

Course Syllabus

Conceptual Physics I: Force and Motion (SCI/PHYS 5331)

Fall 2016

Wednesdays 5:30 – 8:15 pm, SLC 1.214

Some coursework will be online.

Professor Contact Information: Dr. Mary L. Urquhart (Kelly)

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Office Location	FN 3.218 C
Email Address	urquhart@utdallas.edu and wab090020@utdallas.edu
Office Hours	Mondays 1:30-2:30 pm, Wednesdays 3:30 – 4:30 pm, immediately after class and by appointment. Mr. Baker: Immediately following class.
Other Information	Assignments should be submitted through eLearning, or on paper when necessary. Other correspondence with the instructor should be by email. Please DO NOT email assignments through regular email.

Course Pre-requisites, Co-requisites, and/or Other Restrictions

(including required prior knowledge or skills)

Prior physics experience is not required for SCI section. Course assumes students have an interest, and preferably experience, in pre-college teaching.

Students in the PHYS section of the course are expected to have substantial physics knowledge equivalent to a degree in the field, and to bring this knowledge to bear in evaluating conceptual challenges for physics novices.

Course Description

Designed to enhance both the physics content and pedagogical content knowledge of students the topics covered in this course will parallel those of part of a first year introductory college physics course, but with several important differences. Much of the class will be done workshop style, with hands-on materials available in local districts or demonstrations and experiments that can be done with inexpensive or common materials.

Students will also be expected to think critically about both the science content and how topics discussed in the course can relate to instruction in pre-college classrooms. This course will focus on classical mechanics (motion, force, energy, and momentum) concepts which will be explored in the context of the everyday world. Behavior of systems of particles (fluids, waves, sound, temperature and heat, light, and physical chemistry concepts will be more fully integrated into in the second and third parts of this three-course sequence.

Student Learning Objectives/Outcomes

At the completion of this course, the successful student will:

- Demonstrate a comprehension of the physical science concepts related to motion of objects in the everyday world, including force, energy, and momentum to an 80% level on the rubric through written responses in which students explain, discuss, examine, and apply specific concepts in questions on quizzes and post-instructional journals.
 - Show an ability to utilize and critically evaluate hands-on activities that can be used with pre-college students (some of which will use instructional equipment available in local school districts including probeware and CPO) through instructor-observed performance in small group work and class discussions, written activity reports, and written journals to an 80% level on the rubric.
 - Evaluate the impact of common student misconceptions related to force and motion and demonstrate teaching performances for addressing these misconceptions in an instructional context through discussions and peer teaching a lesson with no content errors and attention to common pre-existing mental models.
 - Apply course content to the Texas Essential Knowledge and Skills (TEKS) through matching appropriate physical science TEKS to assignments dealing with instruction at a specific grade level and through vertical alignment exercises.
 - Demonstrate comprehension of physics processes in the everyday world through discussions and through completion of small projects to within 80% of possible points in the rubric.
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Required Textbooks and Materials – Please note class sets for checkout

- You will not be required to use a specific textbook. However, there is a class set of reference physics texts available for semester-long checkout.
- A scientific calculator will be useful in most, if not all, class meetings. Please bring yours (or the equivalent smart phone, tablet, or computer app) to each class session.
- Access to a computer and the Internet outside of class.

Suggested Course Materials

Three texts are recommended depending upon your own comfort level with mathematics and the subject material. Limited copies of each are available for checkout from your professor.

1. Conceptual Physics (Paul Hewitt) is a high school conceptually-based physics text. Several teacher editions are available for checkout.
2. Conceptual Physics (Paul Hewitt) college edition.

3. Physics (James Walker, 2nd Edition) is an excellent algebra-based physics textbook for those students preferring a more mathematical approach. ISBN: 0-13-101416-1

We will frequently use physicsclassroom.com and hyperphysics as an online physics textbooks.

Assignments & Academic Calendar

(Topics, Reading Assignments, Due Dates, Exam Dates)

Aug 24	1. Orientation and Program Overview Pre-tests and Surveys Introduction to course equipment
Aug 31	2. Tools of the Trade: Mathematics and Physics
Sept 7	3. Motion in One Dimension
Sept 14	4. Making Sense of Motion in One Dimension
Sept 21	5. Motion in Two Dimensions
Sept 28	6. 2-D Motion and Projectiles
Oct 5	7. Newton's 1 st and 2 nd Laws of Motion
Oct 12	8. Newton's Third Law
Oct 19	9. Gravity
Oct 26	10. Free Fall and Projectiles
Nov 2	11. Momentum
Nov 9	12. Work and Energy
Nov 16	13. Conservation of Energy
Nov 23	Have a Happy Thanksgiving
Nov 30	14. Mechanical Advantage and Simple Machines
Dec 7	15. Angular Motion
Dec 14	Final Projects Due and Complete Project Presentations
Exams	Weekly post-journals and quiz questions will serve as mini-exams. Our final exam period typically serves as time for student lesson presentations.

Times and topics are subject to change. Other readings will be as assigned in class.

Grading Policy

Pre-Journals, Class Discussions, and Group Work (10%): Much of the class will be done in the style of an educator workshop. You will be expected to be an active participant in all activities and in discussions and contribute to the learning environment for your classmates. The quality of your contributions and the evidence of deep thinking and development of understanding will be part of this grade.

Post-Journals (30%): Post-journals should be considered mini-exams and will be used to determine your understanding of content. They may be given in class or through eLearning.

Small Projects (20%): A small project is generally an experiment you will conduct on your own. These projects are not meant intended to be extremely time consuming but to extend your learning beyond the classroom setting. Examples of small projects:

- Observing and accurately describing the motion of specific objects in response to forces.
- Gravity and acceleration experiments.
- Amusement park/playground physics.

Weekly Quizzes (30%): Every class meeting, one or more thought questions or simple problems will be asked of the class to probe each student's understanding of the topics discussed. Answers to the journal questions must be in your own words, and when mathematical, you must show your work. Questions may take home or given in class. All quizzes will be graded on a 10 point scale:

Content:

4 point: Excellent. Complete, correct and clear. Little or no corrections are necessary.

3 points: Good. Minor problems with the answer in content, completeness, or clarity.

2 points: Fair. Requires at least one major correction or revision. Consider redoing the quiz.

1 point: Poor. Serious flaws in the answer. Turning in a redo of the quiz is strongly recommended.

0 points: Did not address the question asked. Please try again.

Thoroughness (not length!):

4 point: Excellent. Answer is thorough and demonstrates the student has thought deeply about the question.

3 points: Good. Answer is acceptable and demonstrates a reasonable amount of thought about the question.

2 points: Fair Answer is not thorough.

1 point: Poor. . Answer does not demonstrate sufficient thought or effort.

0 points: Did not address the question asked. Please try again.

Other:

1 point: Readability: Answer is clear, legible, understandable, and does not ramble.

1 point: References are given when necessary and are accurate.

Note: these quizzes are generally given in place of exams. An initial grade of 50% or less on three or more quizzes may result in you being required to take a comprehensive final exam to replace weekly quiz grades.

Peer Teaching/Final Project(10%): Throughout the course you will be creating a portfolio of resources that can be used in future teaching.

For students in the SCI section, your portfolio will be required to include an original lesson plan using the 5 E model. You will have the option of either peer teaching the lesson during the semester or describing the lesson to the class in an oral presentation at the end of the course.

Students in the PHYS section of the course will be expected to demonstrate leadership skills by serving as a peer instructor in your group work AND through peer teaching a lesson related to course content during the semester.

Please make sure you discuss with Dr. Urquhart your specific interest in peer teaching.

Revisions: Whenever reasonable, you may redo take-home quizzes, post-journals, and small projects to **earn back up to half** of your missed points, unless otherwise stated by the professor. Such revisions must be submitted in a timely manner, and will be held to the same standards as the original assignment. We will discuss assignments, including quiz questions, in class. Revisions must demonstrate an individual understanding of the material rather than a summary of the class discussion. If a redo of your portfolio is necessary, it may result in a grade of incomplete in the course.

Important! All submitted work must be in your own words and represent your own understanding. You may use quotes to make up a small portion of your answers to support an argument. All sources and references MUST be properly cited.

A useful resource: <http://www.utdallas.edu/deanofstudents/bigfour/>

Course & Instructor Policies

Make-up Exams	NA
Extra Credit	NA
Late Work	Accepted only at the discretion of the professor
Special Assignments	If you need special arrangements, talk with the instructor as soon as possible.
Class Attendance	Attendance of all class sessions is required! You <i>must</i> get all absences excused by the professor, in advance if possible.
Classroom Citizenship	This is a graduate class and students are expected to behave accordingly. Your presence should enhance rather than detract from the learning of your classmates. Your classroom citizenship is part of your participation grade.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.