Welcome to Physics! Physics is a fundamental science. A good understanding of introductory physics will help you a) understand most technology (e.g., hydraulic brakes, the mechanics of bridges, MRI machines, photocopiers, etc.), b) better appreciate how physics concepts are constantly being used in other sciences (i.e., chemistry, biology, geology, etc.), c) hone your thinking and engineering skills, d) recognize the close connection between physics and history, politics, culture and the arts! By taking Physics 151 and 152Q you will learn the concepts needed for understanding how a big part of the Universe works! I hope you are getting excited!

**Goals of the Course / Learning Objectives**
At the end of this course, we will be able to:

1. Explain the basic concepts, theorems, and principles of physics and when and where they apply.
2. Recognize the limitations of the concepts/theories/principles.
3. Apply these concepts/principles in order to solve both simple and advanced (i.e., multiple-step or multiple-concept) physics problems by learning how to
   a. Deconstruct (i.e., break down) a problem to its component “mini” problems.
   b. Identify and analyze which concept/principle should be used for each “mini” problem.
   c. Integrate “mini” problems to move toward the solution of the problem.
   d. Correctly apply the concept(s)/principle(s) and check the validity of the answer.
   e. Develop an organized and systematic solution to a problem.
4. Use calculus in order to solve advanced problems and gain insight into the concept/principle.
5. Integrate multiple concepts/principles when analyzing a complex phenomenon.
6. Recognize the physics concepts/principles behind our day-to-day experiences.
7. Begin to develop the quantitative and modeling skills used by engineers and physicists.

Remember that **knowing how to use calculus and using calculus is NOT the same as understanding the underlying concept/principle/theorem. In this class you will be asked to do both!**

To achieve these goals, we will solve problems, use laboratory exercises, and discuss real-world applications while employing the mathematical tools of algebra and calculus in the process. We will be learning a lot of important concepts/principles/theorems during this semester. For this reason, you will have daily and weekly assignments and frequent quizzes.

**Student work submitted as part of this course may be reviewed by Oxford and Emory faculty/staff for the purposes of improving instruction and enhancing Emory education.**

**Logistics**

**Instructor and Contact Information:** Dr. Alfred Farris. You can reach me at alfred.farris@emory.edu.

**Office Hours:** Held remotely via Zoom on Mondays from 11AM – 1PM and Thursdays from 8:30AM – 10:30 AM. For the Zoom link, please check the Canvas course page. You can also email me to make individual appointments. Please include the reason for wanting an appointment in your email.

**Tutors:** Allison Cartee is the tutor for the course. Her tutoring hours will be posted on Canvas.

**Prerequisite:** Math 111 and Math 112 (Math 112 can be taken concurrently).
**Textbook:** Serway and Jewett, *Physics for Scientists and Engineers with Modern Physics*, 10th Edition (9th edition is fine also, but the sections for the readings will be based on the 10th edition).

**Course Format**

The course consists of lecture (in-person) and laboratory (remote). The format for each will be slightly different. The specifics are as follows:

**Lecture format:** The lecture will be held in-person. It will be recorded and posted online to Canvas, in addition to all associated class material (readings, assignments). Therefore, you are expected to check Canvas frequently. Omission on your part is not a valid excuse for not completing an assignment. For this component, you will be expected to do the following (in this order).

a) **Daily reading:** BEFORE coming to class, do the reading from the textbook. The reading will prepare you for the material covered in class. It is important that the lecture will not be your first exposure to the material.

b) **Daily videos:** If you are unable to come to class due to illness or quarantine, watch the posted videos and take notes. One benefit of having video lectures is that you can pause them and/or rewatch them, allowing you to take good notes. Even if you do attend class, you may find it beneficial to re-watch the lecture.

c) **Homework assignments:** AFTER reading the textbook and reviewing the lecture material, complete the assigned:
   
   a. **Practice Problems:** At every lecture, you will be assigned a couple of problems and questions from the handout “Physics Problems 141” (posted on Canvas). These problems will be much simpler than the Advanced Problem Sets described in part (b) below (remember that these practice problems were written for the Physics 141 students). Thus, you should be able to do these problems before attempting the Advanced Problem Sets.
   
   b. **Advanced Problem Sets:** Each week I will also be assigning a set of five advanced problems. The due date of each set will be announced on Canvas.

The goal is to be looking at the material as often as possible so that you can actually learn it. The basis of learning is repetition and, therefore, only by working on problems and studying as frequently as possible you will be able to learn physics.

**Laboratory format:** The scheduled laboratory time will be used for discussion of laboratory activities and synchronous assessment over Zoom. Therefore, it is necessary that you are able to attend at the scheduled time. If this is a problem, please contact me immediately. The Zoom link will be posted on Canvas.

a) **Laboratory activities:** Video explanations of each week’s laboratory activities will be posted on Canvas in advance. Please, watch the videos before attending that week’s lab. The beginning of each laboratory period will be used to answer questions about the lab.

b) **Assessment:** The remainder of the lab period will be used for assessment. See below for the details on how assessment will take place.

**Assessment**

During the semester, there will be four kinds of assessment. At the end of the semester, there will be a final exam.
a) **Quizzes (written):** Weekly quizzes will take place during the lab section. You will be asked to have your Zoom camera on during quizzes.
b) **Practice Problems (written):** I will be randomly collecting your solutions to the assigned practice problems throughout the semester (but not the answers to the review questions). Submission of the solutions to the assigned problems will count towards your Practice Problems grade.
c) **Advanced Problem Sets (oral):** During lab each week there will be one-on-one oral assessment over Zoom. The students assessed each week will be picked randomly. This assessment will be 5-7 minutes long per student and you will be asked to explain your solution to one or more of the advanced set problems you have been assigned that week. A rubric and instructions will be provided. Your explanation will count towards your Advanced Problem Sets grade.
d) **Laboratory reports (written):** Lab groups of two will be picked randomly. If you want to switch partners, it is your responsibility to coordinate this process and let me know. A lab report from each group will be due before lab each week based on the lab assignment from the previous week.
e) **Cumulative final exam (written):** The final exam will take place on Monday, December 7, at 6:30 PM – 9:30 PM (EST).

**Working with the Honor Code:** Completing college with academic integrity sets the foundation for a principled life. The Oxford College Honor Code ([http://oxford.emory.edu/catalog/regulations/honor-code.html](http://oxford.emory.edu/catalog/regulations/honor-code.html)) is taken very seriously and applies to this course as follows:

a) **Quizzes and cumulative final exam:** The work presented in these assignments should be your own. No collaboration permitted. You are expected to follow the instructions given by me and abide by the Honor Code. Sharing information in any way is not allowed. You are also not permitted to use online resources (e.g., Chegg, Yahoo Answers, Google, etc.)
b) **Homework:** Even though homework will be assessed orally, before and after the assessment you are definitely encouraged to form study groups to study concepts together and explain to each other things about which you were not clear from class or from your assignments. However, you are strongly encouraged to work on the homework assignments by yourself first, before consulting your classmates, tutor, or me for help.
c) **Laboratory reports:** On these assignments you can only collaborate with your lab partner.

**Grading:** Grades are assigned on the plus-minus scale. The final grade will be determined based on:

- **Quizzes (written):** 30%
- **Advanced Problem Sets (oral):** 30%
- **Practice Problems (written):** 5%
- **Laboratory reports (written):** 20%
- **Cumulative final exam (written):** 15%

Grades represent the professor’s best assessment on whether you have learned what the professor is trying to teach you. My focus on this class is on teaching you methodology as it relates to physics, not just physics concepts. Therefore, grades to the assignments will be given based on correctness and, most importantly, on the methodology you use (see section on “How to solve a physics problem” below, which is the foundation of this course). Methodology represents the core of what you will be learning. So, especially for the homework, make sure that you start on it early, come to me for help, solve the problems correctly, and follow/show all the steps that a solution should have (draw a picture, draw a coordinate system, etc.).
Re-grading Assignments: Though I am very careful when I grade assignments, I might make mistakes. If you would like me to re-grade a quiz or lab report, your request should be submitted to me in writing within 24 hours from the time I give back the graded assignment. Note that such a request will result in me re-grading the whole assignment/quiz (not just the specific problem you requested).

Letter grades will be assigned from your overall numerical grade according to the following:

<table>
<thead>
<tr>
<th>Numerical Grade</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>93 ≤ A</td>
<td>87 ≤ B+ &lt; 90</td>
</tr>
<tr>
<td>90 ≤ A- &lt; 93</td>
<td>83 ≤ B &lt; 87</td>
</tr>
<tr>
<td>80 ≤ B- &lt; 83</td>
<td>70 ≤ C- &lt; 73</td>
</tr>
<tr>
<td>60 ≤ D+ &lt; 67</td>
<td>F &lt; 60</td>
</tr>
</tbody>
</table>

Overall numerical grades will not be rounded (e.g., an 89.99 is still a B+). At the end of the course, it may turn out that the grading scale must be adjusted; this adjustment will never result in a lower letter grade than specified above.

Attendance

a) Lecture: If you are well and able, you are expected to attend class in person. This semester due to the pandemic, some students might be sick or will need to go into isolation or quarantine. If you are sick, understand that I will be flexible about in-person attendance. The most important thing to me this semester is the safety of the students enrolled in this class. Please make sure to email me so that we can discuss your individual circumstances. For students in quarantine who are well, please continue to keep up with the material by watching the recorded lectures that are posted to Canvas. However, please also contact me via email if you are in quarantine.

b) Laboratory: Zoom attendance is mandatory for synchronous, online labs because of the assessment that will be taking place. Again, because of the pandemic, I will be flexible. However, if you have to miss a lab for any reason, you have to let me know as soon as possible so that we can make other arrangements.

Health Considerations

At the very first sign of not feeling well, stay at home and reach out for a health consultation. Please consult the campus FAQ for how to get the health consultation. As you know, Emory does contact tracing if someone has been diagnosed with COVID-19. A close contact is defined as someone you spend more than 15 minutes with, at a distance less than 6 feet, not wearing facial coverings. This typically means your roommates, for example. However, your classmates are not close contacts as long as we are following the personal protective equipment protocols in the classroom: wearing facial coverings, staying six feet apart. (As your instructor, I may be following different PPE guidelines which have been judged to be equally safe by Emory’s Environmental Health and Safety Office (face shield + acrylic barrier)). Due to the necessity of keeping your PPE on, eating and drinking is strictly forbidden in the classroom.

Accommodating Students with Disabilities

The Office of Accessibility Services (OAS) works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, please contact the OAS and complete the registration process. Faculty may not legally provide you with accommodations until an accommodation letter has been processed and discussed with them; accommodations do not start until this point and are not retroactive. Students registered with OAS who
receive a letter outlining specific academic accommodations are thus strongly encouraged to immediately coordinate a meeting with their professors to discuss a protocol to implement accommodations that will (or may) be needed over the course of the semester. This meeting should occur as early in the term as possible. OAS can be contacted at (770) 784-4690 or oas_oxford@emory.edu.

**Recorded Class Sessions**

Our sessions on Zoom (lab) and in-person (lecture) will be audio visually recorded for students in the class to refer back to the information, and for enrolled students who are unable to attend live.

Lectures and other classroom presentations presented through video conferencing and other materials posted on Canvas are for the sole purpose of educating the students enrolled in the course. The release of such information (including but not limited to directly sharing, screen capturing, or recording content) is strictly prohibited, unless the instructor states otherwise. Doing so without the permission of the instructor will be considered an Honor Code violation and may also be a violation of other state and federal laws, such as the Copyright Act.

Students who participate over Zoom with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. The quizzes will not be recorded so you are still expected to have your camera on while taking them.

Likewise, students who un-mute (over Zoom) during class and participate orally (in-person or over Zoom) are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. Keep in mind that it might be difficult for me to keep track of the chat and, thus, I may unintentionally not answer your question. If you are not willing to consent to have your voice recorded during in-person lecture, please let me know as soon as possible.

**Religious Holidays**

Instructors are encouraged, not required, to accommodate students' academic needs related to religious holidays. Please make every effort to negotiate your religious holiday needs within the first two weeks of the semester; waiting longer may compromise your instructor’s ability to extend satisfactory arrangements. If you need guidance negotiating your needs related to a religious holiday, the College Chaplain, Rev. Lyn Pace, ppace@emory.edu, is willing and available to help. Emory’s official list of religious holidays is found at [http://www.religiouslife.emory.edu/faith_traditions/holidays.html](http://www.religiouslife.emory.edu/faith_traditions/holidays.html).

Good luck with the semester! On the next page you will find important information about how to solve physics problems.

Looking forward to working with you 😊!
How to Solve a Physics Problem

In your solutions to all problems (quizzes, advanced problems, etc.), I expect to see that you solve the problems following several important steps. **This is the proper methodology for solving a physics problem and this methodology is the same for all problems!** Following these steps will ensure that you are learning how to approach a problem and how to develop an organized and methodical solution to a problem (see section Goals of the Course).

1. **Read the problem** carefully so that you know what is given and what is asked.
2. **Draw a picture.** I cannot think of any physics problems that can be solved without drawing a good picture. Pictures help you visualize the problem and are the foundation to a good solution.
3. **Label all the quantities** in the diagram, those that are given and those that you need to find. Also, show your coordinate system and show which direction you have defined as positive!
4. **State the Physics Laws/Principles/Theorems** that apply to that problem and explain why. Here, I am not asking for an essay, a sentence is enough. For example: “The system is isolated \( \Rightarrow \) Conservation of Momentum applies.”
5. **Write the law in equation(s) form.** To continue the example, at this point you will say: \( P_{\text{final}} = P_{\text{initial}} \)
6. **Solve** the equations and substitute the values. **Always include the units in your answers!** Also, **show your work**! You cannot just write the initial equation and then the result. You have to show me the intermediate steps (the equations, the algebra, the numbers you plug in, etc.) This way, I can identify the wrong step and help you understand why what you did is not right.
7. **Check your answer.** Do the units match? Does the sign in front of your result make sense? Is the answer too big or too small compared to what you expected?