**AUGUSTA UNIVERSITY**
**PHYSICS 1111 - GENERAL PHYSICS I**
**Fall 2019**

Instructor: Joseph Newton Office: Science Hall, W3013
Phone: 706-729-2509 e-mail: jnewton3@augusta.edu
Text: OpenStax "*College Physics*",
Available at openstax.org electronically at no charge.

**Office hours: M,W** (1:00pm – 2:00 pm) and by appointment **T,R**.
**Learning Center and Supplemental Instruction:** You should also make frequent use of the following:

- Chemistry and Physics Tutoring/Learning Center in Science Hall C-3017
- Academic Success Center

**Course Description and Objectives:** During the course, we will learn to describe and predict the motion of objects. We will also learn what causes motion and more importantly, what causes changes in an object's motion. The course will also delve deeply into the concepts and uses of work and energy. Other topics may include circular motion, gravity, torque, temperature, heat, gas laws, waves, and sound. Throughout the course you will be required to use algebra and trigonometry - as a result, you should see a real improvement in your skill in these areas.

Throughout the course you will be expected to complete reading assignments – the lecture portion of the class will by no means offer complete coverage of the course material. I will spend time lecturing in class, but also addressing questions raised by you, working and discussing problems and in viewing demonstrations of various phenomena. You'll need to be involved in class – constantly thinking and considering various situations we are interested in learning about.

**Course Prerequisites:** You will be expected to have a basic knowledge of MATH 1113. Specifically, we will use mathematical methods which include trigonometry (sin, cos, tan), Pythagorean theorem, exponentials and logarithms and a good bit of straightforward algebra. Some of this will be reviewed briefly when we get to it, but you'll need to be "up on it" quickly.

**Grading:**
1. ***Warmups*** – Questions or problems will be assigned via a handout and then submitted at the ***beginning*** of the next class. These questions will be based on reading that you will do before class or material that we have just covered in the current class. ***No late warm-ups will be accepted.***

2. ***Homework/Quizzes*** - Several homework problems will be assigned each day. *While I will not regularly collect this homework, these problems should be worked out before the next class meeting.* We will often discuss one or two of these problems at the beginning of the next class - this discussion will be useless for you if you have neglected your homework.

We will have several quizzes this semester (about one per week). Quizzes will serve as a test of your diligence in attempting the assigned problems. Your overall homework/quiz average will be determined from these quizzes. I am happy to discuss what to look over in order to prepare for a

quiz, but I will only discuss this in class in front of everyone. The lowest quiz score will be dropped from the average. ***No make-up quizzes will be given.***

3. ***Exams*** - There will be three one-hour exams and the final. Exams will be given **September 16, October 18,** and **November 18**. The final exam is scheduled for **Tuesday, December 10** (2:00 – 4:00pm) and will count as two hour exams. The exams will require about 80% problem solving and some (about 20%) short answer and multiple choice. ***No make-up exams will be given.*** Since accumulated knowledge is one goal of this course, the final exam will include all material covered during the course.

4. Your final average for the course will be determined as follows:

- *Warmups* – 10%
- *Quizzes/Exams* – The **lowest of the following 6 grades below will be dropped.** (Dropping one allows for the total grade to add up to 100%)
    - Quiz average 18%(the lowest quiz grade is dropped from the average),
    - Exam 1 score 18%
    - Exam 2 score 18%
    - Exam 3 score 18%
    - Final exam score 18%
    - Final exam score 18%

5. Your final grade will be based on traditional cutoffs:

$A \geq 90\%$ $B \geq 80\%$ $C \geq 70\%$ $D \geq 60\%$ $F < 60\%$

**Miscellaneous:** You will need an electronic calculator capable of performing trigonometric functions and scientific notation. These are available for about $10. If you need help selecting one, please ask me.

**Withdrawal:** Students that repeatedly miss class may be withdrawn from the course (see AU attendance guidelines) by the instructor after midterm. This will result in a grade of *WF*. It is the responsibility of the student to withdraw before **midterm** (October 7) to avoid this grade.

**Emergency:** In the case of an emergency evacuation, please proceed to the nearest available exit door to exit the building. Please do not use the elevator. Once outside the building, the assembly point for the Science Hall is the large sports field beside the Amphitheatre.

**General Learning Outcomes**

- Learn to employ high scientific standards in written work (homework, quizzes, and exams).
- Demonstrate appropriate academic engagement (preparation for class, attendance, timelines, etc.)
- Learn to demonstrate the ability to work affectively as part of a team in study groups.
- Practice clearly and concisely articulate scientific ideas and arguments through written works.
- Construct logical arguments based on the interpretation of scientific data.
- Demonstrate knowledge of physics related to mechanics.

**Specific Course Objectives**

- To develop an understanding and appreciation of the principles of physics related to Mechanics and waves.

- To understand how the applications of these physics principles have led to the development of our modern technology-based society.
- To develop analytical thinking skills through extensive problem-solving.

**PHYS1111B Fall 2019 Dr. Tom Colbert Science Hall W3005b, tcolbert@augusta.edu**
**Course Materials: http://spots.augusta.edu/tcolbert/** Office Hours
Class location: Science Hall W1002 at 5:30PM-6:45PM M,W

| Week/Day | Topics Physics | Additional Comments |
|---|---|---|
| Week 1 Aug. 14 (partial) | Intro and Motion one Dimension | Start reading and links |
| Week 2 Aug. 19 | Motion one and two Dim | |
| Week 3 Aug. 26 | Two Dim, vectors, projectile motion | |
| Week 4 Sept. 2 Labor Day | Forces /Newton laws | |
| Week 5 Sept. 9 | Forces /Newton laws | .. |
| Week 6 Sept. 16 | **Orbits/Gravity(some rotation)** | Exam 1 (Monday Sept. 16) |
| Week 7 Sept. 23 | **Work/Energy** | .. |
| Week 8 Sept. 30 | **Work/Energy** | .. |
| Week 9 Oct. 7 Midterm | **Work/Energy/Momentum** | Midterm Oct. 7<br>Fall Pause Oct. 10,11 |
| Week 10 Oct. 14 | **Momentum** | .. |
| Week 11 Oct. 21 | *Torque/Statics/Rotation/Equilibrium* | **Exam 2 (Monday Oct. 21)** |
| Week 12 Oct. 28 | *Torque/Statics/Rotation/Equilibrium* | .. |
| Week 13 Nov. 4 | *Angular Momentum and Rotational Energy* | .. |
| Week 14 Nov. 11 | *Angular Momentum and Rotational Energy* | .. |
| Week 15 Nov. 18 | Oscillatory motion and waves | .. |
| Weel 16 Nov. 25 TG | Oscillatory motion and waves | *Exam 3 (Monday Nov. 25)*<br>Thanksgiving off on 27,28,29 |
| Week 17 Dec. 2 | Oscillatory motion and waves | |
| ..Last Day Dec. 4 | .. | .. |

MidTerm Oct 7 Dec. 12 5PM-7PM

**STUDY TIPS AND RESOURCES:** The coursework will have warmup/cooldown (pen and paper) problems, in class quizzes, exams, suggested textbook problems, reading, and other examples. . It is your responsibility not only to complete homework and studying, but also to achieve a high degree of understanding to support your quiz and exam scores. You must read the assigned material **before class** lectures on each topic. I will post assignment comments on my web page listing reading and homework assignments, and other relevant course material. You should take thorough textbook notes on the assigned reading **prior** to lectures. I recommend working with other students on many problems throughout the week. You should be able to complete several physics problems each day as you study. You should examine many end of chapter problems and make sure you feel comfortable with all of the concept questions at the end of each chapter. Be able to do and understand problems. My website is **http://spots.augusta.edu/tcolbert/** **My website is where you will obtain critical daily/weekly information updates.** You are strongly encouraged to work with classmates on general studying and problem solving. . It is your responsibility to ensure that you have appropriate understanding of all assigned or suggested materials. Collaboration and exact duplication or copying of graded work is never permissible.

**Our textbook is College Physics, OpenStax ---do not confuse this with other editions (calculus based or AP versions). The text is free for viewing online, a pdf may be downloaded (the current version of the text is 16.17 Fall2019). The text is viewable on mobile devices.** This is our first time using OpenStax, which has been done to offer students a FREE TEXTBOOK. Please bear with us as we learn features of this new resource. A link to get you started is https://openstax.org/details/books/college-physics. **HERE IS THE FREE BOOK** . You may either download the pdf, or view the text online or on your mobile device. Note there is a very useful table of contents set of internal links for navigating the text---that table of contents displays differently in different environments (different pdf viewers or browsers), find it and use it.

**TESTS AND FINAL:** Three tests will be given which will focus mainly on problem solving (**show all work**). The tests will be graded out of 100 points. The final exam will count as 2 tests and will cover material from the entire course. We will also have short in class quizzes. The total average percentage score on all your quizzes will count as an exam. Your lowest exam score out of these six scores will be dropped. If you must miss a test for an exceptional reason, you will need to see me as soon as possible to consider how that will be handled (in general a missed exam will be your dropped score). If you know about an absence beforehand, you must get approval from me to take the test early or to have that counted as a drop.

**HW:** Warmups materials will be posted online at my website. You will see assignment dates, and posted warmups (or cooldowns) on the weekly assignments web page. We go over these works in class as a prelude to class lectures, so no late work is

accepted. Attempting to hand work in late may result in negative (below zero) grading. Work is due at the start of class. I start on time. I will allow for one missed assignment for everyone. If there is an exceptional excused reason (eg. Coma, torn aorta, medical quarantine, extreme family emergency---yes I have seen all of these) then I may consider an additional missed assignment. Athletics, sports, school events that are scheduled prior to due dates are not reasons for late work---plan ahead to hand in such work early. If you visit me in office I will do my best to work with you as long as you are doing diligent work in the class. The goal of warmups is to introduce you to problem concepts, units, jargon, figures, and other "getting started" issues relating to a course topic. Additional suggested problems, examples in the text and instructor examples will go into greater depth in order to prepare you for exams. These additional problems are "suggested" problems that are recommended as necessary for your course preparation.

I may assign and collect additional problem styles or works that will be counted in either the HW, Exam, or Quiz categories.

**Quizzes:** There will be numerous short quizzes on materials. These will typically extend beyond the introductory level of the warmups. Quizzes should indicate that you have kept up with warmups, lecture material, text reading, examples and suggested problems. Quizzes may be at or near the level of problems you might see on an exam. However, the time will be limited!

I consider quizzes as "unannounced" (and I reserve the right to give a quiz at any time during classes), it is typical that I will mention what to expect for content, timing, and day for quizzes. If you have prepared as I suggest, you will do well on quizzes. I will drop a low quiz score (or missed excused quiz) prior to averaging your quiz grades. If you must miss more than one quiz, you will need an exceptional reason (see comments for HW). Quizzes will typically be at the start of class, will not be handed out late, and will be gone over immediately following the quiz (so no make ups—just drops if excused).

Sidenote: Labs. You are most likely taking our PHYS1111 Lab course along with this lecture course. Physics is an applied topic and you see many examples of physics in action all around you all the time. Labs in physics both demonstrate the connection of topics to real world events (in a simplified manner), but also open up their own unique set of experimentation and measurement skills. Topics covered such as motion, springs, energy, momentum may either precede lectures or follow. Either lab/lecture can be introduced in a manner to support the other. Your instructors are aware of the connection between labs and lectures and make every effort to ensure that you have prerequisite knowledge of either, and that you gain the benefits of experiences based upon coupling the two courses. However, some of you have labs and or lectures with different schedules, so our course progression and coupling is inexact. You may need to look for materials and read ahead in either lecture or lab to gain the greatest benefits of both.

**Course Grades:**
80% of the total grade will come from your test/final/ scores.
20% of the total grade will come from your average warmup score

Grades will be no less than:
A if 90 % or better
B if 80 %
C if 70 %
D if 60%
F if less than 60%

If you are unable to attend classes you should get notes from classmates. You also have posted materials available on my website, and your text. You are responsible for all material, assignments, tests, etc. The current campus policy requires that faculty keep a record of activity in the course. For this I count assignments handed in as attendance, also returned. If these are missed (if you are not there--even to collect your work) it counts as an absence. No more than 10% of the course can be missed. Excessive absence or tardiness or academic dishonesty may result in your being withdrawn or receiving a failing grade in the course. Ultimately it is the students responsibility to make sure that the proper paper work has been handed in by midterm in order to ensure withdrawal. Withdrawals after midterm will generally not be considered unless you are passing the course at the time of withdrawal. Failure to handle paperwork properly may result in receiving a failing grade in the course. Make ups for work missed will be scheduled individually, but only for acceptable reasons. YOU MUST notify me beforehand if possible.

Academic honesty is expected from all students. While collaboration (working together on methods) is expected, copying answers and copying work is not permissible. In particular, copied work during exams or quizzes may result in receiving F or WF in the course and submission of the event to the appropriate administrative office. If you receive comments regarding copying of your work (any work handed in for grading) you should take serious note. In general, when a slew of students (two or more) hand in the exact same error, or a numerical error, or handwritten typo, or other such copying offense, this is an indicator that work was copied directly without appropriate thinking. That is a violation of academic honesty. If you discuss a problem with a class mate, and then write it up on your own, you will find the written work is distinctly different, unique, and your own. .

If changes in the above policies or schedule become necessary you will be notified in class. It is your responsibility to make sure that you take note of any such changes.

**General Learning Outcomes**

- Learn to employ high scientific standards in written work (homework, quizzes, and exams).
- Demonstrate appropriate academic engagement (preparation for class, attendance, timelines, etc.)
- Learn to demonstrate the ability to work affectively as part of a team in study groups.
- Practice clearly and concisely articulate scientific ideas and arguments through written works.
- Construct logical arguments based on the interpretation of scientific data.
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**Specific Course Objectives**

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- To understand how the applications of these physics principles have led to the development of our modern technology-based society.
- To develop analytical thinking skills through extensive problem-solving.

# *PHYS1112 Introductory Physics II*

## FACULTY

**INSTRUCTOR**

Name: Josefa Guerrero Millan
Email: jguerreromillan@augusta.edu
Office Location: SCI - C3006
Research Lab: SCI – W3002 A

**Office hours:**

Mon 12 – 13, We, Fri 12 – 14*** and when you see my door open.

*** If I am not in my office during these times, look for me in my research lab

## COURSE TIME AND PLACE

This class meets:

Mondays, Wednesdays & Fridays 11.00-11:50 am (UH-224)

## I. COURSE INFORMATION

**Term and Year:** Fall 2019

**Course Prefix, Number, and Title:** PHYS, 1112, Introductory Physics II

**Number of Credit Hours:** 3

**Course Description:** A trigonometry-based study of electricity and magnetism, light, and modern physics. Emphasis on problem solving.

**Prerequisite(s):** PHYS 1111 or 2211. Specifically you will need to be capable of applying concepts such as vectors and vector addition, kinematics, energy conservation and work, power, force and acceleration, circular motion and centripetal force, torque, wavelength, frequency, and period. We will use mathematical methods which include trigonometric functions, the Pythagorean Theorem, exponentials and logarithms and algebra. Some of this will be reviewed briefly when we get to it, but you'll need to be "up on it" quickly.

PHYS 1112L is a co-requisite for this course. Unless you already have credit for PHYS 1112L, you must be signed up for that course as well as this one. Normally, if you withdraw from one course, you must also withdraw from the other. If you withdraw from PHYS 1112L late in the semester (well after midterm), with instructor permission, you may be allowed to finish PHYS 1112.

**Department Name:** Department of Chemistry and Physics

**College:** College of Science and Mathematics

## II. GRADING AND ASSIGNMENT DESCRIPTIONS

### COURSE GRADES

Your final course grade stems from the following grading opportunities:

10% of the total grade will come from your warm-up average (the two lowest grades are dropped from the average).

90% of the quiz/exam average.

Your quiz/exam average is determined by taking the best five of the following six scores:

Quiz average (the two lowest grades will be dropped)
Exam 1 score
Exam 2 score
Exam 3 score
Final exam score
Final exam score

Course grades will be assigned as follows:

**A** = 90 – 100%; **B** = 80 – 90%; **C** = 70 – 80%; **D** = 60 –70%; **F** = <60%

### ASSIGNMENT DESCRIPTIONS:

**I. WARM-UPS**

Questions will be assigned and then submitted at the beginning of the next class. These questions will be based on reading that you will do to prepare for class. Some will involve working a problem or answering questions based on what was discussed in a previous class. We will have almost daily warm-ups. **No late warm-ups. None**

**II. EXAMS**

There will be three in-class exams (50 min) and the final (2h). Since accumulated knowledge is one goal of this course, the final exam will include all material covered during the course. The final will weight like two in-class exams.

***No make-up exams will be given*** (If you have a reasonable excuse, you MUST let me know before the exam. Otherwise, a make-up exam will not be accommodated).

No electronic devices (cell phones, tablets, smart watches, laptops, earbuds, etc.) are allowed in the exam room.

Exams are usually on a Friday unless there is a holiday or the campus is closed.

**III. QUIZZES**

We will have a quiz every Friday at the beginning of the class **#QuizFriday** (if you are late, you will have less time …) These are usually about 5 minutes long, and include one or two questions about the material covered during that week. Your overall quiz average will be determined from these quizzes. The two lowest quiz scores will be dropped from the average. ***No make-up quizzes will be given*.**

## III. REQUIRED TEXTBOOKS AND SUPPLIES

### REQUIRED TEXTBOOK

**College Physics** by OpenStax. Good news: your textbook for this class is available for free online!

https://openstax.org/details/books/college-physics

If you prefer, you can also get a print version at a very low cost via the campus bookstore or from OpenStax on Amazon.com. **I posted a pdf copy on D2L. I will refer to this version when I mention equation, figure and problem numbers**.

**REQUIRED SUPPLIES**

You will need an electronic calculator capable of performing trigonometric functions and scientific notation. These are available for about $10. Your phone does not count as a calculator. **Bring your calculator to class every day**.

## V. SCHEDULE

**TENTATIVE COURSE SCHEDULE**

| Week starting | Chapters | In-class exams |
|---|---|---|
| August 12th | 18 Electric fields | |
| August 19th | 18 Electric fields | |
| August 26th | 19 Electric potential | |
| September 2nd (Labor day) | 19 Electric potential | |
| September 9th | 20 Ohm's law | EXAM1: chapters 18 & 19 |
| September 16th | 20, 21 Circuits | |
| September 23th | 21 Circuits | |
| September 30th | 22 Magnetic fields | |
| October 7th (Fall Pause) | 22 Magnetic fields | EXAM2: chapters 20 & 21 |
| October 14th | 22 Magnetic fields | |
| October 21th | 23 Induced EMF | |
| October 28th | 23, 24 Induced EMF | |
| November 4th | 27 Wave optics | EXAM3: chapters 22, 23 & 24 |
| November 11th | 27 Wave optics | |
| November 18th | 25 Geometric optics | |
| November 25th (Thanksgiving) | 25 Geometric optics | |
| December 2nd | 25 Geometric optics | |

**DUE DATES** (These are tentative dates, please check https://www.augusta.edu/registrar/ for any changes)

Last day for withdrawal from the course: Monday, October 7th

Final exam: Friday, December 6th 11-1pm

**HOW TO SUCCESS IN THIS CLASS**

**Study every day**. Studying one hour per day for seven days is worth a lot more than studying seven hours in one day. It takes time for your brain to absorb and process the concepts, you give it time by studying daily.

**Read the textbook before class**. If you walk into class not knowing what will be discussed today, you are already behind. Read the textbook before the lecture. It won't all make sense the first time, but learning abstract concepts is about repetition and interaction. You will take more away from lecture if you read the book before class. The warm-ups will guide and help you with the reading.

**Don't miss class**. **Pay attention in class**. Think you can miss class because you already have the lecture notes? Think again. Think you can multitask and check out Facebook while in class? Think again. There are a lot of studies that show that we are terrible multitaskers. Show up and pay attention.

**Be an active learner**. Studies show that you learn more when you actively participate in class. Try to work the example problems. Talk with your neighbors during the class activities. Think of a question you would ask during class. (You don't have to ask the question, just write it down so that you can look up the answer later, or talk to me after class.)

**Work with others**. If you think you understand how to do a problem, try to explain it to the friend that you are studying with. If you can't explain it, then you don't understand it as well as you think. Working in groups is beneficial for everybody involved.

**Take the labs seriously**. This goes along with being an active learner. Believe it or not, the labs provide an opportunity to actually see up close what's going on. The labs are designed and developed to aid your learning. Try to predict what's going to happen before you try an experiment. If you sit back and watch, you aren't going to get anything out of it.

**Study solved problems**. **This is important.** A great way to learn about problem solving techniques is to see how problems are solved. Textbooks have worked examples. My suggestion is to cover up the solution, and try to solve example yourself. This forces you to think about how you would approach the problem *before* you see the solution. After you've given it a serious effort, then look at the solution. If you don't try it yourself, you'll look at the solution and say, "Yeah that makes sense…" and you've gotten almost nothing out of it.

**Practice solving problems**. Do you know anybody who read a book about riding bicycles and then was immediately a bicycle expert? I don't. Everybody I know had to practice, practice, practice to ride a bike. Same with solving problems in physics. It's true that some people can ride a bike with less practice than others, but everybody needs to practice. Try to solve as many practice problems as you can. Do so in test-like conditions, find a quiet place and don't use your notes or formula sheets. It would be great if you could keep a notebook with all the problems.

**Get help!** Often times, you can bang your head against the wall for hours and hours trying to solve a tough problem, or you can get advice from your professor or a tutor in about 10 minutes. I am here to help you, and I want to help you. My help or the tutor's help is more efficient if you come in with concise questions. That means you should try the problems yourself, make a serious effort, and then go in and ask specific questions. If you haven't tried the problems, or if you go in and say, "I don't understand anything." Then it's hard for me to help you.

(Adapted from Illinois College of Engineering)

## V. POLICIES

### ATTENDANCE POLICY

If you are unable to attend classes you should get notes from classmates. You are responsible for all material, assignments, tests, etc. I will consider any missed assignments or any class activity as an absence. Excessive absence of tardiness may result in your being withdrawn or receiving a failing grade in the course. Ultimately it is the student responsibility to make sure that the proper paperwork has been handed in by midterm (or later on, if that is the case) in order to ensure withdrawal (or WF). Under no circumstances, I will send this paperwork for you. Failure to handle this properly may result in receiving a failing grade in the course.

Make ups for work missed will be scheduled individually, but only for acceptable reasons. You must notify me beforehand if possible.

In addition to the above-mentioned instructor policy, you are also obligated to follow the Augusta University Attendance Policy, which is available at https://www.augusta.edu/student-life/documents/2018studentmanualnew.pdf (section 5.4). This university policy essentially states that you are expected to punctually attend all classes from the first to the last day of the term, that your instructor will monitor both your attendance and participation, and that there are academic penalties for excessive absenteeism.

### ACADEMIC INTEGRITY

You are encouraged to study together and to discuss information and concepts covered in the lecture and the lab sessions with other students. You can give “consulting” help or receive “consulting” help from such students. However this permissible cooperation should never involve one student having possession of a copy of all or part of the work done by someone else, in the form of an e-mail, an e-mail attachment file, a picture, a flash drive, a hard copy, etc.

It is the duty of the student to practice and preserve academic honesty. Each student should be aware of the specific policies governing academic conduct for the course, as well as the grievance and appeals processes put in place for adjudicating such policies. If the student has any doubt about a situation, he or she should consult with his or her instructor. It is also the student’s responsibility to maintain his/her correct address of record with Augusta University so that official notification of the student regarding academic misconduct can be carried out in timely fashion.

More information is available at https://www.augusta.edu/student-life/documents/2018studentmanualnew.pdf (section 5.2).

### DISORDERLY CONDUCT

Augusta University prohibits behavior that disrupts the academic, research or service mission or activities of the University, or disrupts any activity or event of the University community. Some examples of disorderly conduct include, but are not limited to, the following: conduct which causes a breach of the peace; lewd, obscene or indecent conduct; conduct which interferes with or disrupts activities or functions sponsored or participated in by the University or by members of the University community; conduct that is disruptive to a classroom lecture, lab, or other teaching or research entity of the University, interfering with or obstructing pedestrian or vehicular traffic; obstructing or interfering with ingress or egress of campus buildings or facilities; conduct which interferes with the rights of others; unauthorized use of electronic or other devices to make an audio or video record of any person without his or her expressed or implied consent when such recording is likely to cause injury or distress.

In addition to the above-mentioned policy, you are also obligated to follow the Student Manual guidelines which is available at https://www.augusta.edu/student-life/documents/2018studentmanualnew.pdf

**MORE COURSE INFORMATION**

**Course-Level Goals:**

The following course goals articulate the general objectives and purpose of this course:

1. **Math/physics connection**: Students should be able to translate a physical description of a problem to a mathematical equation necessary to solve it. Students should be able to explain the physical meaning of the solution to a physics problem.
2. **Visualize the problem**: Students should be able to sketch the physical parameters of a problem including sketching the physical situation as appropriate for a particular problem.
3. **Expecting and checking solution**: When appropriate for a given problem, students should be able to articulate their expectations for the solution to a problem, such as direction of a force, dependence on coordinate variables, and behavior at large distances or long times. For all problems, students should be able to justify the reasonableness of a solution they have reached, by methods such as checking the symmetry of the solution, checking units, and/or checking the scale/order of magnitude of the answer.
4. **Organized knowledge**: Students should be able to articulate the big ideas from each chapter, section, and/or lecture, thus indicating that they have organized their content knowledge. They should be able to filter this knowledge to access the information that they need to apply to a particular physical problem, and make connections/links between different concepts.
5. **Communication:** Students should be able to justify and explain their thinking and/or approach to a problem or physical situation, in either written or oral form. Students should be able to write up problem solutions that are well-organized, clear, and easy to read.
6. **Build on Earlier Material**. Students should deepen their understanding of PHYS 1111 material. That is, the course should build on earlier material.
7. **Problem-solving techniques**: Students should continue to develop their skills in choosing and applying the problem-solving technique that is appropriate to a particular problem. This indicates that they have learned the essential features of different problem-solving techniques, indicating that they understand the essential features of the technique rather than just the mechanics of its application. Students should be able to articulate what it is that needs to be solved in a particular problem and know when they have solved it.
8. **Intellectual maturity**: Students should accept responsibility for their own learning. They should be aware of what they do and don't understand about physical phenomena and classes of problem. This is evidenced by asking sophisticated, specific questions; being able to articulate where in a problem they experienced difficulty; and take action to move beyond that difficulty.

**Course-Level Student Learning Outcomes:**

The following student learning outcomes indicate competencies and measurable skills that students develop as a result of completing this course:

- Students will be able to apply the scientific method to solve problems.
- Students will clearly and concisely articulate scientific ideas and arguments through written works.
- Students will demonstrate knowledge of the major areas of physics, specifically:
    1. Apply Coulomb's law and superposition principle to compute the force between point charges.
    2. Calculate the electric field of a distribution of point charges.
    3. Compute the potential of a localized charge distribution
    4. Determine the current, potential difference and power dissipated in the elements of a DC circuit.
    5. Understand how a capacitor works and solve RC circuits
    6. Calculate the magnetic field generated by different current distributions.
    7. Apply Faraday-Lenz law to compute induced currents.
    8. Understand the electromagnetic field is a wave.
    9. Understand interference as a sign of the wave character of the light.
    10. Use ray optics to understand instruments such as magnifying glasses, mirrors, and photographic cameras.

## VIII. DISCLAIMER

**RESERVATION TO THE SYLLABUS**

The course instructor reserves the right to make changes to the course syllabus and schedule with reasonable notice to the students.

## IX. EMERGENCY ACTION GUIDE

**IMPORTANT EMERGENCY PHONE NUMBERS**: AU Police Department: 706 721 2911 or 911

**Fire**

When the fire alarm is activated, evacuation is mandatory. Evacuate the building immediately.

- Do not take the elevators
- Notify AU Police or 911
- Proceed to your designated RALLY POINT.
- Help those needing assistance to move from the area.
- Do not re-enter the building until authorized to do so by emergency personnel

**Armed intruder**

Notify AU Police department or 911. In case of an immediate life-threatening event, each individual should take whatever actions are necessary to protect his or her own life. If it is possible to flee the area safely and avoid danger, do so. If flight is impossible, lock and barricade all doors, turn off all lights and silence all electronic devices. Remain in place until an "all clear" is given by an authorized person or law enforcement official.

If you are in a classroom: STAY THERE, secure the door, notify AU police or 911, lock, wedge, or barricade the door. Consider quietly exiting a ground floor window, if safe. If you can't exit a window, stay away from the door, stay low and be quiet. The shooter may bang on the door and yell for help to entice you to open the door. If police are not in the scene yet, move well away from the incident, find a safe cover position, and wait for police to arrive. When instructed to exit, proceed to the safest exit to leave the building and then move toward any police vehicle. Keep your hands on your head and follow the exact directions from the police.

**Hostage situation**

Stay calm, appear submissive, and do not make eye contact. Don't be a hero. Follow instructions of captor. Let them be in charge. Cooperate; be friendly if possible; don't argue with or antagonize captor or other hostages. Inform captors of medical or other needs. Speak in a calm even tone. Give an appearance of calmness so everyone will feel more at ease. Be prepared to wait; elapse time is a good sign. Don't try to escape; don't try to resolve the situation by force. Be observant and remember everything that is seen and heard. If a rescue takes place, lie on the floor, face down, and wait instruction from rescuers.

**Tornado/Severe weather**

Monitor local television and radio stations, NOAA weather radio, weather related internet sites, etc. Be prepared to take shelter on the lower level of your building, Stay away from windows. Move to an interior hallway. Wait for an all clear notification prior to returning to your work area or classroom. If outdoors, lie in a ditch, low-lying area, or crouch area near a building if shelter is not available or if there is no time to get indoors.

**How you will be notified of a campus emergency?**

Emergency notifications can occur through Jaguar Alert, phones, campus email, building managers, NOAA, weather radios, local television station news, local radio stations, AU web site, Law enforcement personnel, social media and text messaging.