Introduction: Welcome to Physics 1252.

This course is the second semester of introductory level physics sequence for engineering majors. 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 would not be possible.

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 will discuss the magnetic field, and how electric and magnetic fields interact with each other.

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

Student Learning Outcomes: In successfully completing this course, students will:

- Demonstrate an ability to apply conceptual understanding and quantitative reasoning skills to solve physics problems in above areas;
- Develop and demonstrate skills in gathering, sorting, analyzing, modeling and communicating scientific data.

Prerequisites/Co-requisites: 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.

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!
Important Dates:

Midterm #1 .............................................. 23, September 9:10 - 11:10 am
Midterm #2 .............................................. 21, October 9:10 - 11:10 am
Midterm #3 ................................................ 18, November 9:10 - 11:10 am
Final Exam (comprehensive) ............... 15, December 7:00-10:00pm (Mass exam time slot)

Course Resources

Required Materials

- **Textbook**: choose either one you wish

  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 2 is what we will use for this class. The bookstore should have this available as a bundle with a FlipItPhysics license.

  As an alternative, you may use the free electronic textbook University Physics, by Samuel J. Ling, William Moebus, 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 Volumes 2 and 3 for this class.

- **FlipItPhysics**: *Electricity and Magnetism*, by Gladding, Selen, and Stelzer (Macmillan). As bundled in the bookstore, this is an online resource system combined with a textbook *Physics for Scientists and Engineers, Vol. 2*, 6th edition, by Tipler and Mosca. Use course access key 1252f20nw to enroll online. You will use this material primarily to prepare for class. If you don’t get the bundle, you will need to purchase the FlipItPhysics license separately;

- We will be using clickers throughout the semester for participatory activities (see section below regarding participation and clicker points). You will not be able to use the physical clicker device this semester since it will not operate for the class periods that will be online. A Turning Technologies ResponseCard NXT (“clicker”) available as an application for smartphone, tablet, or laptop. A Turning Account license is also required. Instructions for setting up an account can be found at [https://ctl.uga.edu/learning-technologies/student-response-systems/turning-point-for-students/](https://ctl.uga.edu/learning-technologies/student-response-systems/turning-point-for-students/); You can use the free TurningPoint app called “Responseware” on your smartphone, tablet, or laptop, but you will still need an active license and to be properly registered with the eLC. However, given the uncertainty of whether this will work, I would encourage you to work with the free app and not purchase a subscription until I let you know it will be necessary.

- 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/](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) both within FlipItPhysics (https://www.flipitphysics.com/) and (after class) on the LON-CAPA homework system at https://spock.physast.uga.edu/.

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 or by phone);

• 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
35% Three in-class exams (15%/12.5%/7.5% for highest/middle/lowest grades)
15% Homework grade (LON-CAPA)
15% Laboratory grade
05% Video generating assignments
05% In-class participation
05% Pre-class preparation

• 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!

Attendance and In-Class Policy:

• During this semester, we will be limited in our face-to-face (or in-person) meetings in order to follow social distancing guidelines. Therefore, the class will be randomly assigned to three working groups and these groups will each have the opportunity to physically come to the classroom one time during each week. Given the ongoing pandemic, I will encourage you to stay safe and healthy and do what is in your best interest. If you do not feel comfortable coming to class, this will not affect your grade nor your performance in the class. You will have opportunities to view all materials synchronously online through Zoom and using UGA’s eLC. The groupings of students will rotate weekly so for example, a student in Cohort 1 may
attend class in-person (face-to-face) Monday the first week, Wednesday the second week, and Friday the third week. This rotation is designed to accommodate for our double period on Wednesdays (typically the day we perform laboratory exercises).

- Whether you are in-person or attending class online, for each class period please bring a device to view the lecture using Zoom (laptop or tablet) as you will frequently be broken into “breakout groups” through Zoom in order to complete many group activities. You will also find it beneficial to bring a pair of headphones into the classroom if you are going to be using the monitors in Room 303. To reduce the amount of feedback in the class room, it is imperative that you bring headphones if you wish to verbally communicate with your classmates who are online.

- You will often be asked in class to work on conceptual and quantitative questions, both individually and in small groups. Some of these activities during class will require the use of 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.

In-Class Groups:

- Class groups will initially be randomly selected based on students that are randomly assigned to different days of the week, but groups will be reassigned a couple more times throughout the semester (usually following the exams). Group work is integral to the studio format, and it is important that you work efficiently with your group mates. It is also important that you meet and interact with everyone in the class. Consider this preparation for your future careers in which will be need to work with new people and be productive. This studio physics course is a perfect opportunity to be exposed to discussing and processing different viewpoints in an academic environment. Due to the COVID-19 pandemic, much of this group work will be performed using Zoom in the classroom since you will be grouped with two students that will be attending class synchronously outside of the classroom via Zoom. In addition, you will be assigned several group activities which will need to be completed outside of the designated class time. Please maintain social distancing practices and wear a face mask if you are to meet in-person on campus to finish an activity.

- Our classroom will have restricted seating due to social distancing guidelines. Please abide by these guidelines and only sit in the designated seats or you will be asked to move. In addition, it is a USG policy to wear a mask during class. **If you do not wear a mask to class, you will be asked to put one on and further refusal will result in dismissal from class.**

Exams:

- All the midterms and the final exam will be online.

- There will be three midterm exams and a cumulative final exam. All exams will be open-textbook, open-notes. But, possible plagiarism/unauthorized assistance includes, but is not limited to: accessing Chegg during 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;

- Since the exams will be distributed online, the written portion will need to be captured (image) or scanned and uploaded to a website to be graded.

- 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 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;
• Homework Solution Activity (Video generating assignments): Throughout the semester, you will be asked to make a video solution for a specific problem in a homework set. More details regarding the expectations for these videos will be discussed during class. Students should anticipate that they will be asked to make between 5 and 7 video solutions over the course of the semester. These videos will be submitted online through a dropbox on the eLC for grading. The points accumulated from your solutions will stand as a separate, additional homework set in your homework grade. The goal of this activity is to develop and demonstrate skills in gathering, sorting, analyzing, modeling and communicating scientific data. The best test of your understanding of the material is to "teach" others what you have done and why.

• 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 period on Wednesdays. Due to the limits of classroom capacity during the COVID-19 pandemic, only one group member will be in-person to perform the labs on a given week. This schedule will rotate so that all students will get a chance to perform a lab in-person if they would like. I still encourage you to stay home as the labs will be available online and your groupmates will have access to the same materials and you will complete one lab activity.

• 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. At the end of the semester, provided that you complete the evaluation of your fellow groupmates, I will drop your lowest lab assignment percentage in calculating your overall score. If you don’t submit a team evaluation during the allotted time, then all of your lab grades will count towards your final grade.

Class Preparation:

• Pre-class lecture video viewing through FlipItPhysics 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.

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 27, 2020.

Student Distress:

• If your course performance is significantly affected by issues beyond your control, I urge you to let me know and to seek assistance promptly from Student Care and Outreach (http://sco.uga.edu/), part of the Office of the Dean of Students. It is always easier to address exceptional circumstances when these issues are raised as early as possible. Waiting until the end of the semester to take action may limit my ability to provide appropriate support.

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!

Coronavirus (COVID-19) Policies:

- Transparency between students, faculty, and staff is key to a successful semester. Please follow these guidelines to keep yourself and the rest of the UGA community safe and healthy. Remember, transparency is key and I understand we are proceeding this semester in a pandemic. Therefore, if you or someone you know has COVID-19 you should quarantine according to the CDC’s recommendations (https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine.html). If you show any symptoms of Coronavirus, please get tested. I will work with all students to make sure any disruptions (of course we hope for none) due to COVID-19 are not a setback. If you need more information, please visit http://coronavirus.uga.edu.

- Face Coverings: Effective July 15, 2020, the University of Georgia—along with all University System of Georgia (USG) institutions—requires all faculty, staff, students and visitors to wear an appropriate face covering while inside campus facilities/buildings where six feet social distancing may not always be possible. Face covering use is in addition to and is not a substitute for social distancing. Anyone
not using a face covering when required will be asked to wear one or must leave the area. Reasonable accommodations may be made for those who are unable to wear a face covering for documented health reasons. Students seeking an accommodation related to face coverings should contact Disability Services at https://drc.uga.edu/.

- **DawgCheck**: Please perform a quick symptom check each weekday on DawgCheck—on the UGA app or website—whether you feel sick or not. It will help health providers monitor the health situation on campus: https://dawgcheck.uga.edu/

- **What do I do if I have symptoms?**

  Students showing symptoms should self-isolate and schedule an appointment with the University Health Center by calling 706-542-1162 (Monday-Friday, 8 a.m.-5 p.m.). Please DO NOT walk-in. For emergencies and after-hours care, see https://www.uhs.uga.edu/info/emergencies.

  Please do not come to class if you have any signs of symptoms or if you have been within 6 feet for more than 15 minutes of someone who is showing symptoms.

- **What do I do if I am notified that I have been exposed?**

  Students who learn they have been directly exposed to COVID-19 but are not showing symptoms should self-quarantine for 14 days consistent with Department of Public Health (DPH) and Centers for Disease Control and Prevention (CDC) guidelines. Please correspond with your instructor via email, with a cc: to Student Care Outreach at sco@uga.edu, to coordinate continuing your coursework while self-quarantined. If you develop symptoms, you should contact the University Health Center to make an appointment to be tested. You should continue to monitor your symptoms daily on DawgCheck.

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**2020 Fall week-by-week 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)

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<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Lab Activity OR Exam (on Wednesdays)</th>
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<tr>
<td>01</td>
<td>08/21</td>
<td>Introduction, Q &amp; A (this class entirely online for all students)</td>
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<tr>
<td>02</td>
<td>08/24 - 08/28</td>
<td>Waves, EM Waves, Doppler effect, Mirrors</td>
<td>Double Class Period</td>
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<td>03</td>
<td>08/31 - 09/04</td>
<td>Snell’s Law, Lenses</td>
<td>Double Class Period</td>
</tr>
<tr>
<td>04</td>
<td>09/07 - 09/11</td>
<td>Lenses, Two-lens Systems</td>
<td>Labor Day - No Classes Sept. 7</td>
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<td></td>
<td></td>
<td></td>
<td>Lab Activity: Reflection and Refraction</td>
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<td>05</td>
<td>09/14 - 09/18</td>
<td>Dispersion, Interference, Double Slit</td>
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<td>06</td>
<td>09/21 - 09/25</td>
<td>Single Slit, Diffraction Example</td>
<td>EXAM 1</td>
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<td>#</td>
<td>Date Range</td>
<td>Topic &amp; Activities</td>
<td>Notes</td>
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<tr>
<td>07</td>
<td>09/28 - 10/02</td>
<td>Electric Charge, Coulomb’s Law</td>
<td>Lab Activity: Interference and Diffraction 1</td>
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<td>08</td>
<td>10/05 - 10/09</td>
<td>Electric Fields, Electric Potential, Electric Potential energy</td>
<td>Lab Activity: Interference and Diffraction 2</td>
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<tr>
<td>09</td>
<td>10/12 - 10/16</td>
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<td>Lab Activity: Electric Fields and Equipotential Lines</td>
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<td>10</td>
<td>10/19 - 10/23</td>
<td>Capacitor Circuits, Circuits</td>
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<td>11</td>
<td>10/26 - 10/30</td>
<td>Circuits, Circuit Power</td>
<td>Lab Activity: Electronics 1 - Ohm’s Law Fall Break - No Class Oct. 30</td>
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<td>14</td>
<td>11/16 - 11/20</td>
<td>Ampere’s Law, Motional EMF, Faraday’s Law</td>
<td>EXAM 3</td>
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<td>16</td>
<td>11/30 - 12/04</td>
<td>Lenz’s Law, Inductance, RLC Circuits</td>
<td>Lab Activity: Magnetic Field Measurements</td>
</tr>
<tr>
<td>17</td>
<td>12/07 - 12/09</td>
<td>AC Circuits, Transformers</td>
<td>Friday Class Schedule in Effect Dec. 8 Classes End Dec. 9 - Double Class Period</td>
</tr>
<tr>
<td></td>
<td>Final Exam</td>
<td>Tuessday, December 15th: 7–10PM</td>
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