Course Title/ Number	**PS for Teachers: Physics / PS 122**
Semester/Year	Spring 2017
Days/Time	PS 122-201 (CRN: 4617): TR 9:00 am – 10:50 pm
Location	Science Building Room 179
Instructor	Dr. Howard L. Richards
Office	Science Building Room 105
Phone	304-696-6466 / Fax: 304-696-2494
E-Mail	RichardsH@Marshall.edu
Office/Hours	

	Monday	Tuesday	Wednesday	Thursday	Friday
09:00 AM		PS 122	Office Hours	PS 122	Office Hours
10:00 AM					
11:00 AM	Office Hours				
12:00 PM		FYS 100		FYS 100	
01:00 PM	PHY 203		PHY 203		PHY 203
02:00 PM	PHY 492		PHY 492	Office Hours	
03:00 PM					
04:00 PM		PHY 101L			
05:00 PM					

University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 Academic Dishonesty/ Excused Absence Policy for Undergraduates/ 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
Consumer Information and Disclosures	To assist in locating federally mandated consumer information and disclosures, Marshall University has created a launching point at http://www.marshall.edu/disclosures/. Reports and information on a variety of specific areas, including financial aid, student privacy, student body diversity, the drug and alcohol abuse prevention program, employment and further education statistics for graduates, refund policies, and campus safety, are available from this website.

Course Description: From Catalog

PS 122 is part of a 3 course sequence of Physical Science for K-9 Education majors. Includes 2-hr, 1 credit lab. (3 hours)

Learning Outcomes (from the *Next Generation Science Standards*):

Practice: Homework & Investigations
Assessment: Unit Exams & Final Exam
Outcomes:

- 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 colliding objects.
- Support an argument that the gravitational force exerted by Earth on objects 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 red, 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 di#erent 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 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 solutions 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.

Required Texts, Additional Reading, and Other Materials

1. *Ranking Task Exercises in Physics*, by Thomas L. O'Kuma, David P. Maloney, and Curtis J. Hieggelke (ISBN-13: 978-0130223555)
2. MasteringPhysics access (can be bought through MasteringPhysics.com)
3. Recommended: *Conceptual Physics* by Benjamin Crowell (http://www.lightandmatter.com/cp/)
4. Recommended: *A Textbook for High School Students Studying Physics* (https://en.wikibooks.org/wiki/FHSST_Physics)

Investigations:

Part of 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" problems. The exact design and procedure of the investigation will be up to you. This is in keeping with both the letter and spirit of the NGSS, so you will have a chance in this course to practice what you will teach.

Journals:

All of your experimental work on the investigations will be kept in your science journal, as well as your conclusions on the results. In addition you will be asked periodically to reflect on the assignments and comment on your learning process. Journals will be kept in the classroom at all times. Although I will periodically review your journals and offer feedback, you are encouraged to discuss your writing with me at any time.

Quizzes:

Quizzes will usually be given on Thursdays. You will be warned in advance what to study. Most quiz questions will be based on ranking problems from *Ranking Task Exercises in Physics*.

Exams:

A total of three (3) exams covering each unit will be conducted throughout the semester. Material from the investigations *will be included* on the exams.
The final exam will be cumulative and is mandatory.

Attendance:

Roll will be taken early in the class period. If you arrive after roll has been taken, it is the instructor's decision whether or not to count you as present. If you are too late to participate in a group investigation, you should not expect to be counted as present. If you are habitually late, you should not expect to be counted as present.

Excused Absences

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

Unexcused Absences

- If you miss two classes, expect an email/notification from your instructor.
- If you miss a third class, you will face:
  - Automatic one letter grade deduction in the course.
  - Mandatory meeting with instructor. At the instructors discretion, you may develop a plan of improvement, and if you meet its criteria, you may have the chance to potentially earn back the letter grade deduction. Keep in mind this option is at the instructor's discretion.
- If you miss a fourth class, the previous letter grade deduction stands. (Improvement plan will not change this grade.)
- Subsequent missed classes will result in additional letter grade deductions.

Homework:

Homework is online at www.masteringphysics.com. Some textbooks may come with a key for access to masteringphysics included, but if you do not have such a key, you can purchase access through the web site. The course ID is **PS122SPRING2018RICHARDS**.

It is your responsibility to check masteringphysics.com regularly to see when new homework assignments are posted. Check at least once a week. Do not attempt homework if the material has not yet been covered in lecture, but do not fall behind, either.

Problems with the technology of the website should be directed to the attention of customer support. Only problems with the physics should be addressed to the instructor, either during office hours or (since any difficulty you have is probably shared by several other students) during class time. Please feel free to ask questions, though!

Grading Policy:

10% Homework	**A = 90^{+}**
10% Journal	**B = 80-90^{-}**
15% Quizzes	**C = 70-80^{-}**
45% Tests 1-3 (15% each)	**D = 60-79^{-}**
20% Final Exam	

Policy for Students with Disabilities:

Marshall University is committed to equal opportunity in education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Office of Disabled Student Services (DSS) in Prichard Hall 117, phone **304-696-2271**, to provide documentation of their disabilities. Following this, the DSS Coordinator will send a letter to each of the student's instructors outlining the academic accommodation he/she will need to ensure equality in classroom experiences, outside assignment, testing and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, please visit http://www.marshall.edu/disabled or contact Disabled Student Services Office at Prichard Hall 11, phone **304-696-2271**.

Students with Medical Conditions:

In addition to the above, students with medical conditions, temporary or permanent, that may require special attention or accommodation (such as epilepsy) should inform the instructor as soon as possible.
Your privacy will be respected.

For Additional Help:

- If you find yourself struggling, **let the instructor know**. Feel free to drop by during office hours – that's what they are there for!
- It may also be a good idea to study with other students taking the same course.
- A very good online tutorial for intro physics can be found at the HyperPhysics web page: http://hyperphysics.phy-astr.gsu.edu/.
- The Physics Department has a page of tutorial links at http://www.marshall.edu/physics/tutoring-resources/.
- There is also a tutoring center in Laidley Hall. See http://www.marshall.edu/wpmu/uc/tutoring-services/ for details.

Course Schedule:

Week	Dates	Subject(s)	Workbook pgs.
1	Jan 9 & 11	Vectors; Kinematics	1-13
2	Jan 16 & 18	Newton's Laws	14-45
3	Jan 23 & 25	Circular Motion; Momentum	46-55; 74-82
4	Jan 30 & Feb 1	Work & Energy; Torque & Equilibrium	56-73
5	Feb 6 & 8	Rotational Motion; Test Review	83-90
6	Feb 13 & 15	Test 1; Electric Charge & Force	122-126;134-136; 143-144
7	Feb 20 & 22	Electric Field; DC Circuits	127; 132; 137-142; 155-179
8	Feb 27 & Mar 1	Magnetism; Induction	180-195
9	Mar 6 & 8	Basic Gas Laws; Fluids	98-108; 110-114
10	Mar 13 & 15	Test Review; Test 2, Mar 15	
Spring Break: Mar 19 - 23			
11	Mar 27 & 29	1st & 2nd Laws of Thermodynamics	…
12	Apr 3 & 5	Vibrations; Mechanical Waves	96-97; 196-207
13	Apr 10 & 12	Reflection and Refraction; Mirrors and Lenses	208-216
14	Apr 17 & 19	Test Review; Test 3, Apr 19	…
15	Apr 24 & 25	Interference; Diffraction; E&M Waves	217-218
FINAL EXAM: 8 am Tuesday, May 1			

Aside from the final exam and Spring Break, the dates and topics are subject to change. See the university academic calendar in the "Calendars" folder under "Course Content" on the MUOnline page for important university dates.

Classroom Behavior:

Disorderly conduct that interferes with the normal classroom atmosphere will not be tolerated. The classroom instructor is the judge of such behavior and may instruct a disorderly student to leave the room with an unexcused absence. More serious misconduct may result in a complaint to the Office of Judicial Affairs. "Official University action will be taken when a student's or student group's behavior violates community standards, interferes either with the University's educational purpose, or with its duty to protect and preserve individual health, welfare, and property. When the behavior is aggravated or presents a continuing danger to the University community, accused students are subject to separation from the institution."[1]

No food or drink is allowed in the lab room. All cell phones must be turned off or set to vibrate only before the beginning of class. Any student who takes a call must leave the classroom to do so. Phone calls may not be placed or received during quizzes or tests. No devices may be used to play games or watch videos unrelated to classroom discussions.

You may not use your phone as a calculator during tests, nor any other tablet or device capable of sending or receiving text, emails, video, or phone messages. You can get a very good scientific calculator (e.g., Casio *fx-300ES PLUS*) for less than $20; I recommend choosing one with two-line display (so you can check for typos in your input) and at least 3 memory locations (usually named A, B, C, …) in which you can store intermediate results to avoid rounding error. Of course, if some other department required you to buy an unnecessarily expensive graphing calculator, you can use that, too.

Academic Dishonesty:

"Academic Dishonesty is something that will not be tolerated as these actions are fundamentally opposed to 'assuring the integrity of the curriculum through the maintenance of rigorous standards and high expectations for student learning and performance' as described in Marshall University's Statement of Philosophy."[2] Cheating and other forms of academic dishonesty will bring serious sanctions, including possible expulsion. **Cheating on an exam will result at minimum in failing the entire course.**

Students are not allowed to use data they had no part in collecting.

You may work together on homework, but do not just copy someone answers from someone else. Not only is this dishonest, it will make you more likely to do badly on the next test.

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1 *Student Handbook*, available at www.marshall.edu/student-affairs/sections/handbook/INDEX.HTML

2 Ibid.