Introduction
Welcome to Physics 1252! This course is the second half of a two-semester introductory sequence. This semester we’ll focus on electromagnetism, one of the four fundamental forces of nature. The understanding of electric, magnetic, and optical phenomena as different aspects of the same underlying force was a crowning achievement of 19th century physics. Without this understanding, our modern electronic world wouldn’t be possible.

Objectives
As with last semester, 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.”

The ordering of topics this semester will be different from the traditional sequence. We’ll start with optics, the study of light and how it interacts with matter. You will then learn about electric fields and electric potential. You will see how to apply those concepts to study electric circuits and currents (moving charges). Next we’ll discuss the magnetic field, and how electric and magnetic fields interact with each other.

If you are not an engineering major, then this course is probably not for you! If you’re considering a major in physics or astronomy, please talk to Dr. Wiegert (physics) or Dr. Caillault (astronomy) about other options.

Prerequisites
Some differential and integral calculus will be used in the course. It is important that you be registered for the second semester of the calculus sequence (Math 2260 or equivalent), if you haven’t already taken it. In order to do well in this course, you should also have a *solid working knowledge* of college algebra, trigonometry, and plane geometry. A prior high school physics course is useful, but not required.

This course will continue to make use of the fundamental principles that you learned to work with in first-semester physics (forces, momentum, energy). Prepare to review that material if you’re feeling rusty!

Basic Information

Instructor: H.-B. Schüttler  
Email: hbs@physast.uga.edu  
313D Physics Building  
Phone: 706-542-3886, 404-641-6522

Instructor: Y. Abate  
Email: yabate@physast.uga.edu  
211 Physics Building  
Phone: 706-542-4007

Class:  
145 Science Learning Center (SLC)

Section A =Schüttler: Tue. Periods 4–5 (12:30–3:15pm), Thu. Period 4 (12:30-1:45pm)
Section B =Abate: Tue. Period 6 (3:30–4:45pm), Thu. Periods 5–6 (2:00-4:45pm)

Final Exams: T.B.A.

Office hours: Schüttler: Tue., Thu. 5:00-6:00pm or by appointment.  
Abate: T.B.A.

Contacting us: The instructors will only receive and reply to emails sent to:  
hbs@physast.uga.edu  or  yabate@physast.uga.edu  
Do not send us or reply to email on the eLC system: We will not receive it and will not reply!  
Before you email us, please read the last page of this syllabus!
Course Resources

Required Materials

• *FlipItPhysics: Electricity and Magnetism*, by Gladding, Selen, and Stelzer (Macmillan). As bundled in the bookstore, this is an online resource system combined with the textbook *Physics for Scientists and Engineers, Vol. 2*, latest edition, by Tipler and Mosca. You will use this material primarily to prepare for class. To enroll online in *FlipItPhysics* at [https://www.flipitphysics.com/](https://www.flipitphysics.com/), use the following FlipItPhysics course access keys:

  x52y18Thbs if you are in PHYS1252 Section A=Schütter;

  a70cac60 if you are in PHYS1252 Section B=Abate.

Important: Use the first nine digits of your *UGA 800-ID number, not your UGA MyID(!)*, as your ID when you enroll in *FlipItPhysics*. Example: If your UGA 800-ID number is 8119876540, enter 811987654 as your FlipItPhysics enrollment ID number.

• A scientific calculator. A simple calculator such as the TI-30X series will do just fine, but a fancier graphing calculator is also acceptable.

Online Resources

• Your UGA email account will be subscribed to a low-volume announcement list. It is your responsibility to be informed of all announcements sent via this email list: check your UGA email daily!

• The eLearning Commons will serve as another repository of course information, esp. for exam grades, at [http://www.elc.uga.edu/](http://www.elc.uga.edu/).

• Online assignments, both before and after class, are an essential part of the course. You'll complete this work both within *FlipItPhysics* and on the LON-CAPA homework system at [https://spock.physast.uga.edu/](https://spock.physast.uga.edu/). Every time you start on a new homework set, make sure to first read the instructions and hints in a file named *LON-CAPA_Failures+Hints ... .pdf*. This file will be posted on LON-CAPA and will also be emailed to you with your first homework assignment.

• Additional practice problems and solutions may be posted on the PHYS 1252 course web site at [http://www.physast.uga.edu/classes/phys1252/schuttler/](http://www.physast.uga.edu/classes/phys1252/schuttler/)

Other Resources

• Office hours are your chance to get one-on-one or small-group help with homework assignments or with understanding topics from class. Please make use of this time; we can’t address your questions if you don’t ask!

• If you can’t come to our regular office hours, or need additional help, please set up an appointment (by email, by phone, or in person) to see us outside of class.

• Tutors are available either through the UGA Tutoring Program at Milledge Hall, or through the Department of Physics and Astronomy.

Grading Policy and Assignments

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

  20% Cumulative final exam grade
  45% Three in-class exams (20%/15%/10% for highest/middle/lowest grades)
  10% Homework grade
  15% Laboratory grade (including lab final worth 30% of total)
5% Pre-class preparation
5% In-class participation

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Numerical Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90.0</td>
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<tr>
<td>A–</td>
<td>87.5</td>
</tr>
<tr>
<td>B+</td>
<td>85.0</td>
</tr>
<tr>
<td>B</td>
<td>80.0</td>
</tr>
<tr>
<td>B–</td>
<td>78.5</td>
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<tr>
<td>C+</td>
<td>75.0</td>
</tr>
<tr>
<td>C</td>
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<td>C–</td>
<td>67.5</td>
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<tr>
<td>D</td>
<td>60.0</td>
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<tr>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

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 we 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 exams will be closed-book and closed-notes. 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 the Web before the exam. The formula sheet’s purpose is to focus your study on understanding rather than memorizing.

Exams will comprise both conceptual and problem-solving questions, 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 the Web 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 “rescaled” into numerical grades. This conversion is based mostly on the difficulty level of the exam and partly on the distribution of raw scores. Your rescaled 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 your missed midterms grade(s), making your final exam worth at least 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 us 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.*

A make-up final exam will be given only for legitimate, documentable reasons as explained above.

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 and/or FlipIt Physics, 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 the Web after the due date.

Assignments will be weighted equally unless otherwise specified. At the end of the semester, provided that you complete an online course evaluation, we 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 we 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.

Labs

Lab activities will usually take place during the longer class on either Tuesdays or Thursdays, 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 so 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; this evaluation will affect your lab grade.

For each scheduled lab, numbered LAB12 - LAB18 in the Class Schedule below, a lab manual pdf-file is posted on eLearning Commons (eLC) at http://www.elc.uga.edu/. You should download and study the respective manual prior to each lab day, in order to be properly prepared for the lab activities.

Class Preparation

Pre-class lecture video viewing on FlipIt Physics and textbook reading take the place of in-class lectures. In addition, you will often receive pre-class preparation assignments from the PHYS1252 course web site, sent by your instructor to your UGA email address, typically within 18 hours before the beginning of class. 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

You will often be asked in class to work on conceptual and quantitative questions, both individually and in small groups. 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 or similar issue. For purposes of in-class participation credit, we will not excuse any absence from class: if you miss a quiz due to absence, your score for that quiz will be zero.

Academic Honesty

UGA has a comprehensive academic honesty policy document, A Culture of Honesty, which is available from Office of the Vice President for Instruction at

http://ovpi.uga.edu/academic-honesty/academic-honesty-policy.
This policy covers all academic work.

As a UGA student, you are responsible for knowing and understanding this policy. If you have any question about the appropriateness of your actions or your work, you are obligated to ask us for clarification.

We take the issue of academic honesty very seriously, and it is our responsibility to uphold the University’s policy. This means, among other things, that we won’t hesitate to report our suspicions of dishonesty to the Office of the Vice President for Instruction. Typical consequences of cheating on homework or an exam range from receiving a zero for that grade, to failing the course.

**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 to interact, and able to ask or answer questions freely. Courtesy also implies that you arrive on time and stay until the end of 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 happens 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 what you missed. Talk to your groupmates, 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.

- **We 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!

- **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.

- The **Undergraduate Bulletin** and the Registrar’s Office website describe the University policies regarding withdrawals and incompletes. If you don’t complete the initial required administrative tasks of the course or are demonstrably not attending class and completing work, we may withdraw you from the course for “excessive absence”.

  If you are considering withdrawing from the course, you should discuss your choice with us beforehand. In many cases, students are doing better in the course than they think they are.
The schedule below is approximate and subject to modification, including possible changes in exam dates, material covered on exams, and lab dates. Significant schedule changes will be announced in class and/or by email to your UGA email address. It is your responsibility to keep track of all such schedule changes by attending class and by regularly checking your UGA MyID email.

All Chapter and Reading assignment numbers below refer to the textbook by Tipler and Mosca, 6th Edition. Lab dates are shown for both PHYS 1252 course sections: Section A=Schüttler and Section B=Abate. The lab numbers below, LAB12 - LAB18, refer to the lab manual pdf-files you should download and study prior to each lab day, from eLearning Commons (eLC), see above.

Deadline for withdrawal from courses is Mon. March 19, 2018.

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Reading</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Th 04 Jan</td>
<td>15-1, 15-2, 31-3, 31-5</td>
<td>Course Intro, Wave Motion, Reflection, Refraction</td>
</tr>
<tr>
<td>2</td>
<td>Tu 09 Jan</td>
<td>31-1, 31-2, 31-7</td>
<td>Nature of Light, Geometrical Optics</td>
</tr>
<tr>
<td>3</td>
<td>Th 11 Jan</td>
<td>32-1, 32-2</td>
<td>Image Formation: Mirrors, Lenses, Ray Diagrams</td>
</tr>
<tr>
<td>4</td>
<td>Tu 16 Jan</td>
<td></td>
<td>Image Formation: The Eye, LAB15(A)</td>
</tr>
<tr>
<td>5</td>
<td>Th 18 Jan</td>
<td>32-4</td>
<td>Optical Instruments: Compound Systems, LAB15(B)</td>
</tr>
<tr>
<td>6</td>
<td>Tu 23 Jan</td>
<td>33-1, 33-2, 33-3</td>
<td>Optical Instruments: Angular Magnification, LAB16(A)</td>
</tr>
<tr>
<td>7</td>
<td>Th 25 Jan</td>
<td>33-8</td>
<td>Wave Optics: Two-Source Interference, LAB16(B)</td>
</tr>
<tr>
<td>8</td>
<td>Tu 30 Jan</td>
<td>33-8</td>
<td>Wave Optics: Multi-Source Interference and Gratings</td>
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<tr>
<td>9</td>
<td>Th 01 Feb</td>
<td></td>
<td>EXAM #1, Chapters 31, 32</td>
</tr>
<tr>
<td>10</td>
<td>Tu 06 Feb</td>
<td>33-4, 33-6, 33-7</td>
<td>Wave Optics: Diffraction, LAB17.1(A)</td>
</tr>
<tr>
<td>11</td>
<td>Th 08 Feb</td>
<td>21-1, 21-2, 21-3</td>
<td>Electric Charge and Force, LAB17.1(B)</td>
</tr>
<tr>
<td>12</td>
<td>Tu 13 Feb</td>
<td>21-4, 21-5, 21-6</td>
<td>Electric Force and Electric Fields, LAB17.2(A)</td>
</tr>
<tr>
<td>13</td>
<td>Th 15 Feb</td>
<td>22-1, 22-2, 22-3, 22-4, 22-5</td>
<td>Continuous Charge Distributions, Gauss’s Law, LAB17.2(B)</td>
</tr>
<tr>
<td>14</td>
<td>Tu 20 Feb</td>
<td>23-1, 23-2, 23-3, 23-5</td>
<td>Electric Potential, LAB18(A)</td>
</tr>
<tr>
<td>15</td>
<td>Th 22 Feb</td>
<td>23-6, 24-1, 24-2, 24-3, 24-4</td>
<td>Electric Potential, Capacitors, Energy, LAB18(B)</td>
</tr>
<tr>
<td>16</td>
<td>Tu 27 Feb</td>
<td>25-1, 25-2, 25-3</td>
<td>Current and Resistance</td>
</tr>
<tr>
<td>17</td>
<td>Th 01 Mar</td>
<td>25-4, 25-5</td>
<td>DC Circuits</td>
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<tr>
<td>18</td>
<td>Tu 06 Mar</td>
<td>25-6</td>
<td>DC Circuits, LAB12(A)</td>
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<tr>
<td>19</td>
<td>Th 08 Mar</td>
<td>26-1, 26-3</td>
<td>Magnetic Fields and Forces, LAB12(B)</td>
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<td>Tu 13 Mar</td>
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<td>SPRING BREAK</td>
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<td>Th 15 Mar</td>
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<td>SPRING BREAK</td>
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<tr>
<td>20</td>
<td>Tu 20 Mar</td>
<td>26-2</td>
<td>Magnetic Fields and Forces</td>
</tr>
<tr>
<td>21</td>
<td>Th 22 Mar</td>
<td></td>
<td>EXAM #2, Chapters 33, 21, 22, 23</td>
</tr>
<tr>
<td>22</td>
<td>Tu 27 Mar</td>
<td>27-1, 27-2</td>
<td>Currents and Magnetic Fields, LAB13.1(A)</td>
</tr>
<tr>
<td>23</td>
<td>Th 29 Mar</td>
<td>27-3, 27-4</td>
<td>Currents and Magnetic Fields, LAB13.1(B)</td>
</tr>
<tr>
<td>24</td>
<td>Tu 03 Apr</td>
<td>28-1, 28-2, 28-3</td>
<td>Induction, Faraday’s Law, Lenz’s Rule, LAB13.2(A)</td>
</tr>
<tr>
<td>25</td>
<td>Th 05 Apr</td>
<td>28-4</td>
<td>Induction and Work, LAB13.2(B)</td>
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<tr>
<td>26</td>
<td>Tu 10 Apr</td>
<td></td>
<td>EXAM # 3, Chapters 24, 25, 26, 27</td>
</tr>
<tr>
<td>27</td>
<td>Th 12 Apr</td>
<td>28-6, 28-7</td>
<td>Inductance and Energy, LAB14(B)</td>
</tr>
<tr>
<td>28</td>
<td>Tu 17 Apr</td>
<td>30-1, 30-2, 30-3, 30-4</td>
<td>Electromagnetic Waves, LAB14(A)</td>
</tr>
<tr>
<td>29</td>
<td>Th 19 Apr</td>
<td>31-4</td>
<td>Polarization</td>
</tr>
<tr>
<td>30</td>
<td>Tu 24 Apr</td>
<td>15-5</td>
<td>Doppler Effect</td>
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<tr>
<td>T.B.A.</td>
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<td>EXAM # 4 (FINAL EXAM)</td>
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</table>
How to Contact Your Instructor by Email for Problem Solving Help or Other Communications

Please read the following carefully, before you try to contact us by email:

- The instructors will only receive and reply to emails sent to
  
  hbs@physast.uga.edu, if you are enrolled in Section A=Schüttrler; or
  
  yabate@physast.uga.edu, if you are enrolled in Section B=Abate.

Please do not send us or reply to email on/from the eLearning Commons (eLC) system: We will not receive it and we will not reply to it! Instead, use your UGA email account to send us email to the appropriate instructor email address given above.

- Clearly identify yourself and your course section:
  
  In the "Subject" line of your email write either PHYS1252 Abate or PHYS1252 Schuttler, followed by a brief, ≤5-word description of what your email is about.

  In the body of your email state your (1) full name, (2) UGA 800-ID, (3) UGA email address (=your email address ending in ...@uga.edu).

- If you are asking for help with the solution of a problem (LON-CAPA homework, practice exam problem, ... etc.) you must provide complete information about your problem and your difficulties, anything you’ve tried to solve it, and any conceptual difficulty you may have encountered. Do this:
  
  Send the complete problem statement. The easiest way to do this is to take and email a screenshot of the problem statement, as shown in your browser on the LON-CAPA or PHYS1252 course website. Otherwise, write or copy the problem statement into your email, including all input parameter values and other information given.

  Send a detailed step-by-step description of your solution attempt(s). The easiest way to do this is to write out all the following neatly, legibly and in a well-organized format on one or a few clean sheets of paper, then scan or by cellphone take a snapshot of each sheet and email them. Ideally send all sheets as a single pdf-file. Or, if you must send multiple files, make sure they are clearly named so we can tell in which order we should read them. Do this by using file names starting with p01..., p02..., etc., for the file for page 1, page 2, ..., respectively, attached to your email.

  For each solution step state or show:
  
  (0) the drawing(s) you have made to visualize the problem;

  (1) the general equation(s) you are using, without numbers plugged in;

  (2) the input variable names, with symbols clearly defined in words, which you’re plugging into the equation(s), and the value you’ve used for each input variable;

  (3) the intermediate or final output variable name(s), with symbols clearly defined in words, which you want to calculate from the general equation(s);

  (4) any algebra you did to solve for the output variables you’ve identified in (3);

  (5) the value(s) you’ve obtained for the output variable(s) you’ve identified in (3);

  (6) a concise verbal description (as best you can!) of any conceptual difficulties you have.

Most difficulties and errors in trying to solve problems arise from the fact that you have failed to first make a neat, clean, big drawing of the problem setup. If that’s the case, we may simply reply to you with one word: Drawing? You may then ask us again, but only after you’ve honestly tried to make the drawing(s) that would help you visualize the problem.