

**Physics 301**

**Unique number 55565**

**Fall 2017, Monday, Wednesday, Friday from 11am-12pm, in Painter 2.48**

**Instructor:** Professor Vernita Gordon, [gordon@chaos.utexas.edu](mailto:gordon@chaos.utexas.edu), office **RLM 14.206**. Office Hours Thursday 1pm-2pm, Friday 1pm-2pm, or by appointment. Email me to request an appointment.

**Graduate Teaching Assistant:** Layla Bakhtiari, [labpuddle@gmail.com](mailto:labpuddle@gmail.com). Office hours **Tuesdays 1:30pm-3:30pm**.

**This course is calculus-based mechanics for science majors, including physics majors.** There are other introductory mechanics courses for engineering students, pre-medical students, and to meet the general education science requirement. Some of these are calculus-based and some are not. Please double-check your major's requirements to see if this class is required, or if there is another course you should take that would be better-fit to your major.

**This course will be taught using an interactive approach, called Peer Instruction.** You should not expect material to be introduced in a classroom lecture. I will spend very little time on lecture and you are expected to study the material ahead of time, by reading the textbook and/or watching online lectures. I use this teaching method because my own measurements and a great deal of peer-reviewed, published education research show that students in Peer Instruction courses learn more than do students in lecture courses. **For your success, it is important that you commit to doing your part, namely preparing for class ahead of time and actively, inquisitively participating in classroom discussions.**

**Recitation Sessions:** Recitation sessions are an opportunity for you to deepen your understanding of concepts, to see example problems worked, and to work on your homework with your classmates in an environment where a TA and LA are also present to help you with questions. Recitation sessions will be held weekly. The times for recitation sections will be set using a Doodle poll of the class. **If you have not gotten a link to this poll, please tell the instructor or TA immediately.**

Pick at least one recitation section and commit to weekly participation. This is one of the most important things you can do to get a good grade.

## **Suggestions for how to study for this class** (Please read these sections carefully!):

*Before coming to class, **read*** the assigned material. Daily reading is indicated in the schedule at the end of this document. Work through the **checkup questions** at the end of each section as you read though. Once you've gotten an answer you think is right, check it against the answer at the end of the chapter. It is important to understand the reasoning behind the answer, and not just be satisfied with getting the “right” answer through erroneous reasoning. Take the **online checkup quiz** on the textbook’s website. Make note of what concepts are giving you difficulty. Review the **Examples** from the textbook. These provide concrete illustrations of the concepts discussed, starting from simple examples and going to more complex. Work through the **online concept tutorials** that are indicated in the margins of your textbook.

*In class, **participate actively*** in the in-class discussion. Don’t be satisfied just with getting the “right” answer. **Having correct reasoning and correct use of the concepts is much more important than getting the “right” answer.** Discuss reasoning and concepts with your neighbors even if you all got the same initial answer.

*Before the test, work through the **checkup questions** again. Take the **online checkup quiz** on the textbook’s website again. **Review the notes** you took in class. Work through the **online tutorials** on concepts that are giving you trouble.*

*If a concept or concepts is giving you trouble, come **talk** with the instructor, the TA, or a LA. Don’t wait until just before the test – seek out help as soon as you realize that you’re not understanding a concept properly. You can come talk with us during **office hours**, during **recitation sections**, or you can **make an appointment** to see Prof. Gordon outside office hours. Her email address is gordon@chaos.utexas.edu.*

Some additional study resources that you can use:

Conceptual Physics, by Hewitt. There are copies in the UT library.

The MIT OpenCourseWare version of this course has Learning Activities that include Self-Assessments you can use to check your understanding of the concepts. <http://ocw.mit.edu/courses/physics/8-01sc-physics-i-classical-mechanics-fall-2010/Syllabus/>

There are online Java applets, called “Physlets,” that can act as tutorials or simulations for problems in physics. Some of these can help you learn concepts because you can watch how things happen. There are many sites of these online. A good place to start is

[http://webphysics.davidson.edu/physletprob/ch8\\_problems/default.html](http://webphysics.davidson.edu/physletprob/ch8_problems/default.html)

There are interactive, research-based simulations of many of the concepts we will study online: [phet.colorado.edu](http://phet.colorado.edu).

You can have Quest create custom reviews for you.

### **How to know how well you understand concepts:**

Try tackling problems on your own. Then ask yourself, explicitly, what do I need to know to solve this? What are the things I do know? Articulate more specifically than just “I need to know how to solve this problem.”

Go over the midterm or homework and discuss or write about where you went wrong. Use your own words to describe where you got stuck and what a strategy would be for you to get un-stuck and solve the problem. You can do this with other students, and/or during office hours with the instructor, TA, or LA.

For the midterm or homework questions that gave you trouble, try doing them again from copies that don’t have answers or explanations. Can you do these problems now? Can you make up similar problems of your own? Can you figure out how to test the same concepts or problem-solving ideas with different problems? Make up your own problems and then discuss them with other students or the instructor/TA/LAs. If you disagree about what concept(s) a problem tests, talk about this and find what is different between the problems and what is similar.

**Grading:** Plus/minus grading will not be used. Course grades will be determined from assignments and exams as follows: 10% homework, 60% midterm exams, 20% final exam, and 10% in-class iClicker quizzes. **Exams will cover material from both the classroom “peer instruction” time and the assigned textbook reading indicated in the schedule below.** Half of the iClicker quiz score will come from participation, and will therefore measure attendance. The lowest homework score will be dropped. The lowest two iClicker quiz scores will be dropped. The lowest midterm score will be dropped. The final exam is required.

At any point in the semester, you can calculate your grade as follows:

**Current average =**

$$\frac{0.1(\text{Homework average})+0.3(\text{Highest midterm})+0.3(\text{Second-highest midterm})+0.1(\text{iClicker average})+0.2(\text{Final exam average})}{0.2 \text{ if no exams have been taken}, 0.5 \text{ if one midterm has been taken}, 0.8 \text{ if two or three midterms have been taken}, 1 \text{ after the final}}$$

**Math Refreshers:** The Sanger Learning Center offers math refresher courses early in the semester.

They are free for UT students, and you can register here:

<https://utdirect.utexas.edu/apps/ugs/my/events/>. The calculus refresher is 9/5 – 9/7, 6-7:30pm. The trigonometry refresher is 9/11 – 9/13, 6-7:30 pm. There is a 2-day algebra refresher 9/5 – 9/6 , 6-8 pm. There is a 3-day algebra refresher 9/5 – 9/7, 6-7:30 pm.

The Sanger Learning Center also offers other courses on better studying, time management, and test-taking.

**Honor Code:** The core values of the University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

**Academic dishonesty:** Academic dishonesty includes, but is not limited to, copying answers on exams or homework, having another person do homework, exams, or iClicker quizzes for you, or bringing non-allowed aids to exams. Collusion in another’s academic dishonesty is itself academically dishonest. Generally speaking, academic dishonesty is any activity that misrepresents another person’s work as one’s own, or that is intended to circumvent the intended purpose of evaluation tools like exams, homework, and iClicker quizzes. Don’t do this. Cases of suspected academic dishonesty will be reported to the Office of the Dean of Students.

**Quest:** You will do your homework in Quest. Homework will be assigned and graded through the online QUEST system: <http://cns.utexas.edu/quest/support/student>. If you make random guesses on homework assignments, your grade will on average be zero. Therefore, there are negative grades on QUEST homework assignments. See the description of grading on the QUEST website. There will be no negative grades on quizzes or exams. Quest also has some other quirks, including non-standard handling of significant figures. Please read the introduction to Quest and the instructions on how to enter answers carefully before beginning work. You don’t want to lose points because of a Quest quirk.

**Paying for Quest:** This course makes use of the web-based Quest content delivery and homework server system maintained by the College of Natural Sciences. This homework service will require a \$25 charge per student for its use, which goes toward the maintenance and operation of the resource. Please go to <http://quest.cns.utexas.edu> to log in to the Quest system for this class. After the 12th day of class, when you log into Quest you will be asked to pay via credit card on a secure payment site. You have the option to wait up to 30 days to pay while still continuing to use Quest for your assignments. If you are taking more than one course using Quest, you will not be charged more than \$50/semester. Quest provides mandatory instructional material for this course, just as is your textbook, etc. For payment questions, email [quest.billing@cns.utexas.edu](mailto:quest.billing@cns.utexas.edu).

**iClickers:** iClickers are required for this course. They may be purchased new or used. Do not register your clicker on the iClicker website. Please register your iClicker remote in Canvas to participate in in-class activities. Simply go to this class in Canvas, click the iClicker link in the menu, and enter the remote ID that can be found on the back. **iClicker registration in Canvas is required for course enrollment.** If you use your iClicker without registering, you will not get credit for your clicker response.

**Textbook:** Physics for Engineers and Scientists, 3<sup>rd</sup> Edition, Volume 1, by Ohanian and Markert. An electronic version is available. Used copies are often available, in a bookstore or online. This textbook is required. There is a website for the textbook with supplementary learning aids:

<http://books.wwnorton.com/books/detail-students.aspx?ID=4591>

**Online Resource:** M.I.T. has an open course on classical mechanics (Physics I):  
<http://ocw.mit.edu/courses/physics>. Khan Academy has tutorials in much of the material covered in this course (although not at a calculus-based level): <https://www.khanacademy.org/science/physics>

**Email and Canvas:** The instructor will sometimes communicate with the class through email, Quest, and/or Canvas. These are official communications and may include information that could affect your grade in the course. You are responsible for checking email at the address the University has on file for you. You should do this at least daily. You are responsible for checking Canvas and Quest at least daily.

**Pre-requisites:** High school physics or consent of the undergraduate advisor; Mathematics 408C, or 408K and current enrollment in or credit for 408L.

**Failing to satisfy Pre- and Co-requisites:** Students who do not meet the pre- and co-requisites will get an email on the first and fifth class days telling them to come into the Physics department to resolve the problem. Failing to satisfy pre- and co-requisites can result in students being automatically dropped from the course.

**Class Seating and Materials:** Please leave rows 3, 6, and 9 empty. Please sit in groups of three or four so that you can work together. Always bring paper that you can write on and pen or paper to write with. On some days, you will turn in short response papers at the end of class.

**Tardiness and early departures:** Tardiness and early departures are disruptive and distracting. Please be seated before the bell rings and remain for the entire class. If there is an urgent reason why you

must leave early or come late, please sit on the aisle in a seat near the back, to minimize disruption to your classmates, and please make sure the door closes softly for the same reason.

**Cell phones and other electronic devices:** Cell phones should always be silenced in the classroom. If there is an urgent or emergency call that cannot wait until after class, please exit the classroom and close the door before answering your phone. Please re-enter the classroom after the call in the way described above to minimize disruption to your classmates. Laptop and tablet computers should be silent in the classroom and should be used courteously. Cell phones, computers, graphing calculators, and other electronic devices with potential for facilitating cheating are not allowed during exams. Scientific calculators are allowed during exams.

**Students with disabilities:** Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, <http://www.utexas.edu/diversity/ddce/ssd>. Students who need special accommodation must notify the instructor no later than the 12<sup>th</sup> day of class.

**Religious holidays:** If you will miss class because of a religious holy day, you must notify the instructor of your pending absence at least fourteen days prior to the date of observance of a religious holy day and no later than the 12<sup>th</sup> day of class. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

**Group study sessions:** You are encouraged to organize a group study session. You may ask a Learning Assistant to lead such a section. You can reserve a Group Study Room in PCL library by going to the Library web site ([www.lib.utexas.edu](http://www.lib.utexas.edu)). Under the column “for students” click on “Reserve a Group Study Room”. These rooms accommodate 6 or 12 people.

**Working together on homework:** You are encouraged to discuss problems with your classmates and teach each other concepts and ways of approaching problems. However, each student must do his or her own work when turning in homework answers on QUEST. Copying another student’s work or having another student do the work for you is academic dishonesty.

**UT Learning Center:** The UT Learning Center in Jester has a variety of individual and group tutoring services. The Learning Center also offers sessions on how to study physics.

**Free Coaching:** The Physics Department provides graduate student coaches to assist students in PHY 301 and other introductory courses. This coaching is available on a one-to-one basis. Coaching tables are in the area by the elevators on the 5<sup>th</sup> floor of RLM. Since the RLM elevator does not stop on the 5<sup>th</sup> floor, take the stairs or escalator one flight up from the ground floor (4<sup>th</sup> floor) to the coaching area on the 5<sup>th</sup> floor. Coaching hours will be posted by the tables.

**Residential Halls Study Groups:** There are free study groups that meet at the study tables in the freshmen dorms, Jester and Kinsolving. More information is available at  
<http://cns.utexas.edu/community/resident-hall-study-groups>

**Private tutors:** The Physics undergraduate administrator in RLM 5.116 can put you in touch with private tutors. Rates and other arrangements are made directly between tutors and students.

**Homework:** Each homework assignment will have the same weight toward your final grade. Homework is due at 11pm on its due dates. Late homework assignments will not be accepted. Solutions to homework will be available on Quest after its due date.

**Midterm exams:** Midterm exams will NOT be held in the usual classroom, but in another room to be announced. Midterm exams will be multiple choice and use Scantron sheets. You must bring your UT ID and at least two #2 pencils to the midterms. Solutions to midterms will be available on Quest after all tests have been graded.

**Adding and Dropping the Course:** See the UT Austin Academic Calendar, <https://registrar.utexas.edu/calendars/17-18>. During the first four class days, students may add and drop courses using the Registrar's online service. During class days 5-12, students may drop courses online but must get departmental permission to add the course. For this course, you should contact the physics department. Some departments may not allow add/drops after the fourth class day. If you wish to add a course after the twelfth class day, you must go to the Student Division of the Dean's Office (1<sup>st</sup> floor of WC Hogg) to provide justification for the proposed change. You must have written permission and documentation of class attendance from the instructor and approval from the department.

**Academic Q-drop:** See the UT Austin Academic Calendar. If you want to drop this course after the 12<sup>th</sup> class day and before the Q-drop deadline, you must get the forms from the Dean's Office (WCH 1.106) or your departmental advising center and ask the instructor to sign the drop form.

**Nonacademic Q-drop:** Students who have substantiated nonacademic reasons, as determined by the Dean's Office, may be able to drop a course. Students with significant nonacademic problems, such as extended health difficulties or family emergencies, are encouraged to contact the Dean's Office. The course instructor cannot give permission for a nonacademic Q-drop.

**One-time Drop:** Once in his/her undergraduate career, a student who has completed at least two long semesters at UTAustin can drop a class or all classes in a semester at any point until the last class day. A student may drop a class only if he or she has an average grade of D+ or below in the class at the time of the request and if there are no pending investigations of scholastic dishonesty for the course in question. More information is available here: [http://www.utexas.edu/faculty/council/2010-2011/legislation/EPC\\_OTE.html](http://www.utexas.edu/faculty/council/2010-2011/legislation/EPC_OTE.html)

**Quantitative Reasoning Flag:** This course carries the Quantitative Reasoning flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

**Safety in Emergency Situations:** Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside. Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building. Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class. In the event of an evacuation, follow the instruction of faculty or class instructors. Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office. If you have concerns about the behavior of a member of the campus community, you may call the Behavior Concerns Advice Line (BCAL): 512-232-5050. Link to information regarding emergency evacuation routes and emergency procedures can be found at: [www.utexas.edu/emergency](http://www.utexas.edu/emergency)

**Finding buildings at UT:** For this course, you need to be able to find buildings for recitation sections, office hours, midterms, and the final exam, as well as the classroom. There is an online map of campus buildings: <http://www.utexas.edu/maps/index.html>

Please see the next page for the course schedule.

**Lecture, Homework, and Exam Schedule:**

You are responsible for material in the assigned reading, regardless of whether it is discussed in class.  
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\*Professor Gordon's planned absences are indicated by asterisks and italics.

Date	Topic	Reading in Textbook	HW Due
8/30 Wed	Introduction	Chapter 1	
9/1 Fri	Speed, velocity, and acceleration	2.1-2.4	HW 0901 due 11pm
9/4 Mon	<b>Labor Day holiday</b>	<b>No class</b>	
9/6 Wed	Motion with constant acceleration; integrating equations of motion	2.5-2.7	
9/8 Fri	Vectors; vector addition and subtraction	3.1-3.3	HW 0908 due 11pm
9/11 Mon	Position vector; components of a vector; Vector multiplication	3.3-3.4	
9/13 Wed	Velocity and acceleration: components and vectors	4.1-4.2	
9/15 Fri	Motion with constant acceleration; Projectiles	4.3-4.4	HW 0915 due 11pm
9/18 Mon	Uniform circular motion	4.5	
9/20 Wed	Relativity of motion and addition of velocities	4.6	
9/22 Fri	Newton's First and Second Laws; combination of forces	5.1-5.3	HW 0922 due 11pm
9/25 Mon	Weight, contact, and normal forces; Newton's Third Law; motion with constant force	5.4-5.6	
9/27 Wed	Friction; Hooke's law	6.1-6.2	
9/29 Fri	Force for uniform circular motion; fundamental forces	6.3-6.4	HW 0929 due 11pm
10/2 Mon	Work	7.1-7.2	
10/4 Wed	Kinetic energy; gravitational potential energy	7.3-7.4	
10/6 Fri	Potential energy	8.1-8.2	HW 1006 due 11pm
10/9 Mon	Forms of energy; power	8.3-8.5	
10/11 Wed	<b>Review for Midterm Exam #1</b>	<b>Chapters 1-7</b>	<b>Midterm from 7-9pm Location TBA</b>
10/13 Fri	Gravitation and orbits	9.1-9.6	HW 1013 due 11pm
10/16 Mon	Energy in orbital motion	9.5	
10/18 Wed	Momentum	10.1	
*10/20 Fri*	<i>Center of mass</i>	10.2	<i>HW 1020 due 11pm</i>

10/23 Mon	Motion of the center of mass; energy of a system of particles	10.3-10.4	
10/25 Wed	Impulse; elastic collisions in 1D	11.1-11.2	
10/27 Fri	Inelastic collisions; 2D and 3D collisions	11.3-11.4	HW 1027 due 11pm
10/30 Mon	Rotational kinematics	12.1-12.4	
11/1 Wed	Kinetic energy of rotation; moment of inertia	12.5	
11/3 Fri	Rotational motion	13.1-13.2	HW 1103 due 11pm
<b>11/6 Mon</b>	<b>Review for Midterm Exam #2</b>	<b>Chapters 1-11</b>	<b>Midterm from 7-9pm Location TBA</b>
11/8 Wed	Conservation of angular momentum; vector nature of torque and angular momentum	13.3-13.4	
11/10 Fri	Static equilibrium	14.1-14.2	HW 1110 due 11pm
11/13 Mon	Levers, pulleys, and elasticity of materials	14.3-14.4	
11/15 Wed	Simple harmonic motion; the simple harmonic oscillator	15.1-15.2	
11/17 Fri	Energy in oscillations; the simple pendulum	15.3-15.4	HW 1117 due 11pm
11/20 Mon	Damped oscillations and forced oscillations	15.5	
11/22, 24	<b>Thanksgiving Holidays</b>	No class	
11/17 Mon	Forced oscillations; waves	16.1-16.2	
11/29 Wed	Superposition; standing waves	16.3-16.4	
12/1 Fri	Sound; intensity and speed of sound	17.1-17.3	HW 1201 due 11pm
12/4 Mon	Doppler Effect; diffraction of sound	17.4-17.5	
12/6 Wed	Fluids at rest	18.1-18.4	
<b>*12/8 Fri*</b>	<b>Review for Midterm Exam #3</b>	<b>Chapters 1-16</b>	<b>Midterm from 7-9pm Location TBA</b>
12/11 Mon	Pressure, buoyancy, and fluids in motion; Fluid Dynamics	18.5-18.6	
<b>12/13 Wed</b>	<b>No class</b>		<b>HW 1213 due 11pm note Wed. due date</b>
<b>TBA</b>	<b>Review for Final Exam</b>	<b>Chapters 1-18</b>	
<b>Final Exam</b>		<b>Location to be announced – Check the Registrar's Website about four weeks before the semester ends</b>	


**Old exams** are available on Canvas. These give you an idea of how my exams are constructed (a mix of conceptual and computational problems) and show you what I think is an appropriate level of difficulty for an exam. Your midterm exams will be about 30 questions long. Your final exam will be about 40 questions long.

**How to do well in this class:** You should expect to spend, at a minimum, three hours studying outside of class for every hour you spend in lecture. Read the material to be covered in class before coming to class, and a second time afterwards. Some iClicker questions will concern material the reading that has not yet been covered in lecture. Review your lecture notes after each lecture. Make written notes of things that you do not understand from the reading and lectures, and come talk with the instructor, the TA, a LA, or a physics graduate student coach about the things you do not understand. **Start working on your homework as soon as possible. The homework assignments are difficult and they will take substantial time to do.** As soon as you have obtained an answer to a problem, submit it – don't wait until you have solved other problems. On Quest, you are allowed multiple tries for missed questions, but less credit is possible after each wrong answer. **This course moves rapidly, and students who fall behind are often not able to catch up.** Test your understanding by answering questions and working problems from the textbook in addition to the assigned homework.