PHYS 1251 (50072) - Introductory Studio Physics for Engineers I

The University of Georgia, Fall 2022
Syllabus

Instructor:	Dr. Nandana Weliweriya	**Email:**	nandanaw@uga.edu
Time:	Mon,Fri 1:50-2:40 PM and Wed 1:50-3:50 PM	**Class:**	Room 303, Physics Building
Office Hours:	TBA	**Office:**	234-A Physics Building

Getting Ready for Fall 2022 Classes

- **This course continue to be offered in a face-to-face format**. The UGA classes will no longer follow hybrid or HyFlex instruction.

  - UGA's class attendance policy has not changed, where classroom attendance always has been an important part of the educational experience.

- **All tests/exams will be in-person.** Students with DRC accommodations can take your tests at UGA DRC's physical space.

Introduction: Welcome to Physics 1251.

This course is the first semester of introductory level physics sequence for engineering majors. This semester focuses on Mechanics, the study of motion. Understanding the motions of objects and their interactions is one of the principal goals of physics. The fundamental laws of mechanics, first enumerated by Isaac Newton in the 17^{th} century, can be applied to an enormous range of phenomena on scales as diverse as dust grains and galaxies.

The primary objective of this course is to engage you in a process that is central to physics: modeling physical phenomena by applying a small set of fundamental principles. The modeling process encompasses explaining and predicting physical behaviors; making appropriate approximations and simplifications for complicated physical systems; and communicating results through mathematical and numerical expressions, diagrams and visualizations, graphs, and even "plain English."

If you are a prospective physics or astrophysics major, then this course is probably not for you. Please talk to Dr. Mike Geller (Physics) or Dr. Loris Magnani (Astrophysics) about other options.

Prerequisites/ Co-requisites: In order to do well in this course, you should be comfortable with college algebra, trigonometry, and plane geometry. You should also have an understanding of some elementary science concepts such as scientific notation, significant figures, units and dimensions, and graphing. A prior high school physics course is useful, but not required.

Some differential calculus will be used in the course. It is important that you be registered for the first semester of the calculus sequence (Math 2250 or equivalent), if you haven't already taken it.

Student Learning Outcomes: In completing this course, connected to the topics covered in this class,

- **Organized knowledge**: Students should be able to,

  Articulate the ideas from each chapter, lecture, and make connections between different concepts,

  Organized their content knowledge to apply to solve a particular physical problem.

- **Visualize the problem**: Students should be able to sketch the physical parameters as appropriate for a particular scenario.

- **Math/physics connection**: Students should be able to,

  Explain the physical meaning of the mathematical formula.

  Translate a physical description of a problem to a mathematical formula necessary to solve it.

- **Communication**: Students should be able to justify and explain their thinking and approach to solve a problem in either written or oral form.

- **Problem-solving techniques**: Students should be able to choose and apply the appropriate problem-solving technique to a particular problem.

- **Problem-solving strategy**: Students should be able to,

  Identify/categorize Problem-solving techniques based upon underlying principles rather than contexts,

  Identify alternate methods of solving a given problem,

  Recognize common mistakes/wrong turns and learn to recover from those mistakes.

- **Expecting and checking solution**: When appropriate for a given problem, students should be able to articulate their expectations for the solution to a problem.

Important Dates:

Midterm #1	WEDNESDAY, 09/21/2022 – 1:50-3:50 PM
Midterm #2	WEDNESDAY, 10/19/2022 – 1:50-3:50 PM
Midterm #3	WEDNESDAY, 11/16/2022 – 1:50-3:50 PM

Final Exam(comprehensive) **December 13 : Tuesday, 7 - 10 pm** (Mass exam slot)

Final Exam Schedule, read for more details: https://reg.uga.edu/general-information/calendars/final-exam-schedule/

Course Resources

Required Materials

- *Textbook*: You may choose either one you like: **Paid or Free textbook**

  I would suggest trying the free textbook (link below) and going for the paid one if you do not like the free one.

  Paid textbook: The official textbook for 1251 (and 1252) is Physics For Scientists and Engineers, 6th ed., by Tipler and Mosca (W. H. Freeman). You may use older editions if you wish, but you're responsible for knowing about any changes in content. **Volume 1** is what we will use for this class. The bookstore should have this available as a bundle with a Achieve license.

  Free textbook: As an alternative, you may use the free electronic textbook University Physics, by Samuel J. Ling, William Moebs, and Jeff Sanney. It is published by the OpenStax open educational resources project and is available for free in various electronic formats: online, PDF, iBooks, and Kindle. You can also order a print version, if you prefer that format. You will need **Volume 1** for this class (https://openstax.org/details/books/university-physics-volume-1).

- **Pre-class lecture videos** will be assigned through eLearning Commons assignments (http://www.elc.uga.edu/).

- In addition to in class problem solving activities, **we'll do clicker questions** in this course. **BUT, you do not need to purchase a clicker or clicker subscription**.

- **Calculator:** You will be allowed to use a calculator: A simple calculator such as the TI-30X series will do just fine, but a fancier graphing calculator is also acceptable. **But**, on exams, you will be limited to the functions that a standard scientific calculator can perform. No graphing, solving, programming, etc.

Online Resources

- Please check your UGA email daily. The UGA email system will be used (infrequently) for announcements.

- The eLearning Commons (http://www.elc.uga.edu/) will serve as a repository of course information: announcements, homework solutions and exam solutions, grades, etc.;

- **Online assignments:** both before and after class, are an essential part of the course. You'll complete this work;

  (**before class**) within eLearning Commons assignemnts (http://www.elc.uga.edu/) and

  (**after class**) assignments on the LON-CAPA homework system at https://spock.physast.uga.edu/.

- Besides the Tipler and Mosca textbook, openstax textbook described in the required materials, you may also find it useful to have a supplemental textbook(s), **YouTube videos** for different explanations of concepts and additional problems to solve.

Other Resources

- If you need help with understanding principles and concepts from class or homework assignments, I do encourage you to first talk to your colleagues, if that is not helping come see me during my office hours. If you need additional time please set up an appointment (by email);

- Tutors are available either through the

  Division of Academic Enhancement (https://dae.uga.edu/services/tutoring/) at Milledge Hall and Miller Learning Center, or through the

  Department of Physics and Astronomy (https://www.physast.uga.edu/tutors/).

Assessment: Your overall grade will be determined from your course performance, weighted as follows;

20% Cumulative final exam grade
40% Three midterm exams (18%/13%/9% for highest/middle/lowest grades)
10% Homework grade (LON-CAPA)
15% Laboratory grade
05% Pre-class preparation (*pre-lecture videos, questions*)
10% In-class participation (clickers, minute papers, and problem-solving)

- Letter grades will be assigned from your overall numerical grade according to the following: **A** 90.0, **A-** 87.5, **B+** 85.0, **B** 80.0, **B-** 77.5, **C+** 75.0, **C** 70.0, **C-** 67.5, **D** 60.0, **F**
- Overall numerical grades will not be rounded (i.e., 89.99 is still an **A**−);
- Any requests for a regrade of an assignment or exam must be made **no later than one week after it's returned**. For a regrade I will look at the entire assignment/ exam, not just one problem, and this may ***raise*** *or* ***lower*** your score. Regrade requests (including those for online homework) should be accompanied by all your work;
- Like any other measurement, grades possess a degree of uncertainty. Factors such as improvement, effort, and participation *may* help borderline grades. Lobbying, however, will not, and requests for extra credit will be ignored, so don't ask!

Exams:

- **All tests/exams will be in-person.** Students with DRC accommodations can take your tests at UGA DRC's physical space.
- There will be three midterm exams and a final exam. All exams will be closed-book and closed-notes. **But, possible plagiarism/unauthorized assistance includes, but is not limited to: accessing Chegg or similar during or after an exam is not accepted.** The format of the exams will be discussed in class but will include conceptual as well as problem-solving questions. You may use a scientific calculator for arithmetic only, not for algebra, calculus, or graphing; all memory and programs must be cleared. I'll provide you with a formula sheet for each exam, and will also post it to eLC (at least one week) before the exam. The formula sheet's purpose is to release you from memorizing formulas, and allow you to focus your studying on understanding the principles and concepts involved;
- PDA's and cell phones are not allowed on exams and must be off and secured away;

- Exams will comprise both conceptual and problem-solving aspects, similar to homework, practice problems, and in-class examples. Unless told otherwise, you must show your work on each problem in order to receive full credit. Partial credit is awarded (based on your work) for incomplete or incorrect answers, so it is usually in your best interest to attempt every problem. Detailed solutions will be posted to eLC after each in-class exam;

- Exams are designed to test your understanding thoroughly and to distinguish among levels of performance. In order for exams to be effective assessments, raw scores will often be lower than the expectations created by the "standard" letter grade cutoffs. These raw scores will be "re-scaled" into numerical grades. This conversion is based mostly on the difficulty level of the exam and partly on the distribution of raw scores. Your re-scaled grade will never be lower than your raw score. Also, unlike a "grade curve", you are *not competing* against your peers; it is possible for everyone to get an A or B, for example;

- ***There will be no make-up midterm exams***. If you need to miss a midterm exam for a serious, documentable reason, your final exam grade will be substituted for one of your midterms, making your final exam worth 30-40% of your overall grade (depending on how this grade compares to your other midterm exam grades). This policy is designed to handle unavoidable situations like medical or family emergencies, or previously scheduled academic or athletic events. You must contact me as soon as you know of the conflict (before the exam if at all possible), and you must provide sufficient documentation in a timely fashion. (An example of unacceptable documentation is a note stating only that you visited the health center, with no indication of the severity and nature of your illness.) Do not presume that your situation or documentation merits an excused absence; that determination is not your prerogative. ***Unexcused exam absences will result in an exam grade of zero***.

- **Make-up final exams** will be given only for students with legitimate, documentable reasons and MUST be arrange PRIOR to the final exam.

Homework:

- Sustained practice with physics problems is crucial to understanding physics, so you will have regular homework assignments. Assignments will be posted online through LON-CAPA (`https://spock.physast.uga.edu/`) and most problems will require you to submit your answers online. However, a few assignments may also have a handwritten component. Detailed solutions will be posted to eLC after the due date;

- Assignments will be weighted equally unless otherwise specified. At the end of the semester, *provided that you complete a course evaluation*, I will drop your lowest two assignment percentages in calculating your overall score. (If you don't submit a course evaluation during the allotted time, then none of your assignments will be dropped.) This dropped-assignment policy compensates for the unavoidable circumstances that may occasionally prevent you from submitting homework on time (e.g., illness, scheduled event, Internet failure, etc.). *Late homework won't be accepted or excused.* However, even if you miss the deadline to submit homework answers for credit, you should still make every effort to work through all the problems on every assignment, in order to master the topics covered. You will likely do very poorly on exams if you don't work through each assignment in its entirety;

- Teamwork is an effective way to learn, so I encourage you to collaborate with your classmates. Ask them questions; critique others' work; explain your reasoning to your study partners. However, don't mistake teamwork for plagiarism. You're responsible for understanding all the details of every solution, and your solutions must be your own. Copying from any source of homework solutions is a violation of academic

honesty policies. Since you can't collaborate on exams, homework is your best opportunity to develop your own problem-solving skills. If you've read this far in the syllabus, please write your favorite color under your printed name on the agreements form.

Labs:

- Lab activities will usually take place during the longer class on Wednesdays, although you might also perform "mini-labs" during some other classes.
- Lab work is a group effort; your group will hand in one report to be graded as a team. Because teamwork is important to the success of labs, there are no make-up labs. You will have an opportunity to evaluate yourself and your groupmates on each person's contributions to the team and this evaluation will affect your lab grade.

Class Preparation:

- Pre-class lecture video viewing through eLearning Commons assignments (http://www.elc.uga.edu/) and textbook reading take the place of in-class lectures. This preparation before class is essential for you to learn well in class, just as it would be for a literature course. You'll regularly answer a few questions before class based on these materials to gauge your understanding.

In-Class Activities:

- In addition to in class problem solving activities, we'll do clicker questions in this course. **BUT, you do not need to purchase a clicker or clicker subscription**.
- You will often be asked in class to work on conceptual and quantitative questions, both individually and in small groups, and often using the "clickers". These activities allow you to demonstrate your sincere effort and active class engagement;
- A fraction of these in-class activity scores will be "dropped" (similar to the fraction of dropped homework assignments) to compensate for the occasional absence, clicker malfunction, or similar issue. I will not accept a written record of your responses as a clicker substitute, or otherwise excuse any absence from class.

Course Policies

Academic Honesty

- UGA has a comprehensive academic honesty policy, **A Culture of Honesty**, which is available from the Office of Instruction at http://honesty.uga.edu/. This policy covers all academic work. All students are responsible for fully understanding and abiding by this policy. If you have any questions about the appropriateness of your actions or your work, you are obligated to ask me for clarification;
- I take the issue of academic honesty very seriously, and it is my responsibility to uphold the University's policy. This means, among other things, that I won't hesitate to report evidence of dishonesty to the Office of the Vice President for Instruction. Typical consequences of academic dishonesty on homework or an exam range from receiving a zero for that grade, to failing the course, to being suspended from the university.

Disability Accommodations:

- I will make every reasonable effort to accommodate students with documented disabilities. Students requesting accommodations must provide documentation from the Disability Resource Center during the first two weeks of class (or within two weeks of DRC certification).

Withdrawals/ In-completes:

- The Undergraduate Bulletin (http://www.bulletin.uga.edu/) and the Registrar's Office website describe the University policies regarding withdrawals and in-completes (http://reg.uga.edu/policies/withdrawals). If you don't complete the initial required administrative tasks of the course (e.g., the questionnaire), or are demonstrably not attending class and completing work, I may withdraw you from the course for "excessive absence";
- If you are considering withdrawing from the course, you should discuss your choice with me beforehand (In many cases, students are doing better in the course than they think they are);
- A grade of incomplete is not appropriate for a student who has missed a large portion of the course assessments, for whatever reason.
- **The Withdrawal Deadline is October 24; Monday.**

Well-being, Mental Health, and Student Support:

- If you or someone you know needs assistance, you are encouraged to contact Student Care Outreach in the Division of Student Affairs at 706-542-7774 or visit https://sco.uga.edu/. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services. UGA has several resources to support your well-being and mental health: https://well-being.uga.edu/
- Counseling and Psychiatric Services (CAPS) is your go-to, on-campus resource for emotional, social and behavioral-health support: https://caps.uga.edu/, TAO Online Support (https://caps.uga.edu/tao/), 24/7 support at 706-542-2273. For crisis support: https://healthcenter.uga.edu/emergencies/. The University Health Center offers FREE workshops, classes, mentoring and health coaching led by licensed clinicians or health educators: https://healthcenter.uga.edu/bewelluga/

Monitoring conditions:

- Note that the guidance referenced in this syllabus is subject to change based on recommendations from the Georgia Department of Public Health, the University System of Georgia, or the Governor's Office or. For the latest on UGA policy, you can visit coronavirus.uga.edu.

Technology Policy:

- Cell phones should be turned to silent or off during class. Texting, checking email, posting to Facebook, etc. are not allowed during class. These activities are distracting and disrespectful to your fellow students. Tablet computers and convertible laptops in tablet mode may be used with a stylus for the purpose of taking notes. Typing notes on a traditional laptop is not very effective for a class like this, because of the large number of diagrams, graphs, and equations required.

Student Responsibilities:

- Above all, you have the right to expect courtesy from your fellow students, and the same will be asked of you. Courtesy includes the expectation that everyone will come to class ready and willing to learn and interact, and able to ask or answer questions freely. Courtesy also implies that you arrive on time, stay until the end of class, and remain focused during class.
- Attendance is required. Class attendance keeps you well connected to the course and to the members of your group. In physics courses, each new concept builds on earlier ones, so mastering key concepts is critical. If your schedule makes it difficult to attend class regularly and on-time, you shouldn't take this course.
- The most common causes of missed classes are lack of sleep and time pressure from other obligations. If this starts happening to you, you need to seek out advice on how to set priorities and manage your time effectively.
- If you miss class, it's your responsibility to find out from other students what you missed. Talk to your group-mates, and notify them of your absence in advance if possible. They're relying on you to be caught up by the time you return to class.
- You *must* prepare for class. Class time is valuable and limited. Using that time effectively requires that you've had some exposure to the necessary concepts, so that you can ask good questions and practice applying those concepts in class. Evidence from other courses with this format suggests that the time you spend preparing for class *significantly* reduces the amount of time needed for homework. Finally, *class discussion will not cover all of the assigned material.*
- Ask for clarification on anything you find unclear, ambiguous, or unspecified. This includes both course policies and physics topics. Ignorance is never a valid excuse. It's your responsibility to show me what you do and don't understand through your questions, so that I can help you learn. You help influence the pace of the course. Silent confusion benefits no one.
- I can't emphasize enough the importance of homework! Just as with other areas of learning, your physics problem-solving skills will improve only by practicing regularly and conscientiously. You'll get very little value out of homework if you procrastinate, or if you depend on the efforts of others. If you start to get behind, get help early before the problem gets worse!

2022 Fall week-by-week Tentative plan: (this is a general plan for the course; Any modifications to this schedule will be announced during class. Be prepared for class by reading the assigned chapter before class)

Week	Dates	Topics	Lab Activity OR Exam (on Wednesdays)
01	08/17 - 08/19	Intro. and Diagnostics, Scalars vs. Vectors, 1-D vectors	Double Class Period
02	08/22 - 08/26	2-D vectors, Vector addition and subtraction, Kinematics Quantities	Activity 1: Vector Addition
03	08/29 - 09/02	1-D Kinematics, Graphs	Double Class Period
04	09/05 - 09/09	Free fall, 2-D Kinematics	Activity 2: Inclines #Labor Day - No Classes on Monday, 09-05
05	09/12 - 09/16	Projectile motion, Relative motion	Double Class Period
06	09/19 - 09/23	Uniform circular motion, Kinds of Forces	EXAM 1
07	09/26 - 09/30	Newton's laws of motion, Frictional forces	Activity 3: Video analysis of Projectile Motion
08	10/03 - 10/07	Forces on circular motion, Connected objects (ropes and pulleys)	Activity 4: Newton's Second Law
09	10/10 - 10/14	Work & Energy, Work-Energy Theory, Hooke's Law	Activity 5: Uniform Circular Motion
10	10/17 - 10/21	Conservation of Mechanical Energy	EXAM 2
11	10/24 - 10/28	Extended Work-Energy Theory	Activity 6: Elastic Systems and Hooke's Law # Fall Break No Classes on Friday, 10-28

12	10/31 - 11/04	Power, Linear Momentum, Conservation of Linear Momentum	Activity 7: Ballistic Pendulum
13	11/07 - 11/11	Center of mass, Collisions	Activity 8: Rotational Kinetic Energy and Inertia
14	11/14 - 11/18	Rotational Kinematics	EXAM 3
15	11/21 - 11/25	Rotational Dynamics	# Holiday: Thanksgiving - No Classes on Nov. 23– 25
16	11/28 - 12/02	Static Equilibrium	Activity 9: Statics
17	12/05 - 12/06	Static Equilibrium, Diagnostics	Friday Class Schedule in Effect for Dec. 6 Tuesday
	December 13 : Tuesday, 7 - 10 pm	Final Exam (comprehensive)	Mass exam slot