PHYS-1200 Course Syllabus Spring 2023

Course Website: http://lms.rpi.edu

Lecture	Monday-Thursday Sections 1 – 5	8:30am – 9:20 am	DCC 318
	Tuesday-Friday Sections 6 – 9	8:30am – 9:20 am	DCC 318
Labs	Sect 1,2 M/Th	10:00 am – 11:50 am	JRowl 2C14, 2C22
	Sect 3,4 M/Th	Noon – 1:50 pm	JRowl 2C14, 2C22
	Sect 5 M/Th	2:00 pm – 3:50 pm	JRowl 2C14
	Sect 6,7 T/F	10:00 am – 11:50 am	JRowl 2C22, 2C14
	Sect 8,9 T/F	Noon – 1:50 pm	JRowl 2C22, 2C14

Course Supervisor

Prof. Glenn Ciolek – cioleg@rpi.edu – JRSC 1C36
Office hours: to be posted to LMS

Laboratory Faculty

Prof. Glenn Ciolek (sections 1 & 5)	cioleg@rpi.edu
Prof. Charles Martin (sections 3 & 4)	martic13@rpi.edu
Prof. Nadarajah Narendran (sections 6 & 7)	narenn2@rpi.edu
Prof. John Schroeder (sections 7 & 9)	schroj@rpi.edu
Prof. Yong Zheng (Sections 2 & 8)	zhengy14@rpi.edu

Classroom Facilitator and Teaching Assistant names and office hours for Professors and TA's will be posted on LMS as they become available. Office hours may be held in-person, virtually (e.g., WebEx), or a combination of the two.

Communication

There are five major communication channels in this course.
1) Announcements in LMS.
2) Announcements in LMS sent as an email.
3) MasteringPhysics (for homework and quizzes).
4) Real in-person announcements in class.
5) Announcements made in the lecture sessions for each class topic.

Keep up to date on all of them. You should check your email at least once per day to receive timely updates that could affect your grade.

Course Description

Physics 1200 is the second semester of a two-semester introductory sequence. Topics include electric and magnetic forces and fields, Gauss's Law, DC and AC circuits, Ampere's Law and Faraday's Law, mechanical oscillations and waves *leading into* electromagnetic radiation, physical optics, and quantum physics.

Prerequisites or Other Requirements: PHYS 1100 or equivalent or permission of instructor. Co-requisite: MATH 1020.

Course Text and Equipment

Text: *University Physics* 15th edition by Young and Freedman (published by Pearson) with on-line Modified MasteringPhysics for Homework (same as PHYS 1100 last semester). You need not buy the physical textbook because all problems will be accessible online.

Course Structure

Course Format: The course consists of four regular class meetings per week---two lectures and two laboratory sessions. The lectures will meet on Mondays & Thursdays or Tuesdays & Fridays, from 8:30 am to 9:20. Your labs will meet twice a week for 110 minutes on the same day as your lecture. Exams are given during the 6:00 pm – 7:25 pm test block on selected Wednesday evenings.

You must attend the lab section for which you are registered unless you have made an alternate arrangement with your faculty instructor. Lab activities will be divided among conceptual work, simulations, and hands-on experiments. Faculty and staff will be available to help you in-person during on-campus lab sessions. You are encouraged to work in small groups, and to get help from your class faculty and staff when needed.

Laboratory description and write-up forms will be supplied and submitted through LMS. **Lab write-ups submitted for grading must be in the PDF format. Submissions in other formats will receive a zero grade.** (There are many free online PDF converters available.)

Examinations will be supplied to you for in-class exams. In the event of campus closure/remote instruction, exams will instead be provided using online platforms such as the class LMS test feature.

Pre-lecture quizzes will be supplied and graded through Pearson/MasteringPhysics. They will be due by 10 am of the day of your lab class.

In the event of campus closure (such as COVID-19 or some other reason), all lab classes will still be held at their regularly scheduled times. However, for that circumstance, remote/online instruction may be performed instead. Detailed instructions relevant to off-campus instruction (exams, if necessary) for that situation will be provided to the student by announcements from the Course Supervisor through the PHYS 1200 LMS site.

Demonstration videos for some labs have been prerecorded. If you must miss a section for health (such as campus quarantine) or other approved reasons, you may be allowed to use that online material instead.

Course Content

At the end of this course, a student should understand basic concepts of electromagnetism and quantum physics and be able to solve problems at a level consistent with any introductory Physics text. Students should be able to set up and solve problems using calculus at the level of a first-year course in calculus. Mastery will be developed through classroom lectures and laboratory activities as well as through required homework assignments. Mastery of the material will be assessed through homework, classroom labs, quizzes, three regular semester exams, and a comprehensive final.

Grading Criteria and Assessment Measures

The course numerical grade range for each letter grade is given below.

A	92 to 100;	A-	89 to 91.99		
B+	86 to 88.99;	B	82 to 85.99;	B-	79 to 81.99
C+	76 to 78.99;	C	72 to 75.99;	C-	67 to 71.99
D	55 to 66.99.				

Your final course grade will be determined as follows:

Unit Exams and Final Exam (3 + 1 Final)	60.0%
Laboratory Activity and Worksheets	22.5%
Lecture quizzes (due 10 am on your lab day)	5.0%
Online Homework (due 10 am on your lab day)	12.5%

EXAM GRADES:

There will be three topical exams at approximately one-month intervals throughout the semester, plus a three-hour comprehensive final exam that will count as two topical exams, giving you an effective total of five exam scores. Of those five exam scores, only the four highest scores will be used to determine

your exam average score; that is, the lowest of the five exam scores will be dropped. This means that your total maximum exam score is 400 pts, which will be scaled to 60% of your course grade.

COURSE POLICIES

Grades

All grades will be recorded in the Blackboard LMS Gradebook and Pearson MasteringPhysics Gradebook for this course. You should review them regularly to be sure that your grades are being properly transcribed. All your grades are administered by your laboratory section professor – not necessarily the course supervisor.

Laboratory Activities

The primary mode of interaction will be through real-time laboratory classes. You must attend the in-person lab section for which you are registered unless you have arranged with your faculty instructor for an absence. Lab activities will be divided among conceptual work, simulations, and hands-on experiments. Faculty and staff will be available to answer questions during class. You are strongly encouraged to work in small groups.

Written laboratory reports will be due at designated times hours several hours after the end of the last lab section on a topic. Your reports will be submitted online to the course LMS via a link that will be found in each class's LMS folder. Your submitted work must be in pdf format.

You may find that completing some of the background theory prior to lab helps in two ways, by giving you a stronger preparation at the start, and by allowing you to spend more time on the experiment and asking questions.

Quizzes

Quizzes will be available (on MasteringPhysics) several hours prior to each lab class and must be completed by 10 am on the day of your class. Quizzes will focus on the new material for that lab day and should serve to encourage you to read the new material and/or watch the recorded lectures prior to lab class.

Major Examinations

There will be three in-term (85 minute) topical exams in this course. They will be held from 6:00 p.m. ET to 7:25 p.m. ET on the dates below:

Exam 1	Wednesday, February 15, 2023
Exam 2	Wednesday, March 29, 2023
Exam 3	Wednesday, April 19, 2023

All exams will be held on-campus. Exam information (including assigned exam rooms) will be announced on LMS and in lecture prior to each exam. You will be allowed to bring to each on-campus, in-person exam:

- Writing instruments.
- A basic scientific calculator.
- One 8.5" × 11" sheet of paper containing constants, formulas, and any other information that you might find useful. Both sides of the page may be used, as well as any size font (printed or handwritten).

The use of any electronic communication or data storage devices is forbidden and will result in a grade of ***F*** for the course and a letter to the Dean of Students.

A grade of zero will be recorded for any major exam that is missed for any reason without an excuse.

If you have a conflict with an examination time for a valid reason, you may take that exam during a conflict time. Contact your section professor one week prior to the exam to find out if your reason is valid and to make arrangements to attend the conflict exam.

Students with approved special needs or accommodations (large print, extra time, quiet room, computer, etc.) should contact their section instructor in the week before the exam so we can make arrangements for you.

Final Examination

The Final Exam counts as two regular topical semester exams. Do not plan to skip it unless you fully understand and accept the consequences to your grade. Do not make travel arrangements until after you know the date of the final.

There is no conflict exam possible for the Final Exam unless it conflicts with another scheduled Final Exam having a class number that is less than that of PHYS 1200 (if the class number of the other class is greater than PHYS 1200, it is the other class's responsibility to give you a conflict final exam). If you are given a conflict exam for the PHYS 1200 final exam, it may be given on the same day but at a different time.

The items that you are allowed to use on your final exam will be the same as those used for your three semester unit exams.

Homework

The philosophy of this course is that you learn best through your own study and practice, not by passively listening to lecture and certainly not by copying the

work of others. We will try to focus and clarify your learning through assignments, labs, lectures, and exams but it is your job to learn. Online homework uses the same MasteringPhysics system that you would have used in PHYS 1100 (Physics I), which provides rapid feedback on your understanding of the material.

We strongly encourage you to do homework yourself and make sure you understand it. Copying may increase your homework grade but statistically it has been proven to correlate with lower exam grade, usually by at least one letter grade. (Remember that exams count for 60% of your grade and homework counts for 12.5%.)

Each graded homework question or problem counts for 1 point in your homework total. (Some problems and tutorials may be long or difficult – they count the same as short or easy questions.) Detailed policy is given on the "Mastering Physics" site for this course. Many problems have hints that you can access at no cost to your grade. Late homework will be assessed a penalty that increases with lateness to a maximum loss of 60% of the possible grade. It is therefore always worth doing the homework, but it is best to submit it on time. Check the policy on the MasteringPhysics site.

Some problems in the online homework may listed as "Practice." Some entire sets of problems may be listed as "Practice." Practice problems and sets do not count toward your homework total but are provided to help you learn the material.

Extra credit homework problems may also be given in a homework assignment. (See below about limits to the total number of extra credit points that may be accrued in a semester.)

Lectures

Lectures are where you will be presented with the topic being studied for each class; example problems will often be worked out during these sessions. The material discussed in lecture will assist you in the understanding of the subjects that you will be investigating in your lab section later in the day. Student questions during lecture are encouraged. Copies of the slides presented in a lecture will be made available to all students in the LMS folder for each class prior to the actual lecture itself – usually the day before the actual lecture.

In the event of campus closure, lectures may be held at their regularly scheduled times. However, for that circumstance, remote/online instruction will be performed instead. (Alternatively, it is possible that lectures would instead be recorded and made available for asynchronous viewing.) Detailed instructions relevant to off-campus instruction for that situation will be provided

to the student by announcements from the Course Supervisor through the PHYS 1200 LMS site.

Laboratory Section Attendance

Laboratory is where most of your learning will take place. This is your opportunity to discuss with your fellow students and ask questions of the instructors. Laboratory experiments and related activities form 22.5% of your grade and are represented on the exams. You are responsible for the material covered in laboratory, even if you have an excused absence.

If you have an excused absence from the Dean of Students, from an athletic coach due to a sporting event, or another faculty member for another university sanctioned absence you will be allowed to make up a missed laboratory assignment. See your professor beforehand so he is aware of your circumstances.

To receive credit for the lab classes you must attend the class you are registered for, and you must actively participate in the laboratory activity unless other arrangements have been made. You will not be allowed to arrive later than other members of your group and copy their work. That is plagiarism and will be given zero credit. You must also hand in (i.e., upload to LMS) an individual completed laboratory report every class which will be graded on a scale of 0 to 10.

Uploaded written reports are due by 11:59 pm of the day following the day in which the lab exercise is performed.

In the event of campus closure, all labs will be held at their regularly scheduled times. However, for that circumstance, remote/online instruction will be performed instead. Detailed instructions relevant to off-campus instruction for that situation will be provided to the student by announcements from the Course Supervisor through the PHYS 1200 LMS site.

Extra-Credit Work

Extra-credit work may be offered in labs, homework problem assignments, quizzes, and exams. Any extra-credit points that are accrued will be applicable only to the category in which they are awarded. For example, online extra-credit homework points will count only towards a student's total homework score, and extra-credit exam points will count only towards their total exam score, and so on. ***The maximum score percentage that can be obtained in any one category (labs, homework, quizzes, and exams) will be capped at 100%.***

Course Policy on Missed Work:

Homework

Homework is due at the start of the day of your lab. A fraction of the grade is automatically deducted for homework that is late using a scale programmed into the MasteringPhysics system.

Laboratories

If you know in advance that you are going to miss a lab due to a valid* excuse, you must inform your section professor in advance. Excuses supplied after the missed class will only be accepted if the reason was unforeseeable. Depending on the circumstances, students may be either excused or required to make up the lab work. Labs missed without a valid excuse are recorded as zeros and will decrease your grade by about 0.8% per missed lab. Up to six labs may be excused if you can present a valid excuse. Students who miss more than six labs must meet with both the course supervisor and their class Dean to address the issue.

*Serious medical situations, university sanctioned competitions (e.g. – MCM, Robotics, Sports), and academic congresses are examples of valid excuses.

Quizzes

Quizzes missed without a valid excuse are recorded as zeros and will decrease your grade by about 0.2% per missed quiz. Excuses supplied after the missed class will only be accepted if the reason was unforeseeable. Depending on the circumstances, students may be either excused or required to make up the lab work. Up to six quizzes may be excused if you can present a valid excuse.

ACADEMIC INTEGRITY

Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Acts, which violate this trust, undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities define various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration. Students taking courses at Rensselaer have a right to expect that their work will be evaluated fairly with respect to other students. They have a right to expect that other students will not attempt to enhance their own grades or the grades of their friends by cheating. Professors have a right to expect that their students are honest and submit work reflecting their own efforts. In an atmosphere of academic integrity, students and professors are on the same team trying to achieve

the same learning objectives. If you attempt to cheat, you are placing yourself in a position where you are at odds with your professors and the vast majority of your fellow students. Academic dishonesty is a serious offense and we will treat it accordingly.

Here are some examples of what is considered "cheating" and "not cheating" in PHYS 1200. This is not intended to be a comprehensive list. **If you are unsure about something, ask your lab instructor or lecturer.**

Not cheating:

- Most learning is done through discussion with your peers and instructors. It is encouraged.
- Students are expected to actively participate in a collaborative group when working on the in-class activity. Discussion with peers or instructors is encouraged.
- Discussion with peers or instructors on homework is encouraged.
- You may use lab data supplied by a partner or instructor, as long as you acknowledge the source.

Cheating:

- Each student must turn in her/his own activity write-up. No student will be allowed to submit an activity in the name of any other student. The same policy applies to homework and quizzes. If you are caught copying or handing in work that is not your own, you will receive a non-droppable zero for that assignment and will be warned that this is not acceptable behavior. If unacceptable behavior persists after warning, it may result in an F for the course and a letter to the Dean of Students.
- Collaboration (giving or taking information) or copying of any sort or using any aid that is not allowed during an exam is cheating. It will result in immediate failure and a letter to the Dean of Students.
- Altering a returned exam and asking for a re-grade is cheating. It will result in immediate failure and a letter to the Dean of Students.
- Use of lab data supplied by another person without acknowledgement of the source.

If you become aware of another student cheating on an exam or in any other aspect of the course, it is your responsibility and in your best interests to inform the professor in charge of the lab section or the course so that appropriate action may be taken. The reputation of Rensselaer as a premiere institute of research and learning rests on the integrity of its students, faculty, and staff.

If you have any question concerning this policy before submitting an assignment, please ask for clarification.

OTHER COURSE-SPECIFIC INFORMATION

Course Information: Course information and a PowerPoint version of the lecture notes are available at the LMS (Blackboard) site for this course. Class-wide announcements are also posted at that location, so check in daily. Lecture videos from past semesters may also be available and posted on LMS.

Extra Help: All instructors and graduate teaching assistants are available during laboratory class and in office hours for students who need help outside the classroom. Supplemental (ALAC) tutors and mentors may also be available to help you with this course. A list of the office hours for all the instructors and tutors in the course will be published and updated on the PHYS 1200 LMS as soon as the information is available. Office hours may be in-person, remote through WebEx meetings, or a combination thereof. Students may go to the office hours of any instructor listed, not just their section professor or section TA.

Safety Protocols Related to COVID

Rensselaer is committed to the health and safety of all students. Rensselaer will continue to monitor all new developments with COVID-19 and determine a best course of action to uphold the well-being of its students while maintaining a high-quality educational experience.

Masks: In the event of campus public health protocols requiring the wearing of masks, masks will be worn by all students and faculty in all classrooms/labs, as well as in Institute buildings. In this situation, students who violate this policy by not wearing masks will be reported to the Dean of Students and will be requested to leave a classroom of building and return to their living quarters. The Dean of Students will provide the appropriate sanctions for the students per the code of conduct signed by the students.

Traffic Flow and Social Distancing: In the event of campus public health protocols requiring enhanced social distancing, students and faculty will respect the need for social distancing to the degree possible by the setting. Under these circumstances, faculty and students will move in and out of classrooms as per the appropriate instructions of the faculty/administration. They are expected to follow printed traffic flow statements posted in all rooms and buildings.

In-Class Seating: In the event of campus public health protocols requiring enhanced social distancing, faculty may be asked to assure that students sit in the appropriate designated seating in the classroom, using social distancing. Under these circumstances, students are not allowed to move furniture or sit in seats not

designated by the Institute. PHYS 1200 students will be expected to only sit at specified workstations with only one student per station.

Cleaning of Spaces: In the event of campus public health protocols requiring heightened cleaning procedures, students are encouraged to clean the surfaces of the chairs/tables/desks they occupy before they sit down and as they prepare to leave.

Student Health: Students who are ill, under quarantine for COVID-19, or suspect they are ill will report that to Student Life. Student Life will verify and notify all faculty who have that student. Once notification is made, all faculty will make every reasonable effort to accommodate the student's absence and will communicate that accommodation directly to the student. Failure to make an appropriate accommodation for a verified or reasonably suspected case of illness may be appealable under the student grade appeal process. Students who need to report an illness should contact the Student Health Center via email or call 518-276-6287. For student seen off campus, a student may request an excused absence via www.bit.ly/rpiabsence with an uploaded doctor's note that excuses them.

Refusal: Refusal to comply with any appropriate campus public health request will be treated as would any classroom disruption and disciplinary actions and sanctions will be taken through our judicial process in the Student Handbook (request to change the behavior; request to leave the class; dismissal of the class and referral to Student Life and the Dean of Students.)

Diversity/Difficult Content/Accommodation Statement:

Diversity: We value the voice of every student in the course. Our diversity as a class—in race, gender, sex, religion, language, ability, veteran status, place of origin—is an asset to our learning experience. As a result, we will design inclusive lessons and assignments that provide you with the opportunity to speak and be heard, explore your own understanding, and encounter each other.

Difficult Content: The subjects of science, society, and culture are complex and wondrous. They can also be violent, misogynist, racist, and disturbing. In this course, we will confront any difficult content together with sensitivity, both to the figures represented and to each other.

Accommodations: We all learn differently, and we want every student to succeed in the course. If you have a learning need or disability, please register as soon as possible with the Rensselaer Office of Disability Services for Students (DSS, dss@rpi.edu) so that they can provide us with the appropriate documentation for

accommodations.

Science and/or engineering can solve world problems by using technology creatively. We invite and expect every student to contribute creatively as part of their learning process. Success in these fields depends critically on teamwork. We invite and expect every student to engage in constructive discourse, to bring their perspective, and to be accepting of others's opinions. Degrading, abusing, harassing, silencing, or dismissing others in the process is not acceptable behavior. It is also bad science/engineering. We are committed to providing an enriching learning environment for every student.

The professor is available to discuss academic accommodations for students with special needs or concerns. Requests for academic accommodations should be made as soon as possible, so that arrangements can be made in a timely fashion. Students are also encouraged to register with Rensselaer's Office of Disability Services for Students as needed.

STUDENT LEARNING OUTCOMES

The successful student will:

1. Demonstrate key factual knowledge of electromagnetism and circuits and basic quantum physics. Examples of such knowledge include the order of magnitude of the wavelength, speed, and frequency of sound, light, and radio waves; and typical power consumption in common electrical devices.
2. Demonstrate understanding of key concepts applying to electromagnetic and circuits and basic quantum physics.
    a. Demonstrate knowledge of the basic physical concepts of conservation of momentum, energy, mass, and charge.
    b. Demonstrate knowledge of the relationships between electric charge, vector electric fields, electric forces, and electric potential.
    c. Demonstrate knowledge of the relationships between moving charges, vector magnetic fields, and magnetic forces.
    d. Demonstrate knowledge of the relationship between charge, current, and voltage in direct current and alternating current series and parallel circuits.
    e. Demonstrate knowledge of the relationships between wavelength, wave speed, and frequency for sound and electromagnetic travelling waves.
    f. Demonstrate knowledge of wave interference and diffraction phenomena.
    g. Demonstrate understanding of the fundamental ideas of Special Relativity.
    h. Demonstrate knowledge of the DeBroglie hypothesis and the relationship between particle-like and wave-like behavior of matter.
3. Be able to follow written and oral instructions as well as be familiar with the apparatus to acquire physical measurements of electric, magnetic, and optical quantities.

4. Relate academic material related to the topics in section 2 to the world outside of the classroom.
    a. Recognize real-world situations in which quantitative or mathematical analysis produces predictive ability.
    b. Recognize real-world applications in which electric and magnetic effects must be considered in making a quantitative analysis of a situation.
    c. Recognize real-world applications in which quantum effects must be considered.
5. Translate a word, diagrammatic, or graphical description of a physical situation into a solvable mathematical description.
    a. Demonstrate the ability to use mathematical tools including algebra, trigonometry, and differential and integral calculus to solve problems in electromagnetism, vibrations and waves, and basic quantum physics of particles.
    b. Demonstrate the ability to select appropriate physical principles and relevant parameters that apply to quantitative analysis of a situation and then to represent the solution in logical mathematical form.
    c. Convert a word problem into a diagrammatic or graphical description and vice versa.
6. Solve straightforward quantitative physical problems that involve one or two physical concepts in this course.
7. Recognize when sufficient information is given to allow the student to solve for required quantities.
8. Start with the statement of a physical situation, derive useful relationships from basic formulas, and symbolically and quantitatively solve for required quantities.
9. Solve unfamiliar problems and assess unfamiliar physical situations based on the physical concepts of this course.