

## *Course Syllabus*

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### **Conceptual Physics II: Particles and Systems (SCI/PHYS 5332)**

Spring 2020

Wednesdays 5:30 – 8:15 pm, SLC 1.214

Some coursework will be online through eLearning.

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#### **Professor Contact Information: Dr. Mary L. Urquhart**

Office Phone	972-883-2499
Other Phone	972-883-2496 (main office)
Office Location	FN 3.218 C
Email Address	urquhart@utdallas.edu
Office Hours	Immediately after class and by appointment.
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.

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#### **Important: COVID-19 Online Teaching Update**

We will continue to make the class interactive, using tools such as Blackboard Collaborate in eLearning. I will also set up a TEAMS group for the class, so please download that application for which our university has a site license.

Some resources I will ask you to explore on your own. Sometimes we may do this synchronously as a break in the interactive portion of the class, and sometimes asynchronously.

All students have responded to the survey as of Sunday March 22, and have computer and internet access. However, some of you have expressed you have data limits. Please contact me if you have concerns on data usage with this course.

Please see the revised teaching schedule.

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

*(including required prior knowledge or skills)*

For the SCI section, no prior astronomy, physics, or geology course work is required. Prior physics experience is not required.

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 into their study of particles and systems and assist peers in the SCI section who may struggle with physics concepts important to the course.

Course assumes students have interest and/or experience in pre-college teaching.

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## **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 physical science concepts involving properties of matter, behavior of fluids, mechanical waves including sound, and heat, temperature and thermodynamics explored in the context of the everyday world. Building upon classical mechanics (motion, force, energy, and momentum) concepts explored in the first semester, students will explore the behavior of systems of particles. The atom, physical chemistry, light, electricity and magnetism concepts will be more fully integrated into final course of this three-course sequence.

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## **Student Learning Objectives/Outcomes**

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

- Organize the complex and interconnected systems and processes that shape systems of particles in properties of matter, fluids, state changes, and thermodynamics based upon particle interactions according to basic physics principles in mechanics into a framework shareable with others.
- Explain the concepts and physical principles related to basic physical properties of systems of particles on written responses on thought questions, projects, and post-instructional journals.
- Apply critical thinking skills to reasoned arguments in quizzes, small projects, and in class discussions.
- Demonstrate an ability to utilize and critically evaluate classroom applications of the science content related to systems of matter particles, including hands-on activities that can be used with pre-college students, through instructor-observed performance in small group work and class discussion and written journals to an 80% level.
- Evaluate the impact of common student misconceptions related to the physics of systems of particles 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.
- Demonstrate an awareness of the application of course content to the Texas Essential Knowledge and Skills (TEKS) through matching appropriate all appropriate physical science TEKS to assignments dealing with instruction at a specific grade level and through vertical alignment exercises.

- Demonstrate an awareness and understanding of physics in the everyday world through discussions and through completion of small projects to within 80% of possible points in the rubric.
- Design a final project that demonstrates the ability to synthesize and apply course content in the creation of project relevant to the student's profession or professional goals (typically classroom teaching) to at least 80% of possible points in the project rubric.

### **Textbooks and Materials – Please note class sets for checkout**

No specific textbook is required. However, use of one of the following textbooks is recommended as a reference. Limited numbers are available for checkout

- Conceptual Physics (Paul Hewitt) is a high school conceptually-based physics text. Two different Teacher Editions are available.
- Conceptual Physics (Paul Hewitt) college edition.
- Physics (James Walker, 2<sup>nd</sup> 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.

### **Suggested Course Materials**

A computer or other means of accessing online assignments and electronic resources is strongly recommended.

### **Academic Calendar**

*(Assignments will be given in class.)*

<b>January 15</b>	1. Review, Density and States of Matter
<b>January 20</b>	2. Density and Matter
<b>January 29</b>	3. Density of Fluids
<b>February 5</b>	4. Static Fluids
<b>February 12</b>	5. Fluid Dynamics
<b>February 19</b>	6. Energy Conservation in Fluid Dynamics
<b>February 26</b>	7. Non-Ideal Flows
<b>March 4</b>	8. Oscillations
<b>March 11</b>	9. Waves and Matter
<b>March 18</b>	Spring Break!
<b>March 25</b>	Extended Spring Break
<b>April 1</b>	10. Waves, Matter, and Sound
<b>April 8</b>	11. More Sound
<b>April 15</b>	12. Temperature and Heat

<b>April 22</b>	13. Thermodynamics
<b>April 29</b>	14. Heat and Chemistry
<b>May 6</b>	15. Bringing it Together and Final Projects Due
<b>Exams</b>	Weekly post-journals will serve as mini-exams. Our final exam period will be used for student lesson presentations.

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### **Grading Policy**

*(including percentages for assignments, grade scale, etc.)*

**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 (15%):** 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.

**Weekly Quizzes (40%):** 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%):** All students are expected to create lessons that synthesize or extend content from the course, in a way relevant to their own teaching, and to share with peers.

For students in the SCI section, to include an original lesson plan using the 5 E model, PBL, or other similar format. 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.

**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 is important. A lack of quality participation can result in an up to a 10% (out of 100%) grade reduction.***

**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/>

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### Course & Instructor Policies

*(make-up exams, extra credit, late work, special assignments, class attendance, classroom citizenship, etc.)*

<b>Make-up Exams</b>	<b>By arrangement with the professor</b>
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<b>Extra Credit</b>	<b>NA</b>
<b>Late Work</b>	<b>Accepted only at the discretion of the professor</b>
<b>Special Assignments</b>	<b>If you need special arrangements, talk with the instructor as soon as possible.</b>
<b>Class Attendance</b>	<b>Attendance of all class sessions is required! You <i>must</i> get all absences excused by the professor, in advance if possible.</b>
<b>Classroom Citizenship</b>	<b>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.</b>

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### **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.”

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### **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.***