

# Fundamentals of Physics

## PHYS 3400      Spring 2013

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**Office:** Science 21: office hours by appointment

PHYS 3400	-001	MW	9:00 - 11:50
	-002	MW	1:00 - 3:50
	-003	TR	9:00 - 11:50
	-004	TR	1:00 - 3:50

***Text:***

*Coloring Book of Physics* second edition ISBN 978-1-4652-0244-4. It contains almost all of the activities being covered in class.

***Course Description:***

This is a course designed to instruct future educators in the basics of science and, then, introduce the techniques of teaching science. Class time will move freely from lecture to hands-on activities and back again. First, we will learn the fundamentals of a part of physics, and then we will learn several ways to explore this physics. Lastly, we will learn how to teach this to someone else. This will, hopefully, de-mystify science and you can then approach the teaching of science with less fear. This is an unparalleled opportunity for beginning educators. You could learn a great deal this semester.

This class will be in Cooper ISD classrooms about half the time. We will get you into public school classrooms as quickly as possible. You will have an opportunity to observe science and in some cases practice your own ideas. You will get an impression of how to start with a new science concept, put it in a deliverable form, and see your idea change as it and you react with the students. You can learn a lot in just a few classes.

***Learning Outcomes Assessment:***

The successful student will acquire content information on physics applicable to the primary classroom. This will be assessed by pre- and post-testing around concept clusters (balance & motion and sink & float). The successful student will learn to take a topic, research it, design a lesson to teach it, and implement it. This will be assessed by having you design your own lessons around a variety of topics. This will hopefully show how well you learned the material presented and how well you can potentially teach it.

***Expectations of students:***

Your attendance in class will be important. The class is made up of hands-on activities; therefore your attendance is expected. Your attendance will be monitored by asking you to sign an attendance sheet. If you cannot be in attendance, please have the professional courtesy of letting me know prior to meeting time.

### ***Outline of Activities and Assignments:***

1. **Participation** is going to be a large part of your course grade. Each class will introduce you to a hands-on activity. The lessons that will be presented are listed in your text and on the last page of the syllabus.

To begin each concept cluster, you will be given a pre-assessment to assist me in understanding how much you know before beginning the lessons. The pre-assessment will be counted as participation points, not an actual letter grade. Your honest participation is required.

The semester will be broken up between participation at Texas Tech and at Cooper ISD. You will be placed in an elementary classroom in which you will attend half of the semester. All paperwork necessary for you to begin at Cooper will be given to you in class to fill out. While at the schools, you will be directed to sign in to a folder so that your participation is monitored. If you are attending a classroom in a K-12 school district in another course, I will need information regarding how often you are to attend, the school you are attending, grade level, area of concentration, and the course name and number.

2. **Post-Assessments** will be given at the end of a concept cluster. These assessments assist me in assessing my teaching and your learning. You will be graded on the information presented to you in the post assessments. If you miss a class due to an excused absence, you will get the chance to make-up the assessment. On the last page of the syllabus, I have provided an outline of when the post assessments will be given so you can be sure not to miss that day of class.

3. **Short reflection papers** give you a chance to discuss topics about the classroom you are observing or elaborate on a lesson taught in class. The professor will assign the topics and you will not be required to write more than a page. Free writing is a great way to promote learning in the classroom and give the student time to reflect on what was learned. The reflection papers will be opinion based and cannot harm your overall grade.

4. **Sony Bloggie Discussions** are ways for your groups to communicate about a topic that was just learned. You will be given two assignments that will be discussed and answered using a Sony Bloggie. A Sony Bloggie is a flip camera that can record or take pictures. The discussions will be recorded as a group and given to me for review. This is a new concept used in the course that helps translates the students knowledge and learning into words, much like presenting to a classroom.

5. **Lesson plans** will be put together at the end of the semester to make a portfolio. A portfolio is, first a collection of evidence of your learning, and, second, a record of how to teach several lessons. You will design 6 science lesson plans focused on an elementary grade you are interested in teaching. When writing your portfolio you need to think in terms of coming back to this in about five years. You do not have to focus strictly on Physics while compiling your lesson plans.

The portfolio of you lessons will follow a 5E format:

- \* **Engage**- These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.
- \* **Explore**- Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the

concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

- \* **Explain**- Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.
- \* **Elaborate**- Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.
- \* **Evaluate**- The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.

**Discovery Education Science 5E lesson plan template. [Discoveryeducation.com](http://Discoveryeducation.com).**

### ***Grading:***

Relative weights to these components will be as follows:

- 50 pts Class participation
- 40 pts Unit Post-test on concepts
- 30 pts Portfolio of lesson plans
- 20 pts Reflection Papers
- 10 pts Video Explanations

The anticipated grading scale is 90-100%= A [135-150]; 80-89%= B[120-134]; 70-79%= C[105-119]; 60-69%= D[90-104]; and less than 60%= F [less than 89 points]. There will not be a comprehensive written final. You are learning to do things, not write things or regurgitate facts.

Any student, because of a disability, who may require special arrangements in order to meet course requirements, should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note that instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or (806) 742-2405.

Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student, such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor or the attempt to commit such an act. **If plagiarism is found, the students involved will lose a full letter grade from the final grade. Plagiarism will be determined solely by the informed opinion of the instructor.**

Any student who intends to observe a religious holiday should make that intention known to the instructor prior to the absence. A student who is absent from class for the observance of a religious holiday shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.

## **Tentative Class Meeting Schedule PHYS 3400**

	<b>Date</b>	<b>Topic</b>
1	W 1/16, Th 1/17	Review Syllabus / Discuss schools / Paperwork
2	W 1/23, Th 1/24	Balance & Motion --- Pre-Test / Newton's Laws
3	M 1/28, T 1/29	B&M --- Movement and measuring it
4	M 2/4, T 2/5	B&M --- Balance / Mobiles
5	M 2/11, T 2/12	B&M --- Roller coasters / Energy / Literature in primary
6	M 2/18, T 2/19	B&M --- Intro to Weighing/Weighing Game / Pendulums / Post-Test
7	M 2/25, T 2/26	Sink & Float --- S&F Pre-Test / Objects / Density
8	M 3/4, T 3/5	S&F --- Salt & Fresh / Hot & Cold / Clay Boats / Soap bubbles
9	M 3/11, T 3/12SB	<b>NO CLASS MEETING</b> --- Spring Break
10	M 3/18, T 3/19	S&F---Hot air balloons / Displacement Boat / Archimedes' Principle
11	M 3/25, T 3/26	S&F---Water Bottle & Nuts / Video Explanation
12	M 4/1, T 4/2	<b>NO CLASS MEETING</b>
13	M 4/8, T 4/9	S&F --- Density Column / Vials / Horse & Chihuahua / Video Explanation
14	M 4/15, T 4/16	S&F---S&F Post-Test / Measurement / States of Matter --- Oobleck
15	M 4/22, T 4/23	Color---Mouse Paint / Black Butterfly / Chromatography
16	M 4/29, T 4/30	Sound --- Tuning Forks / Table Guitar / Boomwhackers
17	M 5/6, T 5/7	Last Class Meeting at TTU