, you may remove that letter grade drop.

- If you miss a fourth class, the previous letter grade deduction stands.
  (an improvement plan will not change this grade.)
- Subsequent missed classes will result in additional letter grade deductions.

Other Course Policies:

- Any work handed in late will suffer a 20% penalty per **calendar** day.
  This does not apply for any day for which there is an excused absence.
- Makeup work will **NOT** be allowed except for *documented* emergencies.
- If you must miss a class, contact me ASAP - ahead of time if scheduled in advance.
- Cell phone use is not permitted in the classroom - turn phones to OFF or vibrate - please step into the hallway if you need to take an incoming call during classtime.
- Any act of academic dishonesty of any kind will result in a final grade of F for the class.

Learning Outcomes …

Practiced on Homework & Investigations
Assessed on Unit Exams & Final Exam

Learning Outcomes List (essentially lifted from NGSS):

- Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
- Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a force.
- Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- Apply Newton's Third Law to design a solution to a problem involving the motion of two objects during their colliding.
- Support an argument that the gravitational force exerted by Earth is directed down.
- Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
- Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object
- Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

- Define a simple design problem that can be solved by applying scientific ideas about magnets.
- Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
- Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
- Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
- Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
- Generate and compare multiple solutions that use patterns to transfer information.
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Analyze data from tests to determine similarities and differences among several design solu- tions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.