

PHYS 2211 and PHYS 2212

Everything except “course overview” applies equally to both classes

Course Overview - 2211

In an effort to reduce cost to students, we are offering this course using a combination of instructor created content and open-access resources. This means students are not required to purchase a textbook or pay a lab fee. Our curriculum will, however, roughly follow the [Matter & Interactions](#), Vol. I: Modern Mechanics, 4th Edition by R. Chabay & B. Sherwood (John Wiley & Sons 2015). If students prefer a traditional textbook as a study aid, we recommend purchasing a used copy (even the 3rd edition should work).

The M&I version of 2211 emphasizes the atomic nature of matter and integrates traditional mechanics with thermal physics. There is strong emphasis on the Momentum Principle, the Energy Principle (the first law of thermodynamics) and the Angular Momentum Principle. The main goal of this course is to have students engage in a process central to science: the attempt to model a broad range of physical phenomena using a small set of powerful fundamental principles.

To aid in this goal students will develop computational models that predict the motion of interacting objects. These models will be made using the Visual Python programming language (run in your browser at www.glowscript.org). The course also emphasizes the atomic structure of matter, especially the ball and spring model of solids, and photon emission and absorption in quantized systems.

Topics include:

- The different types of matter and interactions found in nature
- Using the momentum principle to predict future motion
- An atomic model of solids
- The momentum principle in moving reference frames
- Energy conservation including relativistic energy
- Energy in macroscopic systems including thermal energy
- Multi-particle systems and the center of mass
- Collisions including relativistic particle collisions
- Angular momentum and quantized angular momentum
- Energy quantization and photon emission and absorption

By the end of the course, you will be able to:

- Apply a small set of fundamental physical principles to a wide variety of situations.
- Use these principles to explain a wide variety of physical phenomena.
 - Communicating scientific ideas is a big part of the laboratory.
- Make macro-micro connections, based on the atomic nature of matter.
- Model physical systems: make idealizations, simplifying assumptions, estimates.
- Construct computational models to predict the time evolution of system behavior.

Course Overview - 2212

In an effort to reduce cost to students, we are offering this course using a combination of instructor created content and open-access resources. This means students are not required to purchase a textbook or pay a lab fee. Our curriculum will, however, roughly follow the [Matter & Interactions](#), Vol. 2: Modern Mechanics, 4th Edition by R. Chabay & B. Sherwood (John Wiley & Sons 2015). If students prefer a traditional textbook as a study aid, we recommend purchasing a used copy (even the 3rd edition should work).

The M&I version of 2212 deals with electric and magnetic interactions, which are central to the structure of matter, to chemical and biological phenomena, and to the design and operation of most modern technology. The main goal of this course is to have you engage in a process central to science: the attempt to model a broad range of physical phenomena using a small set of powerful fundamental principles.

The specific focus is an introduction to field theory, in terms of the classical theory of electricity and magnetism. To aid in this goal you will develop computational models to visualize these fields and the interaction of charged particles. These models will be made using the Visual Python programming language (run in your browser at www.glowscript.org). The course also emphasizes the atomic structure of matter, especially the role of electrons and protons in matter.

Topics include:

- Matter and electric field, polarization of atomic matter
- Electric fields of distributed charges, setting up physical integrals, numerical integration
- Electric potential and energy for fields
- Magnetic field, atomic model of ferromagnetism
- A microscopic view of electric circuits, surface charge model
- Capacitors, Inductors, Resistors, and Batteries
- Magnetic force, including motional emf
- Patterns of field in space (Gauss's and Ampere's laws)
- Faraday's law and non-coulomb electric field
- Electromagnetic radiation, including its production by accelerated charges and re-radiation (classical interaction of light and matter)

By the end of the course, you will be able to:

- Apply a small set of fundamental physical principles to a wide variety of situations.
- Use these principles to explain a wide variety of physical phenomena.
 - Communicating scientific ideas is a big part of the laboratory.
- Use these principles to predict the behavior of a variety of physical systems.
- Model complicated physical systems by making idealizations and approximations.
- Create a 3D, animated computer model of a physical situation involving particles and fields.

Course Modality

Our expectation is that everyone who is eligible will be vaccinated. Vaccination significantly reduces likelihood of severe disease, including from the new variants of SARS-CoV-2.

- **Lectures** will be delivered in-person in [classroom TBD]
 - To actively participate during class, students will need a computer or phone with internet access
- **Lab Meetings** will take place in Clough and also be in person
- **Tests** will take place in person and on campus
 - Tests are taken on paper, scanned with a smartphone, and uploaded to Gradescope during the testing period

GT Lorraine and Barcelona (Sections R and RBS)

Students enrolled in **Section R** (GT Lorraine) and Section **RBS** (Barcelona) are not required to attend lectures. However, they are encouraged to attend the streaming of Dr Alicea's lecture if their schedule permits. Otherwise, they can watch the lecture recordings on Canvas > Media Gallery.

As you are not required to attend lectures, you will not have a class participation grade (see "The Bucket Points" below). Instead, you will have the Homework category count double (10 points instead of 5 points).

Your lab meetings (GPS and lab experiments) will happen remotely through **MS Teams**. All 2211 R and RBS students will meet simultaneously, and you'll all have the same GTA and UTA assigned to you. Your lab meetings are Mondays and Wednesdays:

- Barcelona (RBS), 6pm-8pm Central European Time (12pm-2pm Atlanta)
- Lorraine (R), 6:30pm-8:30pm Central European Time (12:30pm-2:30pm Atlanta)

Your first class meeting will be on **[date TBD]**. Dr Alicea will be there along with the GTA and UTA to explain how the course will work. In general, you will be doing GPS on Mondays, and on Wednesdays you will have office hours and help with the lab experiments.

Your tests will be proctored remotely through MS Teams, and will happen during the class period on: Wednesday **[date TBD]**, Wednesday **[date TBD]**, and Wednesday **[date TBD]**. Your final exam date will be announced sometime during the semester.

Determining your Grade

Numerical ranges for final grades are as follows: 90-100 points = A, 80-89 points = B, 70-79 points = C, 60-69 points = D, 0-59 points = F. **Final grades will not be curved** and rounding is at the discretion of the individual instructors.

We will be using the Canvas Grades to keep track of your progress in this course. However, please note that **the Canvas gradebook cannot accommodate our test weighing scheme or the bucket points** (see below).

- This causes a small but sometimes significant error in the overall grade that Canvas reports to students.
- To accurately compute a final grade, students will need to manually calculate a weighted average using the guidelines below or utilize the spreadsheet found under Files > Documents > [WhatsMyGrade.xlsx](#)

The Core Points

All students must participate in these activities or receive a zero for the assignment. Please contact Dr Alicea to be excused from these activities or to schedule a makeup.

- **40 pts - Tests**
 - There are three evening tests weighted depending on the grade the student receives in them:
 - Lowest score **5pts**, middle score **15pts**, highest score **20pts**
 - See [Modules](#) for the testing schedule
 - Taken in person, graded through Gradescope
 - The tests and the final exam will follow the same general [Exam Grading Rubric.pdf](#)
 - Regrades must be submitted through Gradescope before the start of the next test
 - Students with ODS accommodations should contact Dr Alicea
- **25 pts - Final Exam**
 - Our final exam will be on **[date TBD]**, as it is a common exam (i.e., all PHYS 2211 classes have the final exam at the same time)
 - Graded final exams are not returned to students but can be reviewed by appointment
- **25 pts - Laboratory**
 - **10 pts** will be earned for actively participating during group problem solving activities (**GPS**)
 - These will take place in Clough during the scheduled lab meeting time
 - Your lowest GPS score is dropped
 - **15 pts** will be earned for the five **individual lab experiments**, which have peer-graded video lab reports
 - Make sure to read this page for the full details: [Working on Lab Experiments](#)

The Bucket Points

Students must earn **10 points** toward their final grade through any/some combination of the following activities.

- These **cannot be excused or made up**; missing points are earned by completing additional bucket activities
- **You can earn partial credit in all the bucket categories**
- Students cannot earn extra credit by completing more than 10 bucket points
- These activities are intended to support student learning and give students flexibility
 - Pick and choose from as many different types of assignments as needed

General due dates for these assignments are on Sunday evenings at 11:59pm. All course work must be completed by the **Hard Deadline on Sunday, [date TBD], at 11:59pm Atlanta time.**

- **5 pts - Homework**
 - Online, on edX
 - Due weekly on Sundays at 11:59pm, but no penalty for late submissions
 - Must be completed by the **Hard Deadline**
 - Note that the [Reviewing the Syllabus](#) assignment is part of the Homework category
- **5 pts - Class Participation**
 - Monitored through a series of in-class polling-type questions (clickers)
 - Each student will need to download and use the PointSolutions App (free)
 - You are not penalized for wrong answers during lecture but you must complete **at least 50%** of the questions in each lecture to earn participation credit for that lecture
 - Quick summary of how to calculate your class participation grade:
 - Answer at least half of the clicker questions in each lecture to earn one point for that lecture
 - There are X lectures with clicker questions during the semester (example, X=30). If you earn the participation point in each lecture then you have X points. If you miss a lecture or don't answer enough clicker questions you miss points (for example, you finish the semester with 28 clicker points)
 - Your clicker score is the percentage of lectures in which you earned points (in this example, $28/30 = 93.33\%$)
 - Multiply your percentage by 0.05 to know how many points you earn for class participation (in this example, it's 4.67)
- **2 pts - Weekly Previews**
 - Interactive assignments delivered through Perusall
 - More details: [How do the Weekly Preview assignments work?](#)
- **1 pt - Extra Problems**
 - Online, on edX
 - Additional physics problems due by the **Hard Deadline**

- **1 pt - Test Wrappers**
 - These reflection exercises help you focus on common errors and time management
 - Available after each test, and must be completed before the start of the next test
- **1 pt - Wiki Resource**
 - Make a substantial improvement to an assigned topic on our class wiki resource
 - Part of your your score will be determined by peer review
- **1 pt - Public Lecture Reviews**
 - Watch evening lectures (in person) by visiting scientist
 - Part of your score will be determined by peer review

Extra Credit

You have the opportunity to earn **up to 1 pt of extra credit** to be added to your final course grade. This can be earned by completing the Physics Pre-Test and Post-Test.

- If you do the **pre-test** (only available for the first week of the semester) you earn 0.5pt of extra credit
- If you do the **post-test** (only available starting on Week 15), you can earn up to 0.5pt of extra credit, depending on your score in the post-test.
Example: if you scored 80% in the post-test, then you earned 80% of 0.5pt, which is 0.4pt
- You can do one or both or neither of these, it's entirely up to you.

Course Guidelines

General guidelines for handling absences, getting help, or academic misconduct. **If a student is unsure about a policy please contact Dr Alicea for help.**

Accommodations for Students with Disabilities

A student with learning needs that require special accommodation should contact the Office of Disability Services at 404-894-2563 or <http://disabilityservices.gatech.edu/> (**Links to an external site.**) to make an appointment to discuss their special needs and to obtain an accommodations letter. Once a letter is obtained, students should email Dr Alicea in order to set up a time to discuss your learning needs. In general we are able to accommodate all requests given advanced notice.

Excused Absences

Students may be excused from core coursework (see above) at the recommendation of the Dean of Students office or the office of the Registrar.

- Students who plan to miss a test or lab should follow these instructions:
 - <https://studentlife.gatech.edu/resources/class-attendance> (Links to an external site.)
- Please contact Dr Alicea within two weeks of receiving a recommendation from the Dean or Registrar
 - In general we extend due dates for students or excuse missing work
 - The final exam score is used in place of a missing test
 - Experience has shown this to be more beneficial for the student than giving a makeup test.
 - If a student disagrees, please speak with Dr Alicea so that we can find a resolution.
 - **We do not excuse or provide makeups for missing bucket points assignments, as those can be made up with other bucket assignments**
- If you are ill (e.g., if you have covid or covid-like symptoms) or have an emergency on the day of your lab meeting, email Dr Alicea as soon as possible to receive an excused absence for the missed GPS.

Academic Misconduct

The policy on academic honesty as stated in the [Honor Code \(Links to an external site.\)](#) will be fully enforced during this course for both the instructor and student. All Honor code violations will be referred to the Dean of Students office.

- Collaboration with other students in this course on homework assignments, lab assignments, and in-class activities is permitted and encouraged.
 - Study groups can be facilitated through private channels on edstem ("Ed Discussion", our class forum)
- **Collaboration is not permitted during tests or the final exam**
 - These activities are closed internet, books, and notes with the following exceptions:
 - Students are allowed a copy of the formula sheet found on Canvas
 - Students are allowed blank paper
 - Students are allowed a calculator (that cannot communicate with other calculators)
 - Students must work on the test individually and receive no assistance from any other person or resource
- Work submitted outside of the testing window will not be graded
- **Students who post course content to online resources external to Georgia Tech (e.g, Chegg) will be referred to the Dean of Students office for Academic Misconduct**

How to Succeed in This Course

As a member of the Georgia Tech community, your instructors are committed to creating a learning environment in which every student feel safe and included. Because we are individuals with varying needs, we are reliant on student feedback to achieve this goal. To that end, we invite students to enter into dialogue with us about the things we can stop, start, and continue doing to make our classroom an environment in which every student feels valued and can engage actively in our learning community.

The secret to succeeding in this course is to actively participate during lecture, on homework, and through online discussions. The more authentically a student engages with the material the better they perform during evaluations. In general the course is scheduled so that during a given week an actively engaged student would spend between 11-14 hours with this course:

1. Interact with material (e.g., videos) that will be covered before coming to lecture or lab **(1 hour / week)**
2. Attend lecture & lab, taking notes and asking questions to clear up points of confusion **(5-6 hours / week)**
3. Working on the take home lab experiments **(2-3 hours / week)**
4. Work through the homework questions to check for understanding and not just an answer **(1-2 hours / week)**
5. Practice solving new problems leading up to a test. **(1 hour / week)**
 - Work through old exams and quizzes, attempt some of the extra problems
 - **Reading written solutions or watching video solutions only FEELS like learning, it's not actual learning!**
6. Get help early on and often from experts **(1 hour / week)**
 - Instructors are available to discuss physics related problems during office hours.
 - Utilize the "Academic Support" section for free tutoring services found on campus
 - Students can request online help from students, TAs and instructors through our class forum on edstem ("Ed Discussion")

Any issue related to the administration of the course should be directed to Dr Alicea. Because so many students are taking introductory physics courses, it is to your advantage to schedule a meeting with Dr Alicea during office hours. Please note that Dr Alicea responds to all student emails, but due to the high volume of emails, sometimes it may take her a few days to reply.

Inclusivity and Classroom Community

We strive to create a classroom in which all students can flourish and learn. Our differences in terms of race, gender identity, sexuality, religion, ability, and age (among others) broaden and enrich our collective understanding, and our backgrounds and identities influence our individual experiences and our interactions with others. We are committed to minimizing bias in course policies and procedures and our own words and actions, and welcome feedback should you notice that any aspect of this course is inhibiting your ability to participate and learn.

Campus Support Services and Resources

It is not usual for any of us to find ourselves in need of support during stressful periods. Recognizing that, we have compiled a list of Georgia Tech resources that may be of help.

Academic support

- Center for Academic Success <http://success.gatech.edu> (Links to an external site.)
- Drop in tutoring <https://tutoring.gatech.edu/drop-in/> (Links to an external site.)
- 1-to-1 tutoring <https://tutoring.gatech.edu/tutoring/> (Links to an external site.)
- Peer-Led Undergraduate Study (PLUS) <https://tutoring.gatech.edu/plus-sessions/> (Links to an external site.)
- OMED: Educational Services (<http://omed.gatech.edu/programs/academic-support> (Links to an external site.))
- Communication Center (<http://www.communicationcenter.gatech.edu> (Links to an external site.))

Personal Support

- The Office of the Dean of Students: <https://studentlife.gatech.edu/content/get-help-now> (Links to an external site.)
 - Smithgall Student Services Building 2nd floor or by phone **404-894-6367**
- You also may request assistance at https://gatech-advocate.symplicity.com/care_report/index.php/pid383662? (Links to an external site.)
- [\(Links to an external site.\)](#)Center for Assessment, Referral and Education (CARE) <https://care.gatech.edu/> (Links to an external site.)
 - Smithgall Student Services Building 1st floor or by phone **404-894-3498**
 - Students seeking assistance from the Counseling Center or Stamps Psychiatry need to visit CARE first for a primary assessment and referral to on and off campus mental health and well-being resources.
 - Students in crisis may walk in during business hours (8am-4pm, Monday through Friday) or contact the counselor on call after hours at **404-894-2575** or **404-894-3498**
 - Other crisis resources: <https://counseling.gatech.edu/content/students-crisis> (Links to an external site.)
- Students' Temporary Assistance and Resources (STAR)
 - <https://star.studentlife.gatech.edu/> (Links to an external site.)
 - Can assist with interview clothing, food, and housing needs.

- Stamps Health Services: <https://health.gatech.edu> (Links to an external site.) or by phone **404-894-1420**
 - Primary care, pharmacy, women’s health, psychiatry, immunization and allergy, health promotion, and nutrition
- OMED: Educational Services: <http://www.omed.gatech.edu> (Links to an external site.)
- Women’s Resource Center: <http://www.womenscenter.gatech.edu> (Links to an external site.) or by phone **404-385-0230**
- LGBTQIA Resource Center: <http://lgbtqia.gatech.edu/> (Links to an external site.) or by phone **404-385-2679**
- Veteran’s Resource Center: <http://veterans.gatech.edu/> (Links to an external site.) or by phone **404-385-2067**

National Support

- The <https://suicidepreventionlifeline.org/> (Links to an external site.)
 - Telephone **1-800-273-8255**
 - Free and confidential support 24/7 to those in suicidal or emotional distress
- The <https://www.thetrevorproject.org/> (Links to an external site.)
 - Crisis intervention and suicide prevention support to members of the LGBTQ+ community and their friends
 - Telephone **1-866-488-7386** available 24 hours a day, 7 days a week
 - [Online chat \(Links to an external site.\)](#) available 24 hours a day, 7 days a week
 - Text message “START” to **687687** available 24 hours day, 7 days a week