

Spring 2022

PHYS 121-014: Physics II

Gareth Perry

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COURSE OUTLINE PHYSICS 121 SECTIONS 014/020 SPRING 2022

INSTRUCTOR

Dr. Gareth Perry

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Webex (for office hours and appointments): <https://njit.webex.com/meet/gperry>

OFFICE HOURS

Tuesdays 11:30 am – 12:30 pm and Fridays 2:00 pm – 5:00 pm, or by appointment, in TIER 101 (CSTR conference room) or via Webex.

CLASS SCHEDULE

Section 014 Tuesdays and Fridays, 2:30 – 3:50 pm, in CULM LECT 1

Section 020 Tuesdays and Fridays, 10:00 – 11:20 am, in KUPF 210

Delivery Mode: Face-to-Face. Delivery of instruction is structured around in-person classroom meeting times. Instruction is delivered in person and students are expected to attend class. There may be a need to switch to an online modality, depending on the conditions of the COVID-19 pandemic. For example, **instruction delivery will be synchronous online until January 30, 2022.**

Webex links for online lectures will be sent to you by your instructor.

GENERAL INFORMATION

- Description: Physics 121 is a calculus-based introduction to electricity and magnetism, emphasizing fundamental concepts and applications. It is the second course in a three-course sequence.
- Pre-requisites (all with grade of C or better): Physics 111 or 111H, and Math 111 or 111H.
- Co-requisites: Physics 121A (the lab course) and Math 112 (Calculus-II).
- Physics 121A Laboratory must be taken along with Physics 121 unless it has been passed previously. A student who drops Physics 121 automatically drops the lab (and vice versa, no exceptions). Physics 121A is otherwise a totally separate course from Physics 121 in that the lab instructors set the requirements and grades. The lab manual (Physics 121A Laboratory Manual 9th Edition) can be purchased at the NJIT bookstore. The most up-to-date lab schedule will be posted at <https://centers.njit.edu/introphysics/welcome>.

LEARNING EXPECTATIONS, GOALS, AND OUTCOMES

Students will be expected to demonstrate understanding and mastery of calculus-based classical electricity and magnetism up to AC circuits, not including Maxwell's Equations or beyond. The topics covered include electric charge, electric and magnetic fields, forces on stationary and moving charges and currents due to electrostatic and magnetic fields, electrostatic potential and potential energy, Gauss' Law, capacitance, current, resistance, DC circuits, the Biot-Savart Law, Ampere's Law, Faraday's Law, inductance, RC circuits, LR circuits, LCR circuits, AC circuits including "phasor diagrams" and resonant oscillations.

In any/all of the above subject areas, students should be able to do the following:

- Recall and use the conceptual and mathematical definitions and be able to explain them.

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- Understand the conceptual and mathematical relationships between quantities used.
- Explain and manipulate equations and techniques developed in the text, lectures, problem examples, and in the course of working problems.
- Use symmetry arguments, sketches and diagrams, graphs, algebra, trigonometry, and basic integral and differential calculus methods for reasoning about nature and in setting up and solving textbook-level problems.
- Critically evaluate the soundness and precision of their own reasoning and answers, explain and interpret their solutions to problems in a way that shows understanding, and identify and appraise the range of applicability of their results, and state the limitations of their solutions.
- Apply the skills above to successfully solve textbook-level problems with numeric, symbolic, or conceptual answers.

Learning outcomes are assessed by means of 3 common exams, a final exam, scores on homework assignments, in-class quizzes, and class participation scores.

MATERIALS FOR PHYSICS 121

- **Textbook (Abbreviation: Y&F): “University Physics”, 15th Edition, authors Young & Freedman (Pearson, 2020). We use Chapters 21 to 31 in Volume 2.** This is the same textbook used in Physics 111 Fall 2021 at NJIT (and some previous iterations of Physics 111). Most students now buy the e-text, which is bundled with the Modified Mastering Physics homework system. The ISBN is **9780135206348**. Students may also use the old 13th and 14th editions of the same text for reading assignments, as the sections numbers match. The end-of-chapter problems are numbered differently. Many students are comfortable using only the e-text.
- **Canvas Learning Management System:** Your instructor will use Canvas as a central point to post lecture notes, make announcements, and post grades. Canvas may be used for other class activities. Students will be able to access the Mastering Physics Online Homework System directly through Canvas.
- **Mastering Physics Online Homework System:** Each student must obtain an access code kit that allows access to the online homework system specifically for the 15th edition of “University Physics”. In addition to having a valid access code, each student must enroll in the Mastering Physics (MP) “course” for his/her Physics 121 section using a course identifier code supplied by each instructor. Note, your instructor may have already integrated the homework system with their Canvas page, in which case you can register directly through the Canvas system.
- Homework assignments will be posted on-line in Mastering Physics and will be automatically graded. Specific Information for the **Pearson Mastering (PM)** homework system are as follows:
 - You first create an account on the PM platform and then need a valid Pearson Mastering access code to sign up for the course.
 - **The pearsonmastering.com homework course ID is: perry82753** (Section 014) and **perry94511** (Section 020).
 - For your own reference, record the unique course identifier announced by your instructor, and your login ID and password. Instructors cannot access forgotten logins or passwords.

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GRADING

Final Letter Grades will be based on a term average of the semester's work that includes the three common exam scores, the final exam, the term's homework score, quiz scores, and participation measures for attendance (if applicable).

Final Letter Grades: Here are the approximate weights to be used for calculating the composite score:

- **48%** for all three common exams (16% each)
- **32%** for the final exam
- **10%** for the total of homework work
- **10%** for the in-class participation (canvas quizzes)

The cutoff percentages for various letter grades will be:

Percentage	Letter Grade
≥ 85%	A
≥75	B+
≥65	B
≥56	C+
≥50	C
≥45	D
< 45	F

Final grades are not negotiable: A score of 84.99% is a B+, not an A.

EXAMS

There will be three Common Exams plus a comprehensive Final Exam. The schedule is:

- **Common Exam 1:** Monday, 02/28/2022, 4:15 -- 5:45 PM
- **Common Exam 2:** Monday, 03/28/2022, 4:15 -- 5:45 PM
- **Common Exam 3:** Monday, 04/25/2022, 4:15 -- 5:45 PM

- Comprehensive Final Exam after May 6, 2.5 hours long

The final exam will emphasize the work covered after common exam 3, but also re-caps the whole course.

Note: Common Exams and Final Exam are all going to be Multiple-Choice questions. Students are going to submit exam questions and Scantron cards to be collected at the end of each exam. There is not going to be any partial credit for multiple-choice questions, however students are required to show work to support their answers.

It is the student's responsibility to take the exam in the class that is scheduled.

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In-class quizzes covering the preceding or current work may be given during lectures and/or recitations. Those scores count toward your final course grade. **There are no make-ups for in class activities.** Students missing a quiz will receive a grade of zero for that item.

MISSED EXAMS

The general policy is that students who miss a common exam will receive a score of zero for that Exam. That score will be included in the calculation of your final grade. Students that miss two common exams automatically fail the course. Students who anticipate an absence from a common exam should discuss their situation with the Dean of Students **PRIOR TO** their absence.

To be qualified to receive an "excused absence" for the common exam (a very rare occurrence), the student should present documentation for not being able to take the test as scheduled. As is the standard policy of NJIT, the student should present this document to the **Dean of Students - (973) 596-3466, Room 255 Campus Center** for evaluation. BOTH the Physics 121 instructor and Dean of Students must concur in permitting an "excused absence" for the common exam. Students who miss common exams that do not present documentation within 7 days of the common exam will receive a score of zero for the common exam.

If the above qualification is met, a separate make-up test for the missed common quiz will not be offered. Instead, the final exam grade will be considered for giving a grade for the missed test. The instructor will evaluate the final exam questions from those chapters and normalize this portion of the student's grade for the missed common exam.

Conflict common exams are usually held from 6:00 to 7:30 PM on exam days; contact Ms. Oertel (christine.a.oertel@njit.edu) for arrangements.

COURSE POLICIES

Honor Code Violations or Disruptive Behavior: NJIT has a zero-tolerance policy for cheating of any kind and for disruptive student behavior. Violations will be reported to and judged by the Dean of Students. The penalties range from failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable.

- Students are required to agree to the NJIT Honor Code on each exam.
- Turn off all phones, wireless devices, laptops, and messaging devices of all kinds during classes and exams, unless instructed otherwise.
- Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.
- Do not contact any "tutoring services" for help during an exam. This is strictly forbidden.

Attendance may be taken in all classes and will be taken for all exams. More than 3 unexcused absences (in total) is excessive. If you have excusable absences contact your instructor or the Dean of Students (973-596-3466; Room 255 Campus Center). Students may sign in only for themselves on attendance sheets; do not sign in for absent students.

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Withdrawal: If you must withdraw from the course, do it officially through the Registrar before the last withdrawal date. If you simply stop attending and taking exams your instructor will have to assign a failing grade in the course.

COURSE WORK

The Class Schedule (see below) lists the topics covered, text readings, and homework assignments, exam dates, etc. week by week throughout the term. Some details may be subject to change depending on the class schedule or other circumstances.

Be sure to do the homework problems: it is almost impossible to succeed in physics courses without working a lot of problems. It will not help to use someone else's solutions. It can help to form study groups so long as each group member participates in real discussion and independent thought.

Each weekly work unit starts with a lecture and includes a related homework assignment. The final homework submit deadline is typically about a week after material is introduced in lecture class.

- Read the assigned sections of the text before the lecture covering that material.
- Read the instructor's lecture notes before class (if provided) and bring them to class.
- Work on homework problems before they are covered in recitation and certainly before they are due.
- The Mastering Physics online system shows the applicable homework due dates and keeps track of scores.

Class Participation: Students are expected to initiate and participate in class discussions by asking and answering questions, doing quizzes, working actively with others during in-class group assignments (if applicable). When students participate in an active learning environment they become more engaged, learn more, enjoy the course more, and have better success in the course.

Help: If you are having trouble in this course visit or email your instructor; do not simply hope for a miracle and fall further behind. All instructors hold office hours (see above) and will also meet with students at other mutually convenient times.

The Physics Dept. office on the 4th floor of Tiernan has specific information on tutoring. Physics tutoring is available through the CAPE organization, and possibly elsewhere. Also, please check NJIT Physics Tutoring: <https://physics.njit.edu/physics-tutoring-sign-sheet>.

Academic Support and Students Affairs, Academic Advising Centers: These organizations assist students who need to make academic decisions, sometimes needing support to progress toward successful graduation.

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<u>Topic</u>	<u>Text Studies</u>	<u>Notes</u>
Week 01, Vectors, Intro to Fields		Instructor Notes
Week 02, Electric Charge & Force	Chapt. 21	Sec. 21.1 – 3
Week 03 Electric field		Sec. 21.4-7
Week 04, Gauss' Law	Chapt. 22	Sec. 22.1 – 5
Week 05, Electric Potential	Chapt.23	Sec. 23.1 – 5
Week 06, Capacitance	Chapt.24	Sec. 24.1– 6
Common exam 1 – Feb. 28		Covers Vectors & Fields + Ch. 21 + Ch. 22
Week 07, Current, Resistance, DC Circuits, Intro to Kirchoff's Rules	Chapt. 25 & Chapt. 26	Sec. 25.1 - 5, Sec. 26.1 – 2
Week 08, Multi-loop and RC Circuits	Chapt.26	Sec. 26.2 – 5
Week 09, Charges & Currents in Magnetic Fields	Chapt. 27	Sec. 27.1 – 8
Common exam 2 – March 28		Covers Chapters 23, 24, 25
Week 10, Sources of Magnetic Field. The Biot-Savart Law, Amperes Law	Chapt.28	Sec. 28.1- 7
Week 11, Faraday's Law of Induction,	Chapt. 29	Sec. 29.1 – 5
Week 12, Inductance, RL Circuits,	Chapt. 30	Sec. 30.1 – 6
Common exam 3 – Apr. 25		Covers Chapters 26, 27, 28
Week 13, LC & LRC Circuits, EM Oscillations, AC Circuits,	Chapt. 30 & Chapt. 31	Sec. 31.1 – 3
Week 14, Driven AC Circuits and REVIEW	Chapt.31	Sec. 31.4 - 6
Final Exam		Comprehensive Exam Chapters 21 to 31

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January	17	Monday	Martin Luther King, Jr. Day
January	18	Tuesday	First Day of Classes
January	22	Saturday	Saturday Classes Begin
January	24	Monday	Last Day to Add/Drop a Class
January	24	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	25	Tuesday	W Grades Posted for Course Withdrawals
January	31	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	14	Monday	Last Day for 50% Refund, Full Withdrawal
March	7	Monday	Last Day for 25% Refund, Full Withdrawal
March	14	Monday	Spring Recess Begins - No Classes Scheduled - University Open
March	19	Saturday	Spring Recess Ends
April	4	Monday	Last Day to Withdraw
April	15	Friday	Good Friday - No Classes Scheduled - University Closed
April	17	Sunday	Easter Sunday - No Classes Scheduled - University Closed
May	3	Tuesday	Friday Classes Meet
May	3	Tuesday	Last Day of Classes
May	4	Wednesday	Reading Day 1
May	5	Thursday	Reading Day 2

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May	6	Friday	Final Exams Begin
May	12	Thursday	Final Exams End
May	14	Saturday	Final Grades Due
May		TBA	Commencement