Electromagnetism, Optics, and Nuclear Physics

PHY 302L: General Physics II

Course Syllabus: 2021 – 2022

UT Austin Faculty Lead	OnRamps Course Staff
Dr. John Markert, Professor of Physics	Dr. Jason Dowd, Physics Course Manager
	jason.dowd@austin.utexas.edu
	Hector Tejeda, Physics Senior Course Coordinator
	hector.tejeda@austin.utexas.edu

1. COURSE DESCRIPTION

Electromagnetism, Optics, and Nuclear Physics serves as an introduction to electricity, magnetism, optics, waves, and quantum and nuclear physics. You will explore how electric, magnetic, and electromagnetic effects arise from static, uniformly moving, and accelerating charges, respectively. You will obtain practical experience with electrical circuits and optical devices, while also investigating modern physical phenomena including quanta of light (photons) and the properties of the atomic nucleus. You will gain an appreciation of how scientific inquiry reveals the fundamental principles of the universe and how these principles are applied to the invention of technologies that shape the modern world.

This is the second in a sequence of algebra-based (non-calculus) courses that fulfills a general physics requirement. You will develop critical thinking, empirical, and quantitative skills through problem solving and analyzing physical situations.

This course may be used to fulfill the science component of the university core curriculum. Students can earn three hours of UT credit for this course.

Natural Science & Technology, Part II (Texas core curriculum code 093)
TCCN PHYS 1302

A. Course Pre-requisites

a. TEKS-based Physics course
b. Algebra II
c. Geometry
d. Recommended: OnRamps PHY 302K, AP Physics 1, Honors Physics, or PHY 1301
e. Recommended: Precalculus or Trigonometry

B. Course Learning Outcomes

a. Students will describe electric force and fields, Gauss' Law, energy and potential, capacitance, current, resistance, and direct-current circuits.
b. Students will investigate magnetic force and fields, Ampere's Law, magnetic materials, Faraday's Law, magnetic induction, and alternating-current circuits.
c. Students will research and create models pertaining to electromagnetic waves, reflection and refraction, mirrors and lenses, wave optics, and optical instruments.
d. Students will learn about photons, quantum physics, and nuclear physics.

C. Course Format and Procedures

a. **Course Pedagogy Overview.** The course pedagogy will focus on Peer Instruction and Inquiry-Based Learning. Learning will be student-centered and emphasize the active construction of knowledge. In the classroom, you will discuss ideas with your peers and articulate your own understanding. You will explore simple models and simulated systems to test and evaluate your ideas.

b. Instructional Activities

i. Discussion

You will actively engage in Peer Instruction instead of a traditional lecture model. During Peer Instruction, each lecture will have embedded ConcepTest conceptual questions designed to expose common difficulties and misconceptions associated with the content. You will be given time to formulate your own answers to each question and work in small groups to reach a consensus on an answer. This promotes discussion and articulation of understanding.

ii. Quest Homework

You will complete a college-level homework assignment for each unit using the Quest Learning System. Collaboration on homework is encouraged. However, you may be required to turn in your independent work to provide reasoning for your answer selections to your HS Instructor.

iii. Inquiry

Each unit will have at least one activity that will utilize inquiry-based learning. These learning experiences will involve both hands-on and computer simulation-based elements. You will be expected to pose questions, design experiments, collaborate, and communicate results.

D. University Course Staff

Title	Description
UT Austin Faculty Lead	A UT Austin faculty member who designs and oversees delivery of the OnRamps college distance course and ensures its alignment to the course as it is delivered at the residential university campus.
OnRamps Course Staff	A UT Austin staff member and designee of the UT Austin Faculty Lead who serves as a primary subject-matter expert in the academic discipline of the OnRamps course and provides yearlong support to high school Instructors to ensure the course is delivered with fidelity. As a designee of the UT Austin Faculty Lead, Course Staff assist with academic integrity investigations, send official University communication to students, and ensure students have access to all course resources and policies.
UT Austin Instructor of Record	The UT Austin Instructor of Record grades or oversees grading of college course work and determines student eligibility and credit award. The UT Austin Instructor of Record also investigates and resolves suspected incidents of academic integrity violations in the distance college course. The UT Austin Instructor of Record meets departmental and university criteria prior to appointment. The UT Austin Faculty Lead, Course Staff, or other UT Austin-appointed staff member may also serve as the UT Austin Instructor of Record.

E. Course Outline

Unit & Topic	
OnRamps Orientation	
Unit 1	Electric Charge, Force, & Fields (Quest HW1)
	Gauss' Law & Electric Potential (Quest HW2, Exam 1)
Unit 2	Capacitance (Quest HW3)

Unit & Topic	
	Current, Resistance & DC Circuits (Quest HW 4, Exam 2)
Unit 3	Magnetism (Quest HW5, Exam 3)
Unit 4	Faraday's Law & Induction (Quest HW6)
	AC Circuits (Quest HW7, Exam 4)
Unit 5	Electromagnetic Waves (Quest HW8)
	Wave Optics (Quest HW9, Exam 5)
Unit 6	Geometric Optics (Quest HW10)
	Vision & Optical Instruments (Quest HW11, Exam 6)
Unit 7	Quantum Physics (Quest HW12)
	Atomic Physics (Quest HW13, Exam 7)
Unit 8	Nuclear Physics (Quest HW14)
Spring Final Exam (Units 1 – 8)	

2. COURSE REQUIREMENTS

A. Technology Access and Expectations

Technology System	Description and Expectations
Canvas Learning Management System URL: https://onramps.instructure.com	• OnRamps provides an online learning environment in Canvas Learning Management System (LMS) for all students in this class. • You will have access to two (2) Canvas courses for the purpose of the dual-enrollment experience: the OnRamps high school course and the OnRamps college course. • You are expected to access Canvas daily or weekly for readings and assignments. You will get many of your assignments and turn in your college work in Canvas. • You are responsible for reading course information, including assignment instructions and due dates, that is posted in Canvas. You are also responsible for frequently checking your Canvas Inbox and viewing course announcements.

Technology System	Description and Expectations
Quest URL: https://quest.cns.utexas.edu	• This course uses Quest, a web-based content delivery and homework server system maintained by the College of Natural Sciences at UT Austin. • You will turn in your UT Austin work, including homework and exams, in the Quest System. You are expected to access Quest daily for homework assignments. • Exams will be given in Quest during your class time and solutions will be posted after the deadline has passed. Quest can be accessed using a computer and/or tablet.
Learning Catalytics URL: https://learningcatalytics.com	• This course uses Learning Catalytics (LC), a web-based interactive student response tool. Questions in LC will be a part of your college grade. • LC can be accessed using a computer, tablet and/or smartphone.
OnRamps Portal URL: https://onramps.utexas.edu/portal	• You will access the OnRamps Portal to manage your current OnRamps distance college course enrollment(s), including viewing your college credit eligibility status and accepting or declining college credit, if earned. • You may also request accommodations for your distance college course in the OnRamps Portal.
Email Use a personal email address that you check regularly and will have access to after you graduate high school.	• Email is an official means of communication at UT Austin. OnRamps uses email to communicate course, enrollment, and credit information to you. • It is your responsibility to keep your email address updated in the OnRamps Student Portal at all times. You are expected to check email frequently in order to stay current with OnRamps-related communications, recognizing that certain communications may be time-critical. Updating your email address in the OnRamps Student Portal automatically updates your email address in Canvas. • Failure to check email is not acceptable reason for missed communication or missed deadlines.

B. Assignments & Grading

The following assignments and assessments contribute to your college grade. Detailed instructions and due dates for assignments are posted in your Canvas college course.

Assessment	Description	Frequency	Assignment Type	% Course Grade
Unit Exams	Given at the end of each unit (Units 1 – 7)	Every 3 – 4 weeks	Exam	45
Final Exam	Cumulative exam (Units 1 – 8)	Once	Exam	20
Participation	Learning Catalytics-based Peer Instruction activities	Weekly	Peer Instruction	14
Fall Quest Homework	A set of learning problems per unit submitted via the Quest Learning System	Every 2 weeks	Homework	10
Spring Quest Homework	A set of learning problems per unit submitted via the Quest Learning System	Every 2 weeks	Homework	10
Orientation	OnRamps Orientation Modules	Once	Orientation	1
Total				100%

C. College Course Grading Scale

A	89.50 – 100.00
A-	84.50 – 89.49
B+	79.50 – 84.49
B	74.50 – 79.49
B-	69.50 – 74.49
C+	64.50 – 69.49
C	59.50 – 64.49
C-	54.50 – 59.49
D+	49.50 – 54.49
D	44.50 – 49.49
D-	39.50 – 44.49
F	0 – 39.49

Minimum Eligibility Grade

a. Detailed instructions of college-level assignments will be posted on the College Canvas Course. Assignments that are missed will convert to zero if the work is not made up according to the policy and timelines listed below.
    i. Quest Homework
        One Quest HW grade is dropped per semester. If you have difficulty submitting your answers on Quest prior to the deadline for any reason, you have 24 hours to notify your High School Instructor via email or Canvas message. Your High School Instructor will extend the assignment submission window under the following circumstances: documented illness, technical issues with Quest, or internet outage. If an extension is granted, you will have two days to complete the assignment. However, after solutions are posted by your High School Instructor, no further extensions can be given. These policies are firm because of flexibility already incorporated into the Quest homework drop policy. Your High School Instructor may collect your written work for a portion of the High School grade.
    ii. Exams
        Each semester, your lowest exam grade is dropped. Units 1-4 constitute the Fall Exams, and Units 5-7 constitute the Spring Exams. The Final Exam is cumulative and cannot serve as a dropped exam.
        Missed exams due to unplanned and excused absences will count as zeroes if the work is not completed within five school days after you return to school. Makeup versions of exams will not be the same as original versions. If you know you will miss an exam for an excused reason, you are encouraged to arrange a time to take the exam before your absence.
    iii. Participation
        You will participate in at least one Peer Instruction session per week on average. They are facilitated using Learning Catalytics (LC), and you must be logged into LC in order for your responses to be recorded. You will receive 85% for participating and 15% for correctness in each response round for each question. Excused absences do not affect your participation grade. A missed LC module due to an absence will appear as a blank in the college gradebook and will not count as a zero.

b. You must earn a minimum average grade of D- on college assignments and assessments during the course eligibility period in order to be eligible for the opportunity to earn college credit. If you do not earn a D- or higher, there may be other ways you can gain eligibility. For more information about eligibility, see Section 3. College Credit below.

3. COLLEGE CREDIT

This is a college course delivered via distance education through a dual-enrollment program, which means you may earn credit for General Physics II (PHY 302L) in addition to earning high school credit.

A. Eligibility for the Opportunity to Earn College Credit

You may become eligible for the opportunity to earn college credit in two ways:

a. **Eligibility by Grade.** If you meet the minimum eligibility grade on college assignments and assessments completed during the first part of the course, you are determined eligible for the opportunity to earn college credit based on your grade.

b. **Eligibility by Texas Success Initiative (TSI).** If you do not meet the eligibility by grade criteria, you may submit proof of scores on certain standardized assessments, as outlined in the table below, to achieve eligibility by TSI.

Assessment	Subject Area	Minimum Score
TSI	Math	350
TSIA 2.0	Math	950; or Below 950 and Diagnostic Level 6
SAT	Math	530
ACT	Composite and Math	23 (Composite) and 19 (Math)

B. College Credit Decision Period

If you are eligible for the opportunity to earn college credit, you may accept or decline college credit earned during the five-day College Credit Decision Period, which will occur during a Monday – Friday window after you receive your final college grade. You will receive an email notification from OnRamps when your Credit Decision Period begins, a reminder email during the Credit Decision Period, and an email when the Credit Decision Period ends.

If you do not make a decision during the Credit Decision Period, OnRamps will determine course credit as follows:

- **C- or above.** You earned credit and *will* be issued a UT Austin transcript unless you decline credit in the OnRamps Portal.
- **D+, D, or D-.** You earned credit but *will not* be issued a UT Austin transcript unless you accept credit in the OnRamps Portal.
- **F.** You did not earn credit and will not be issued a UT Austin transcript.

C. College Transcript

If you earn and accept college credit, you may request an official UT Austin transcript through the UT Austin Office of the Registrar at the end of the academic year. You will receive an email notification from OnRamps when your transcript is available with instructions for ordering a transcript.

4. POLICY INFORMATION

A. Students with Disabilities

If you receive high-school accommodations related to a disability under the Individuals with Disabilities Education Act (IDEA) or Section 504 of the Rehabilitation Act, you may also receive certain accommodations in your OnRamps college course. Accommodations in an OnRamps course must follow accommodations in your Individual Education Plan or 504 Individual Accommodation Plan and be allowable under the university assessment practices. Accommodations are individualized and based on need and disability.

You must make your need for accommodations known to OnRamps Course Staff prior to the due date for an assignment in order to access accommodations for that assignment. You are strongly encouraged to provide information about your need for accommodations during registration at the beginning of the course or immediately following changes to your Individual Education Plan or 504.

B. Academic Integrity

OnRamps students are subject to the University's academic integrity policies. Academic integrity is honesty in your academic work. Each student in the course is expected to abide by the University's Student Honor Code:

> "As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity."

This means that work you produce on assignments and exams is all your own work, unless it is assigned as group work. The UT Austin Instructor of Record or your high school Instructor will make it clear for each assignment or exam whether collaboration is allowed. Refer to **Section 2, Part B: Assignments and Grading** for further details about assignment types in your course.

You are responsible for understanding UT Austin's Academic Honesty Policy which can be found here: https://deanofstudents.utexas.edu/conduct/academicintegrity.php
You must respond to email requests from OnRamps staff for investigations of potential academic integrity violations. If you fail to respond to email requests about potential academic integrity violations from OnRamps staff, you may receive an academic disciplinary action.

More information about academic integrity may be found in the OnRamps Orientation in Canvas.

Please note that solutions are intended for personal use only. You do not have permission to share or distribute materials, even after the instructor has made solutions available. Sharing, distributing, or posting solutions in physical or electronic format will be treated as an academic integrity violation.

C. Student Code of Conduct

As a participant in the UT Austin OnRamps program, you are expected to uphold a high standard of integrity and ethical behavior. This includes using UT Austin resources in an appropriate, ethical manner for the purpose of learning. Prohibited behavior includes:

- Unauthorized use of institutional technology and services
- Providing false or misleading information about an academic record
- Engaging in violent or disruptive conduct, including hazing, stalking, or behavior that impedes, interferes with, or disrupts any University teaching, research, administrative, disciplinary, public service, learning, or other authorized activity.

Failure to abide by the student code of conduct may result in an academic sanction or removal from the course. For more information about standards of behavior, refer to The University of Texas catalog, Chapter 11, Student Discipline and Conduct: http://catalog.utexas.edu/general-information/appendices/appendix-c/student-discipline-and-conduct/

D. FERPA

All students in OnRamps are college students and subject to the federal Family Educational Rights and Privacy Act (FERPA). As a participant in the UT OnRamps program, it is important that you understand these rights as they apply to you.

Under FERPA, university staff may not share information regarding a student's college coursework or academic standing (grade point average, academic transcript, academic probation, or discipline records).

Exceptions:

1. If the student signs a waver stating that FERPA-protected information may be released to the student's parent/guardian, university staff may share the FERPA-protected information with the parent/guardian.
2. If university staff share FERPA-protected information with high school staff, including the high school Instructor, and the student is under 18 years of age, then the high school staff may share that information with the student's parent or guardian.

3. If university staff suspect a student presents a significant risk of harm to self or others, university staff may disclose FERPA-protected information with a student's parent/guardian, high school Instructor, principal, or other appropriate authority to ensure the safety of the student and/or other individuals.

For more information about FERPA, refer to The University of Texas catalog, chapter 9, Educational Records: https://catalog.utexas.edu/general-information/appendices/appendix-c/educational-records/