Teaching Portfolio

Reginald A. Bain
Instructional Assistant Professor of Physics, University of Houston
✉ rabain@uh.edu | 📞 (803) 760-6891 | 🌎 uh.edu/~rabain

Contents

Teaching Statement

I am passionate about teaching physics and bring energy and enthusiasm to all of my teaching endeavors. I build my courses around evidence-based teaching practices, which I believe are essential to promoting student engagement and improving student learning. As a graduate student I served as an in-class facilitator for an introductory mechanics course for physics majors that was taught using Michaelsen's team-based-learning (TBL) curriculum. This highly-interactive setting helped make the course an inspirational teaching experience that shaped my teaching philosophy. I drew upon this experience as a graduate teaching fellow and structured my discussion sections around guided group problem-solving activities in an introductory course for engineering students. Through Duke's Preparing Future Faculty (PFF) program, I had the opportunity to work with Robert Beichner's Physics Education Research (PER) group at North Carolina State University where I learned about Beichner's innovative SCALE-UP curriculum. I also completed Duke's Certificate in College Teaching program, in which I took courses on teaching that covered a wide variety of topics including syllabus construction, visual design, classroom management, and teaching diverse audiences. As an undergraduate, I taught at a sixth-grade inquiry-based summer science camp where my students learned about energy conservation through hands-on activities.

At UH, I teach both traditional lecture and studio/inquiry-style courses, both of which heavily incorporate evidence-based teaching techniques. My lectures are built around students solving conceptual and computational clicker-style problems. Through the think-pair-share technique, these problems promote student engagement and prompt class discussions about each topic. Additionally, frequent clicker-style questions help to keep students focused, allow them to periodically check their understanding, and give me a sense of whether further coverage of a topic is needed to clear up confusion. After working example problems, I pose follow-up problems that range from completing an unfinished step in the worked example to calculating the result to a variation on the worked example. The time allocated to each problem is generally between 1 and 5 minutes, depending on the complexity of the example. During this time, TAs and I walk around the room to answer student questions and offer problem solving tips. Posing these problems allows students to ask more precise questions during class as they get stuck in various stages of a problem and helps them to pinpoint what topics they need to study more carefully. I administer in-class problems via TopHat, a software platform through which I present slides, pose a variety of question-types, and take attendance. TopHat also allows students to retry every in-class problem at home while reviewing slides and studying for exams.

My studio courses have a smaller enrollment of 72 students (compared to 200-250 students in lecture courses) and are taught in a three-hour once per week format in UH's Active Learning Classroom, a banquet-hall style room similar in design to SCALE-UP classrooms where monitors are mounted near each group of students. The three-hour format allows for most of the class to be spent on students working in groups on problem-solving tutorials and hands-on activities without as much lost transition time at the beginning and end of each class. The studio course also features five undergraduate/ graduate in-class facilitators that work closely with each group of students to provide guidance on effective problem-solving skills. In addition to clicker-style questions, most of each class is dedicated to hands-on activities adapted from McDermott's *Physics by Inquiry* and tutorials that I have developed using a feature of TopHat that allows instructors to create electronic workbooks. These TopHat tutorials guide students through solving key problems and integrate text, images, video, and a wide variety of question formats that students answer both individually and in groups. Many of the tutorials incorporate interactive simulations such as those developed by the University of Colorado's PhET project. One example of these tutorials, entitled *Pressures, Depths, and Densities,* introduces students to the physics of fluids and features exercises on relevant jargon, derivations of key equations, and

ultimately a calculation of the pressure of medication in a hanging IV bag. After completing these exercises, students are tasked with using PhET's *Under Pressure* simulation to determine the density of several mystery fluids and the gravitational acceleration on mystery planets provided in the simulation using the skills they developed through the tutorial.

Working with students in office hours is one of my favorite aspects of teaching. Offering highly flexible office hours throughout the week and encouraging students to reach out to me for help has allowed me to get to know many of my students and work with them in a more personal setting, which is often difficult in a large-enrollment course. Working with students in office hours has also helped me tailor course materials to better suit students' needs. For example, discussions with students moved me to add exercises to my TopHat tutorials that help students develop fluency with key physics language and ask them to reflect upon their use of problem-solving skills. Individual work with students has also taught me a great deal about their experience in the course. UH is one of the most most diverse universities in the nation. Over 40% of UH students are first-generation college students and many of my students work part-time/full-time jobs while enrolled in classes. College physics courses are often especially challenging for students with little to no high-school physics background. Many of my students have expressed to me a lack of confidence that they have the background to learn physics at the college level. Through office hours, tutorials, study-guides, and lecture, I strive to eliminate barriers to learning for students of any background. I emphasize that they should focus only on their own performance and maintain a growth mindset. I also ensure that my lectures in first-semester introductory courses never assume prior experience with physics or advanced mathematics.

When designing a curriculum, I use the backwards course design model of Wiggins and McTighe. In backwards course design, all course resources and assessments are developed to help students master a specific set of skills upon completion of the course. I am currently working with members of the undergraduate studies committee to retool the common syllabi used for the introductory course sequences at UH using backwards course design. Identifying a set of precise learning objectives will make assessments and instruction more focused and consistent from year to year. Making these learning objectives publicly available will also help make the expectations of the course clear to students which I believe is a key feature of any successful course that benefits both students and instructors. My courses incorporate a mix of conceptual questions, computational problems with simplified set-ups and context-rich problems. This allows students to practice the basics of a topic while also seeing important applications in, for example, biology and medicine. By promoting student engagement, providing numerous online resources, and emphasizing the development of problem-solving skills, I strive to establish a classroom culture that values positivity, inclusivity, and intellectual growth.

Beyond the classroom, I am also interested in communicating science with a broader audience. As an undergraduate, I co-founded an organization called Carolina Science Outreach that gave interactive science presentations to K-12 students across South Carolina. As a graduate student at Duke, I organized a series of national workshops on science communication for graduate students in STEM fields called ComSciCon in Cambridge, MA. I also co-founded ComSciCon-Triangle, a local version of the national ComSciCon workshop for graduate students in the North Carolina Research Triangle. I am still actively involved with ComSciCon at both the national level planning new events and at the local level with ComSciCon-Houston. These workshops aim to improve how science is communicated both amongst scientists and with the public and to improve the culture of STEM to be more open and inclusive. They also provide valuable professional development for graduate students.

Course Evaluation Summary & Reflection

End-of-Semester Course Evaluations (Quantitative)

In my courses at UH, course evaluations are administered to students electronically by the department at the end of each semester. I have summarized results of these evaluations from each of my courses for which I have student evaluations available below:

Key

- N - # of survey respondents in my section (# of respondents for whole department)
- Q1 - *Rate the overall teaching effectiveness of this instructor* - 1 (Poor) to 5 (Excellent)
- Q2 - *Instructor encourages student participation, welcomes questions and discussions* - 1 (Strongly disagree) to 5 (Strongly agree)
- Q3 - *Instructor presents material in a clear and understandable way* - 1 (Strongly disagree) to 5 (Strongly agree)

Semester	Course	Format	Enrollment	N (Dept. N)	Q1 My Avg. (Dept. Avg.)	Q2 My Avg. (Dept. Avg.)	Q3 My Avg. (Dept. Avg.)
Fall 2017	PHYS 1301	Lecture	200	78 (2215)	4.51 (3.77)	4.74 (4.20)	4.58 (3.84)
	PHYS 1301	Studio	72	26 (2215)	4.65 (3.77)	4.81 (4.20)	4.65 (3.84)
Spring 2018	PHYS 1301	Lecture	200	104 (2197)	4.75 (3.94)	4.80 (4.31)	4.72 (4.02)
	PHYS 1301	Lecture	200	78 (2197)	4.63 (3.94)	4.77 (4.31)	4.65 (4.02)
	PHYS 1301	Studio	72	36 (2197)	4.97 (3.94)	4.92 (4.31)	4.83 (4.02)

*Averages for the UH Dept. of Physics are shown in parentheses next to my section averages

**Evaluations are not yet available for my current courses. My current courses include 2 lecture-based sections of PHYS 1301 with 250 and 200 students each and 1 studio section of 72 students.

End-of-Semester Course Evaluations (Qualitative)

The feedback that I receive from students both informally through office hours and formally through course evaluations helps me understand what aspects of the course students find most helpful and where improvements may be needed. End-of-semester evaluations often cited that students particularly appreciated my accessibility outside of class, passion for the subject, the interactive format of the course, and the availability of helpful resources. I have included a few student testimonials below:

Student 1 - Spring 2018 - "Dr.Bain is by far the best professor I have had in my college career. Throughout this course, he has made a relatively difficult course interesting, and easy to follow. He was always so helpful when anyone had questions, and was easy to reach if we had any questions or concerns."

Student 2 - Fall 2017 - "Dr. Bain was a phenomenal professor! He was very attentive and flexible to the needs of his students! Dr. Bain showed his passion and enthusiasm for Physics everyday when he came to class, and this made me desire to learn more. Dr. Bain did an awesome job with using different methods or different ways to explain a topic so were able to fully understand the problems. I would definitely choose Dr. Bain as my professor in the future.

Student 3 - Spring 2018 - "If I could rate him any higher, I would. Dr. Bain shows extreme interest in this subject, as well as interest in his students succeeding. He answered every question diligently, as well as answered our emails very fast. I met with Dr. Bain every week to discuss problems over the homework and any other questions I had. I previously took another professor last semester who was not

as helpful and I was failing the course and had to drop with a W. Dr. Bain has helped me succeed in this course, I even have the possibly of an A due to him. Absolutely the best professor I have ever taken here at UH."

Student 4 - Spring 2018 - "Dr.Bain is an excellent professor. Although I may not have scored the amount that I would've liked to, he was always there for office hours and available to answer anything that may not be clear. He always respected us students and made it very aware that he wanted us to all succeed in his class."

Student 5 - Fall 2017 - "Dr. Bain really cares about his student's and their success. I attempted to take this same course with him in the past and I took him again anyway because I knew that if I put in the work I could excel in the course, and I have. I personally love how organized he is and his use of technology. He always had such a great attitude during all lectures. His office hours were the best, better than any other Professor at UH. The material is difficult but he presents it in a manner where if you put the effort, you will surely learn something from this course. I would definitely take him again if I could."

Student Information Surveys

To supplement the department evaluations, I have administered my own surveys to collect data from students to help me improve my courses. In the spring of 2018, I surveyed 460 of the students enrolled in my course on a number of topics including, but not limited to, what course resources they used most often, whether they had attended drop-in physics tutoring/office hours, their work schedules, and what resources they found most helpful. Feedback from these surveys prompted me to increase the availability of various electronic resources, allocate additional time for students to work through TopHat workbooks in my studio courses, and increase office hours availability. Thoughtful student testimonials have also helped me improve the wording of my problems, the design of homework/in-class assignments, and the pacing of each class.

Additionally, as a part of research I am conducting at UH to identify ways to improve student outcomes in introductory courses, I have developed beginning/end-of course surveys to collect information on students physics/math background, their use of course resources, and their confidence in their physics problem solving skills. Many students have expressed to me that they were quite apprehensive about signing up for a physics class. Since this can impact their expectations of and performance in the course, collecting more data on students' experience will allow me to develop targeted resources to help lower barriers to learning for students from a wide variety of backgrounds.

Teaching Triangles

In addition to student evaluations, gathering feedback from peers is essential to improving as an instructor. As a graduate student, I had the wonderful opportunity to participate in Duke's *Teaching Triangles* program in the spring of 2016. The program groups graduate students from disparate research fields to observe each other's teaching and later meet to provide constructive feedback. I was paired with a Master's student in documentary film studies and Ph.D. student in biology. Both students were excellent instructors and had unique perspectives on how I could improve my teaching. Since they were far afield from physics, they focused their teaching observations on the dynamics of my interactions with students, and provided several suggestions for activities to improve student engagement and promote discussion that I incorporated into my discussion sections. Having had this experience, I would welcome future opportunities to have other faculty both within and outside of faculty observe my instruction.

COURSE TITLE:	PHYS 1301 - Introductory General Physics I — Studio Section
TIME:	Monday @ 1:00 PM - 4:00 PM
LOCATION:	Cougar Place (CPH) Room 1020
FACULTY:	Dr. Reginald Bain
OFFICE HOURS:	TuTh 1-3pm or by appointment
CONTACT INFO:	**Email** — rabain@uh.edu | **Phone** — (713) 743-6416 | **Office** — SR1 531B

I. Course: Physics 1301 – Introductory General Physics I

A. Catalog Description: Elementary principles of mechanics.

B. Prerequisites: MATH 1330. Primarily for majors other than physics and engineering. Credit may not be applied toward a degree for both PHYS 1301 and PHYS 1321.

II. Course Content: This course is a first-semester introductory algebra-based course on the physics of moving objects, Newton's Laws, rotating bodies, oscillations, waves, and fluid mechanics. The main topics covered in the course include:

- Units, Dimensions, and Dimensional Analysis
- Motion in 1-D
- Vectors in Physics
- Projectile Motion in 2-D
- Newton's Laws of Motion & Forces
- Work and Energy
- Conservation of Energy
- Conservation of Momentum and Collisions
- Rotational Kinematics, Dynamics and Energy
- Torque and Static Equilibrium
- Newton's Law of Universal Gravitation
- Simple Harmonic Oscillations
- Properties of Traveling Waves
- Fluid Mechanics

III. Course Objectives:
Students will apply the fundamental concepts of classical mechanics to a wide variety of problems, develop proficiency with key physics language, and apply their knowledge to a number of context-rich problems. Skills students will develop through this class will include:

1. Visualizing/diagraming problems using free-body diagrams, properly choosing coordinate systems, and frames of reference.
2. Categorizing problems based on underlying physical principles and solving complex static and dynamic systems, using math skills in algebra, geometry, pre-calculus, and vectors.
3. Using estimation, units, special limiting cases, and symmetry to make sense of results.
4. Working effectively in small-groups on problem-solving and hands-on activities. Articulating physical principles with other students. Designing procedures for measuring quantities experimentally using interactive simulations.

- For a more comprehensive list of specific course learning objectives for each topic, see the final page of this syllabus-

IV. Course Resources

A. **Blackboard** – Used for posting course information, announcements, and resources.
B. **Mastering Physics** – Accessible via Blackboard. Students required to purchase subscription. Used for Homework assignments, quizzes, etc.
C. **TopHat** – Used for in-class participation as well as Homework assignments/quizzes.

V. Course Textbook

***Physics, Fifth Edition*, James S. Walker.** A binder version with an access code to Mastering Physics and My Readiness Test is available for purchase at the UH bookstore. See our course blackboard page for more information. This textbook is not required but it is highly recommended. Homework problems, the order of topics, and many examples will be drawn from this text. Earlier editions of this book can also serve as a good resource.

VI. Course Requirements

A. **Homework Assignments -** There will be 15 homework assignments, one for each chapter covered in the textbook, each of which will have approximately 10 problems. Late homework is only accepted for exceptional/emergency cases. Homework will be assigned through Pearson's Mastering Physics, for which students will need to purchase an access code, which costs ~$80/year. This access code can be purchased in a bundle with the textbook or directly through Pearson's website.

B. **Exams -** There will be one math diagnostic exam, three mid-term exams and a final exam (5 total exams).

(1) **Required Diagnostic Exam —** Tests skills in algebra, geometry, trigonometry, and word problem solving. Consists of 20 multiple-choice questions and lasts one hour; calculators are not allowed. The exam will be administered by the UH Center for Academic Support and Assessment (CASA) Testing Center on the following dates:

Diagnostic Math Exam: Aug. 20th – Sept. 5th, 2018

To sign up for the exam, log onto your CASA account at http://casa.uh.edu to make a reservation for a time. You may also go to room 222 Garrison Gym to sign up. Please note that the timing of when you registered for PHYS 1301 will affect when the course appears on your CASA account. Sign up will open beginning the week prior to the start of classes.

Interpreting your Diagnostic Score — The diagnostic exam is worth 3% of your final grade for the course. Additionally, if you score:

- >= 70% — You should be well prepared to pass the course,
- 51 - 70% — You should and review algebra, trigonometry and pre-calculus and consider enrolling in Pearson's MyReadinessTest for PHYS 1301, which provides math review and practice.
- <= 50% — You are strongly advised to seek significant math remediation through completing Pearson's MyReadinessTest as well as practice though other online resources (see our course Blackboard page for links). You should potentially consider re-enrolling once you have improved your math and problem solving skills or taken additional math courses.

If you score below 70% on the diagnostic exam and remain in the class, you can take Pearson's My Readiness Test to increase your diagnostic exam score to a 70%. You must complete all tutorial sub-tests as well as the final test with a score of

75% or greater. If you score above 70% on the diagnostic exam, you can still take the math skills tutorial If you simply wish to brush up on your math skills.

Directions on **how to register for the math tutorial** can be found at — http://www.uh.edu/nsm/_docs/phys/resources/how-to-register-and-enroll-in-math-tutorial-program_1301_f18.pdf

If you purchased the textbook from the UH Bookstore, you will receive a free access code to My Readiness Test. If you purchased the textbook elsewhere, you can purchase a code for My Readiness Test for $15 through the publisher's website -- http://www.myreadinesstest.com/support/mpt/contactus_stu.htm. This information can also be found on the UH Dept. of Physics website under the *Resources* tab.

Statistics on Math Tutorial - A study of 543 PHYS 1301 students at UH showed that of the students who scored below 65% on the diagnostic exam, 78% of those that then completed the math tutorial ultimately passed the course. In contrast, only 45% of students who scored below 65% on the diagnostic exam and did NOT complete the math tutorial passed the course.

(2) **Mid-Term Exams** - All 3 mid-term exams will be given at the UH Center for Academic Support and Assessment (CASA). Students are required to sign up for an exam time through the CASA website. Every student is guaranteed one slot, but the times for these slots are first-come-first-serve. Students should register for a time early and **notify employers of exam dates well in advance.** Sign-up for exam time-slots begins at midnight 2 weeks before each exam start date listed below. Exams will be administered through CASA during the following Wednesday-Saturday windows:

1. **Mid-Term 1** - Wed., Sept. 26 – Sat., Sept. 29
2. **Mid-Term 2** - Wed., Oct. 24 – Sat., Oct. 27
3. **Mid-Term 3** - Wed., Nov. 28 – Sat., Dec. 1.

You must take your exam at the time-slot for which you sign up. **There are no make-up exams**. If you need to switch your exam time from what you originally register for, check the CASA website each evening between 6-9 pm to see if additional time-slots have opened up. You are responsible for finding a replacement exam time. Each exam will cover roughly 3-5 book chapters and will consist of 10-20 multiple-choice questions.

(3) Final Exam - The final exam will be a comprehensive, multiple-choice exam and will be administered in a classroom (exact location to be determined) during the scheduled University Departmental Exam time. Our course's exam time is

PHYS 1301 Final Exam - Saturday, December 8th @ 8:00AM-11:00AM

(4) Calculators & Formula Sheets - No calculators are allowed on the diagnostic exam. For the mid-term exams and final exam you may use a scientific, non-graphing/non-programmable calculator for example a TI-30. An electronic formula sheet will **always** be provided at CASA workstations. A paper copy of the formula sheet, along with a cover sheet and formatted scratch paper, will also be provided. If a paper copy or electronic formula sheet is not provided or you cannot find the formula sheet, ask a CASA employee for help. Always report any issues to a CASA employee/proctor immediately. Do not, for example, take an exam without using a calculator or formula sheet simply because you cannot find a calculator/formula sheet.

(5) **Make-Up Exams & Exam Replacement Policy** – While there are no makeup exams for this course, your lowest mid-term exam score will be replaced by your final exam score if the final exam score is higher. For the final exam, if you cannot make the scheduled exam time because of a: documented medical issue, religious holy day, or military service obligation, arrangements must be made at least 1 month in advance of the final exam or as soon as possible.

C. **Recitation Sections** — Through support from a grant from the Howard Hughs Medical Institute (HHMI), this course offers weekly one-hour recitation/discussion sessions taught by undergraduate peer facilitators. These sessions provide extra training in problem solving and extra practice problems. Students will be asked to fill out a FERPA release form and answer online questionnaires throughout the course. These sessions will begin the the third week of classes.

Any student scoring below 70% on the Diagnostic Exam will be required to attend one recitation session each week as a part of their overall attendance grade for the course. However, all students, regardless of their diagnostic exam score, are encouraged to attend weekly. Recitations are offered at a wide variety of times throughout the week. For the students for which the recitations are required, attendance to these sessions will count for 5% of the final grade. This grade will be calculated using the percentage of offered sections that students attended. 2 free absences are allowed throughout the semester. In order to receive credit for attendance, students must arrive on time, stay for the entire session, and follow the proper sign-in/sign-out procedure dictated by their recitation instructor.

D. **Participation/Attendance** — This section is taught using a different approach from the traditional lecture-based format that incorporates evidence-based pedagogical techniques developed using the results of educational research. This course is taught in UH's Active Learning Classroom, and students will spend the majority of each class working in groups of 3-6 on highly structured hands-on activities and problem-solving tutorials.

In this course, daily attendance and participation is required and is essential. Research has shown that environments that promote student engagement improve student understanding and retention of course material. However, this course format relies on students actively participating and working effectively in groups for extended periods of time.

You will be assigned paper and electronic workbooks that incorporate both hands-on activities and step-by-step guides through problem-solving activities that will be graded as a part of your Teamwork/Attendance grade. A set of experienced graduate TAs and undergraduate peer facilitators have been assigned to this course that will provide daily guidance and problem-solving help. These TAs will also be assigning daily participation grades each day by assessing whether each student is working diligently and effectively for the duration of the class period.

Students will also be required to answer conceptual/computational questions during class for credit. Working both individually and in teams, students will use the **TopHat** (see description below) response system to submit their answers. Students will receive credit for TopHat activities only on days that they were physically present in the class. Additionally, any issues with TopHat accounts/points should be raised immediately so they can be resolved immediately following the class. Students are required to enable 'Location Services' on their smartphone/mobile device. If you receive 80% or more of the possible attendance/participation points throughout the semester, then you will receive full credit for the teamwork/attendance component of the grade for the course; 12% of your overall course grade. Any percentage below 80% will be weighted

(i.e. 75% = 75%). If you are required to attend recitation sections, 7% of this grade is determined from TopHat and 5% from recitation section attendance.

Top Hat - We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.

(1) You can visit the Top Hat Overview (https://success.tophat.com/s/article/Student-Top-Hat-Overview-and-Getting-Started-Guide) within the Top Hat Success Center which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system.

(2) An email invitation will be sent to you by email, but if don't receive this email, you can register by simply visiting our course Blackboard page. All students are required to properly register their student ID with their TopHat account. Not doing

Top Hat Unique Course URL	Course Join Code
https://app.tophat.com/e/314906	314906

so properly may result in a student receiving a 0 for their TopHat grade.

Top Hat will require a paid subscription, and a full breakdown of all subscription options available can be found here: http://www.tophat.com/pricing. If a student has issues paying for a subscription, they must contact Dr. Bain before the drop/add date of August 27th.

(3) Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888-663-5491.

VII. Evaluation and Grading

3% Diagnostic Exam
12% Participation/Attendance (via TopHat) (5% from recitation if required)
10% Homework
16% Mid-Term Exam I
16% Mid-Term Exam II
16% Mid-Term Exam III
27% Final Exam

VIII. **Policy on grades of I (Incomplete)** — The grade of "I" (Incomplete) is a conditional and temporary grade given when a student, for reasons beyond their control, has not completed a relatively small portion of all requirements. Sufficiently serious, documented situations include illness, death in the family, etc.

IX. **Consultation** — My mailbox is located in the Physics office, room 617 in Science and Research 1. See our Course Blackboard page or contact me via email to schedule office hours with me throughout the week. Beyond my weekly scheduled office hours, I am more than happy to meet with students individually outside of class. I always respond to student emails as quickly as possible.

X. **Tutoring** — There are a number of tutoring resources available on campus include (but not limited to):

- Physics Learning Center - http://www.uh.edu/nsm/physics/undergraduate/tutoring/
- Tutor List - http://www.uh.edu/nsm/physics/resources/

- LAUNCH - www.uh.edu/ussc/launch
  - At LAUNCH, students can:
    - Drop in for individual **Peer Tutoring** on over 100 different courses—no appointment necessary! LAUNCH is located in Cougar Village 1, room N109. http://www.uh.edu/ussc/launch/index.php.
    - Attend a **Success Workshop**: http://www.uh.edu/ussc/launch/index.php.
    - Set up an individual appointment with an **Academic Counselor**: **713-743-5411**

XI. Addendum

Whenever possible, and in accordance with 504/ADA guidelines, the University of Houston will attempt to provide reasonable academic accommodations to students who request and require them. Please call 713-743-5400 for more assistance.

XII. Academic Honesty

It is each student's responsibility to read and understand the Academic Honesty Policy found at http://catalog.uh.edu/content.php?catoid=6&navoid=1025. Common instances of academic dishonesty in this class include: sharing details of exams with other students, having others use your clicker in class while you are not present. These are not in accordance with the UH Academic Honesty Policies and can result in academic consequences.

XIII. Religious Holy Days

Students whose religious beliefs prohibit class attendance or the completion of specific assignments on designated dates may obtain an excused absence. To do so, please make a written request for an excused absence and submit it to your instructor as soon as possible, to allow the instructor to make arrangements. For more information, see the Student Handbook.
http://catalog.uh.edu/content.php?catoid=4&navoid=791.

XIV. Counseling and Psychological Services (CAPS)

CAPS can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. Also, there is no appointment necessary for the "Let's Talk" program, which is a drop-in consultation service at convenient locations and hours around campus. http://www.uh.edu/caps/outreach/lets_talk.html.

XV. Diversity and Disability Statement

The University of Houston System is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning, discuss your concerns with the instructor. In addition to speaking with the instructor, the following resources are available to ensure an opportunity to learn in an inclusive environment that values mutual respect:

For students with disabilities who are experiencing barriers to learning or assessment, contact the Center for Students with DisABILITIES at 713.743.5400 or uhcsd@central.uh.edu or uh.edu/csd to discuss a range of options to removing barriers in the course, including reasonable academic adjustments/auxiliary aids in accordance with the Section 504 of the Rehabilitation Act of 1973 and Americans with Disabilities Act of 1990 guidelines.

For students who are experiencing conflict which is impacting their educational environment, see your department's Student Advocacy and Support Service office. If further assistance is needed, contact the Dean of Students Student Advocacy Services at 832-842-6183 or dos@uh.edu. Walk-in assistance is available 9-4 M-F at 256 Student Center South.

For students who believe that they have experienced harassment or discrimination on the basis of age, sex, race, religion, color, national origin, disability, or sexual orientation, contact the

1. Center for Diversity and Inclusion uhcdi@central.uh.edu or come by at Student Center South, Suite B12
2. Equal Opportunity Services (EOS) at eos@uh.edu or 713.743.8835

XVI. Bibliography

In addition to our course textbook, there are many other helpful resources available. See our Course Blackboard page for a large list of helpful videos and practice problem sets. Other useful references for the course include: Khan Academy, Physics, Algebra/Trig, Eugene Hecht; Fundamentals of Physics, Halliday, Resnick, and Walker; The Feynman Lectures on Physics, R. Feynman, R.B. Leighton, and M. Sands.

XVII. Course Objectives (Continued)

Upon completion of this course, the skills students will develop will include (but are not limited to) being able to:

1. Perform unit conversions, use dimensional analysis to derive units/dimensions of various quantities.
2. Use different representations of vector quantities, add/subtract vector quantities, and solve systems of vector equations.
3. Perform calculations of 1D and 2D linear kinematic quantities for moving objects with constant acceleration. Computing both average and instantaneous kinematic quantities such as position, velocity, and acceleration.
4. Solve problems involving rotational kinematic quantities. Differentiate between objects translational, rotational, and rolling motion. Recall and apply condition for rolling without slipping.
5. Recall Newton's Laws of Motion and understand representations as equations. Apply Newton's 2nd Law to systems involving multiple linear forces such as tension, springs, contact forces.
6. Recall the definition of uniform circular motion and contrast with non-uniform circular motion. Identify forces causing centripetal acceleration in variety of physical scenarios. Solve problems involving kinematics, forces, and circular motion.
7. Solve both static and basic dynamic systems involving multiple forces and/or torques. Identify and calculate connections between linear and rotational quantities.
8. Calculate the work done by non-conservative vs. conservative forces in 1D. Compare/ contrast static/kinetic friction forces.
9. Apply principle of conservation of energy to solve conceptual/computational problems. Calculate and differentiate between different forms of potential, kinetic, thermal energy including energy associated with rotation vs. translation.
10. Apply principle of conservation of linear momentum to calculate kinematic quantities before and after collisions. Classify collisions as elastic, partially inelastic, completely inelastic, physically impossible based on characteristics of collisions.
11. Define moment of inertia. Use conservation of energy to compare dynamics of rolling objects with different moments of inertia.
12. Define angular momentum and apply conservation of angular momentum to rotating systems, including those where moment of inertia is changing.
13. Recall Newton's Law of Universal Gravitation and calculate force of gravity/potential energy of system of masses. Calculate acceleration due to gravity and escape velocity for objects of planets of varying mass, size.

14. Define properties of simple harmonic oscillations. Solve problems involving spring, pendulum oscillations. Understand which properties of oscillations change with changing properties of oscillator.
15. Classify different traveling waves, perform calculations related to the speed of waves through media. Differentiate between constructive/destructive interference within context of problems based on path length differences. Calculate modes of standing waves.
16. Define and calculate absolute/gauge pressure at various depths, define and apply Pascal's Principle, Continuity equation, Bernoulli Equation to static and dynamic problems involving incompressible fluids.