PHYS 1112 Syllabus
Introductory Physics – Optics, Electricity and Magnetism
CRN 45173
University of Georgia, Spring 2021

Instructor Information:
- Dr. Tara H Cotten
- Office: Rm 239 Physics Building
- Email: thuffor@uga.edu

Course Description

This course is the second half of a two-semester introductory sequence which will 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. We will develop a “toolbox” of techniques for solving problems involving these concepts and approach many topics from their historical theoretical and experimental advances.

The ordering of topics this semester will be different from the traditional sequence. We will start with optics, the study of light and how it interacts with matter. You will then learn about electric fields and electric potential and see how to apply those concepts to the study of currents (moving charges) and electric circuits. Finally, we will discuss the magnetic field and how electric and magnetic fields interact with each other. With any time remaining, we may touch on topics in modern physics.

As you know from the first semester of physics, this is a quantitative science. We will address the qualitative and conceptual aspects of electromagnetism, however, much of the work in this course involves mathematics, solving mathematical problems, and most importantly interpreting physical problems. You will be asked to communicate your understanding of the material in many ways – mathematically, graphically, visually. You are expected to have a working knowledge of college algebra, trigonometry, and basic geometry. In addition, concepts that you learned in the first semester physics (mechanics) like force, energy and torque will reappear in this course. You will continue to make use of Newton’s Laws as well as conservation laws. Please let me know if you are concerned about your preparation for this course.

This course also requires a laboratory component, PHYS 1112L, that will account for a portion of your grade (you sign up for the laboratory section separately). No course grade will be assigned until the laboratory requirement is completed. See the lab syllabus for more information: http://www.physast.uga.edu/courses.

If you are a physics, astronomy, or engineering major, or if you are considering those possibilities, then this course may not be for you. Please talk to Dr. Cooley (physics) or Dr. Caillault (astronomy) about other options.
Basic Class Information

- **TR 12:45-2:00 PM (Period 4)**: MLC 0081-0101
  - Our classroom capacity is limited to 80 students per class period.
- Lab: 314 Physics Building or 116 Science Learning Center (Various times)
- Final Exam: Friday, May 7th: 7 – 10PM (location: TBA)
- Office Hours: TBA
- Office Location: online via Zoom

Required Course Materials

- *Physics*, vol. 2, 5th ed. by James S. Walker. You may use older editions if you wish, but you are responsible for knowing any content changes.
- Laboratory Manual: *Introduction to Physics Laboratory Manual*, (newest edition), Hayden-McNeil Publishing. This is the same manual used for the first semester of physics so you may not need to purchase another. Visit [https://www.physast.uga.edu/courses](https://www.physast.uga.edu/courses) for the lab syllabus.
- A Turning Technologies ResponseCard NXT (app available on smart devices). Bring it to every class; we will be using clickers throughout the semester for engagement activities. A Turning Technologies subscription is required through the application and 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” (available for tablets, smartphones, or laptops via an internet connection), but you will still need an active license and to be properly registered with the eLC.
- A simple scientific calculator for exams, which must be non-programmable, non-graphing, and non-symbolic. Calculator graphing, algebra-solving, or programming functions will NOT be permitted on the exams. Cellphones will not be allowed during exams. (A good rule of thumb is, if the calculator isn’t allowed on the SAT, it’s also not allowed for exams.)
- Homework assignments will be performed online and are necessary to develop understanding throughout the course. You will access them with an account on LON-CAPA at [http://spock.physast.uga.edu/](http://spock.physast.uga.edu/). Several times throughout the semester, you will be required to submit written responses to homework problems through an online grading website. Details will be provided throughout the semester.
- Please check your UGA email and the eLearning Commons ([http://www.elc.uga.edu/](http://www.elc.uga.edu/)) daily. The UGA email system and the announcements section of the eLC will be used for course announcements. The eLearning Commons ([http://www.elc.uga.edu/](http://www.elc.uga.edu/)) will serve as a repository for exam solutions, grades, practice problems, tutorials, and class notes.

Optional Course Resources

- **Tutoring**: Tutors are available either through the Academic Resource Center at Milledge Hall and Miller Learning Center or through the Department of Physics and Astronomy ([http://www.physast.uga.edu/tutors/](http://www.physast.uga.edu/tutors/)) or you can visit the Division of Academic Enhancement ([http://www.dae.uga.edu/tutoring](http://www.dae.uga.edu/tutoring)).
- Given the challenges of learning in the hybrid format, the Division of Academic Enhancement is offering academic coaching to help students maintain a steady and successful track throughout the semester. Please visit their website for more details ([https://dae.uga.edu/services/academic-coaching/](https://dae.uga.edu/services/academic-coaching/)).
If you cannot attend my regular office hours, or need additional help, please set up an appointment (by email, by phone, or in person) to see me outside of class. For email correspondence, include your class and time in the subject line.

Grading Policy

Your overall grade will be weighted as follows:

- 20% Cumulative final exam grade
- 40% Three in-class exams (18% highest, 14% middle, 8% lowest)
- 15% Laboratory grade
- 15% Homework grade
- 10% Participation grade (In-Class Activities and Clickers)

Letter grades will be assigned following:

- A 90.0 – 100.0
- A- 87.5 – 89.99
- B+ 85.0 – 87.49
- B 80.0 – 84.99
- B- 78.5 – 79.99
- C+ 75.0 – 78.49
- C 70.0 – 74.99
- C- 67.5 – 69.99
- D 60.0 – 67.49
- F less than 60.0

Overall numerical grades will not be rounded (i.e. 89.99 is still a B+).

Regrade requests:

Any requests for a regrade of an assignment or an exam are under my discretion and must be made no later than one week after the item is returned. For a regrade, I will look at the entire assignment/exam, not just one problem, and it may raise or lower your score. Arithmetic errors in adding up points will be handled separately. Regrade requests should be accompanied by all your work.

Withdrawal and Incomplete:

The Undergraduate Bulletin and the Registrar’s Office website describe the University policies regarding withdrawals and incomplete (http://reg.uga.edu/policies/withdrawals). If you don’t complete the initial required administrative tasks of the course (e.g. the questionnaire you may be withdrawn from the class). However, if you are demonstrably not attending class and completing work (“excessive absence”) this is not justification for me to submit a withdrawal.

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 March 23, 2021.
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 two working groups/cohorts 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. Responses to the clicker questions can be submitted whilst you are viewing the live lectures via Zoom.

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 to reduce the amount of feedback in the class room and to be able to verbally communicate with your classmates who are online.

The reading assignments are your responsibility to read before you attend class and are listed on the course schedule. Your time spent in class will be much more meaningful and beneficial if you have viewed the material beforehand. The schedule contains the reading assignment for each week based on the topic that we will cover. We may have a short, multiple-choice quiz at the beginning of class using the “clickers”. I will not accept a written record of your responses as a clicker substitute. I don’t expect you to understand everything in the text. However, a good study tip is to outline the reading sections in anticipation for the material we will cover during class. You can also record any questions or clarifications you may need to bring up during class.

During class, we will work through many example problems and discuss the solutions. You may be asked to present your activities to the class, turn them in for additional points that will be added to the clicker points total for that day, or answer numerical clicker questions. It is imperative that you bring a calculator to class each day and participate as these activities are designed to solidify your knowledge of the concepts or bring up any questions you may have about the material. If you have read this far, enter “Hayabusa2 Capsule” in the Additional Comments question of the introductory physics Google survey for one bonus percentage point applied to your final participation grade. Don’t discuss this with your classmates. Let’s see if they read the syllabus thoroughly too.

For the activities during class that will require the use of the “clickers”, each clicker question is worth 10 points for a correct answer and 7 points for an incorrect answer. Therefore, participation is key. 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” to compensate for the occasional absence, clicker malfunction, internet issue, or similar issue. I will not accept a written record of your responses as a clicker substitute, or otherwise excuse any absence from class.

Exam Policy

There will be three midterm exams and a cumulative final exam. All the midterm exams will be open-textbook, open-notes exams. 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 must have a non-programmable calculator to each exam and be comfortable with its functions. A formula sheet will be provided for each exam. This sheet will be updated and posted to the eLC for viewing before the exam day. You should familiarize yourself with the formulas before taking each exam.

There will be no make-up midterm exams; if you do not take an exam, you get a zero. However, if you miss a midterm exam for a serious, documentable reason, the grade of your final exam may be used to replace your lowest in-class exam score (this would make your final exam worth 28% of your grade). You must contact me as soon as you possible and submit documentation of your absence within a week. Do not simply presume that your situation or documentation merits an excused absence; that determination is not your prerogative. Make-up final exams will be given only for students with legitimate, documentable reasons and MUST be arranged PRIOR to the final exam.

Since the midterm exams will be distributed online, the written portion will need to be captured (image) or scanned and uploaded to a website to be graded. Unless told otherwise, you must show your work on each problem and clearly identify the portion of the problem you are solving in order to receive full credit. Therefore, it is in your best interest to show all of your work and thought processes in the exam answer area provided. An incorrect answer without any accompanying work will be given zero points. A correct answer without any work will not receive full credit. More details regarding the final exam will be made available later.

Solutions:
Solutions to the exam will be posted on the eLC after every student has taken the exam.

Final Exam Scheduled Date: Friday, May 7th : 7 – 10 PM
Location: TBA

Homework Policy

Homework is an essential part of the learning and understanding physics. Working through problems enables you to practice problem solving techniques, apply the methods you learn in class, and recognize areas that you may struggle with the material. Homework assignments will be assigned weekly to keep up with the pace of the class and ensure you master the concepts before moving to the next.

Logistics:
Weekly problems sets will generally be due at midnight (11:59 pm) on Mondays online through the LON-CAPA system. Occasionally, the homework will require a written response to be submitted through our online grading website. Responses will be graded for correctness, although for some problems, incorrect responses may earn partial credit. Your best preparation for the exams will be to complete the homework assignments. You can access the homework sets through http://spock.physast.uga.edu and login with your UGA ID. Each assignment will be weighted equally unless otherwise specified. Late problem sets will not be accepted or excused. However, even if you miss the deadline for an assignment to receive credit, you should still make the effort to complete the assignment as the homework is a good way to prepare for the exams.
Dropping the lowest:

_In the case that you complete the online course evaluation at the end of the semester_, I will drop your lowest homework set grade. If you do not fill out the course evaluation, then all of your homework scores will be included in your average. The intent of this policy is to encourage you to fill out the evaluation, but also to compensate for unavoidable circumstances (e.g. illness, emergency, etc.). _Late problem sets will not be accepted or excused._

**Teamwork vs. Plagiarism**

Working together with your fellow classmates is _strongly_ encouraged. However, your goal should be to attempt every problem on your own and then turn to your classmates for a team effort, and not plagiarism. The answers you submit should be your own! Discussing physics is a great way to learn, but simply asking someone how they solved a certain problem is not effective, will not help you prepare for the individual exams, and is in fact a form of plagiarism. Copying from someone else’s work, or other homework solutions (especially those online), is a form of plagiarism and a violation of academic honesty policies. In addition, I understand that internet searches can provide you with solutions or help you to work through a problem, but _fundamentally understanding_ the problem and the solution are key to being successful in this class.

**Labs**

_Labs begin the week of January 25th_. Attendance is restricted to social distancing guidelines. Please visit [https://www.physast.uga.edu/courses/](https://www.physast.uga.edu/courses/) to read thoroughly the lab syllabus for the section in which you enrolled.

**Technology Policy**

During class, cellphones, iPads, iPods, and laptops need to be turned off or silenced unless being used for your communication with groupmates via Zoom. Devices that use a stylus are permitted for _note-taking purposes_. Standard laptops will not be useful for taking notes during class, due to the large number of diagrams, equations, graphs, and physical problem solving. Texting, checking email, Facebook, etc. can be distracting to you and those behind you or around you (see In-Class Policy section of the syllabus).

Since the course will proceed using the hybrid-synchronous format, you will need to have access to Zoom every week. You may often be asked to _turn on_ your camera and/or microphone to communicate with your fellow students. Group activities are not successful without these capabilities and the best way to learn is from each other.

**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 the [Office of Student Support Services (http://sco.uga.edu/)](http://sco.uga.edu/). It is always easier to address exceptional circumstances when you raise these concerns as early as possible. Waiting until the end of the semester to take action may limit my ability to provide appropriate support.
Academic Support

The Division of Academic Enhancement (http://dae.uga.edu) (DAE) offers free peer tutoring for some of UGA’s most challenging courses. For courses, locations, and times, please visit the website listed below. In addition to peer tutoring, the DAE also provides Academic Coaching, Student Success Workshops and more. The DAE is committed to the success of all students at the University of Georgia. For more on these and other resources, please visit dae.uga.edu.

Academic Honesty

The University of Georgia has a comprehensive policy on academic honesty, described in a document entitled A Culture of Honesty (honesty.uga.edu). This document is available through the Office of the Vice President for Instruction or online at https://ovpi.uga.edu/academic-honesty. 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 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 my 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.

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](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.

**Student Responsibilities**

- 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.
- You are responsible for all material: homework problems, assignments given in class, assigned readings. The emphasis on the importance of homework cannot be overstated as it will significantly improve your problem solving skills.
- **You must prepare for class.** Class time is valuable and limits. Using that time effectively requires that you’ve had some exposure to the necessary concepts, so that you can ask questions and practice applying those concepts in class.
- You are responsible for all announcements made in class.
- Class attendance keeps you well connected to the course and to the members of your group. In physics courses, a new concept builds on earlier ones, so mastering key concepts is critical.
- Attend ALL laboratory sessions in your assigned laboratory section.
- Ask me if you do not understand anything. There is no dumb question.
- Physics is fun and everywhere!

*The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.*
Tentative Class Schedule based on Chapters from Walker
Reading Assignments are given in preparation for the next class. Any modifications to this schedule will be announced during class. Be prepared for class by reading the assigned chapter before class.

<table>
<thead>
<tr>
<th>Date</th>
<th>Class</th>
<th>Day of Week</th>
<th>Reading</th>
<th>Topic</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-Jan</td>
<td>1</td>
<td>R</td>
<td>25.1 - 3, 26.1 - 2</td>
<td>Light, Geometric Optics</td>
<td></td>
</tr>
<tr>
<td>19-Jan</td>
<td>2</td>
<td>T</td>
<td>26.3 - 4</td>
<td>Geometric Optics: Mirrors</td>
<td></td>
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<tr>
<td>21-Jan</td>
<td>3</td>
<td>R</td>
<td>26.5</td>
<td>Geometric Optics: Mirror Equation</td>
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</tr>
<tr>
<td>26-Jan</td>
<td>4</td>
<td>T</td>
<td>26.6 - 7</td>
<td>Geometric Optics: Transparent material</td>
<td></td>
</tr>
<tr>
<td>28-Jan</td>
<td>5</td>
<td>R</td>
<td>26.8, 27.1 - 2</td>
<td>Geometric Optics: Ray Diagrams</td>
<td></td>
</tr>
<tr>
<td>2-Feb</td>
<td>6</td>
<td>T</td>
<td>27.3 - 6</td>
<td>Geometric Optics: Thin-lens equation, problem solving</td>
<td></td>
</tr>
<tr>
<td>4-Feb</td>
<td>7</td>
<td>R</td>
<td>28.1</td>
<td>Geometric Optics: Applications</td>
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<tr>
<td>9-Feb</td>
<td>8</td>
<td>T</td>
<td>28.2 - 3</td>
<td>Wave Optics: Introduction</td>
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<tr>
<td>11-Feb</td>
<td>9</td>
<td>R</td>
<td>EXAM 1 - CH. 26, 27</td>
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<tr>
<td>16-Feb</td>
<td>10</td>
<td>T</td>
<td>28.3 - 4</td>
<td>Wave Optics: Young’s Experiment</td>
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</tr>
<tr>
<td>18-Feb</td>
<td>11</td>
<td>R</td>
<td>28.5 - 6</td>
<td>Wave Optics: Diffraction Grating</td>
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</tr>
<tr>
<td>23-Feb</td>
<td>12</td>
<td>T</td>
<td>19.1 - 2</td>
<td>Electrostatics: Charges, insulators, conductors</td>
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<tr>
<td>25-Feb</td>
<td>13</td>
<td>R</td>
<td>19.3 - 4</td>
<td>Electrostatics: Electric Force, Coulomb’s Law</td>
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<tr>
<td>2-Mar</td>
<td>14</td>
<td>T</td>
<td>19.5 - 6</td>
<td>Electrostatics: Electric Field</td>
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<tr>
<td>9-Mar</td>
<td>16</td>
<td>T</td>
<td>20.3</td>
<td>Electrostatics: Electric Potential</td>
<td>UGA Official Midterm Date</td>
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<tr>
<td>11-Mar</td>
<td>17</td>
<td>R</td>
<td>EXAM 2 - CH. (28), 19, 20</td>
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<tr>
<td>16-Mar</td>
<td>18</td>
<td>T</td>
<td>20.3 - 4</td>
<td>Electrostatics: electric potential and electric field</td>
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<tr>
<td>18-Mar</td>
<td>19</td>
<td>R</td>
<td>20.5 - 6</td>
<td>Electrostatics: Capacitance</td>
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<tr>
<td>25-Mar</td>
<td>21</td>
<td>R</td>
<td>21.2 - 4</td>
<td>Electrodynamics: Current, Resistance</td>
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<tr>
<td>30-Mar</td>
<td>22</td>
<td>T</td>
<td>21.5</td>
<td>Electrodynamics: Ohm’s Law</td>
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<tr>
<td>1-Apr</td>
<td>23</td>
<td>R</td>
<td>21.6 - 8</td>
<td>Electrodynamics: Kirchhoff’s Laws</td>
<td></td>
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<tr>
<td>6-Apr</td>
<td>24</td>
<td>T</td>
<td>22.1</td>
<td>Electrodynamics: RC Circuits</td>
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<tr>
<td>8-Apr</td>
<td>25</td>
<td>R</td>
<td>INSTRUCTIONAL BREAK: No classes</td>
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<tr>
<td>13-Apr</td>
<td>26</td>
<td>T</td>
<td>22.2 - 4</td>
<td>Magnetism: Fields</td>
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<tr>
<td>15-Apr</td>
<td>27</td>
<td>R</td>
<td>22.5 - 8</td>
<td>Magnetism: Motion of objects in magnetic fields</td>
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<tr>
<td>20-Apr</td>
<td>28</td>
<td>T</td>
<td>23.1 - 3</td>
<td>Magnetism: Torque, Induced fields</td>
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<tr>
<td>22-Apr</td>
<td>29</td>
<td>R</td>
<td>EXAM 3 - CH. 21, 22, 23</td>
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<tr>
<td>27-Apr</td>
<td>30</td>
<td>T</td>
<td>23.4 - 7</td>
<td>Magnetism: Induction, solenoids, transformers</td>
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<tr>
<td>29-Apr</td>
<td>31</td>
<td>R</td>
<td>24.1, 25.1 - 3</td>
<td>Electromagnetism: Alternating currents, waves</td>
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</tbody>
</table>

Cumulative Final Exam: Friday, May 7th: 7 – 10PM (location: TBA)