NJIT
New Jersey Institute of Technology

**Jordan Hu College of Science
and Liberal Arts
Department of Physics**

Course Outline	Physics 121	Fall 2025

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.
- Number of Credits: 3
- 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.

Course-Sections and Instructors:

Course-Section	Instructor
Phys 121-001	Professor O. Gokce
Phys 121-003	Professor O. Gokce
Phys 121-005	Professor W. Longley
Phys 121-007	Professor W. Longley
Phys 121-009	Professor L. Maljian
Phys 121-011	Professor L. Maljian

Phys 121-013	Professor B. Thomas
Phys 121-015	Professor O. Gokce
Phys 121-017	Professor Ch. Zhou
Phys 121-101	Professor O. Gokce
Phys 121-103	Professor Ch. Zhou
Phys 121-105	Professor Y. Chen

Office Hours for All Physics 121 Instructors: https://physics.njit.edu/students/office

Learning Expectations, Goals, 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.
- 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.** Most students now buy the e-text, which is bundled with the Modified Mastering Physics homework system. The ISBN is **0135491193**. 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.

Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system.

For your own reference, record your login ID and password. Instructors cannot access forgotten logins or passwords.

Specific Information for the enrollment in Pearson Mastering (PM) homework system is given in the pdf "Student Registration Instructions for Canvas" posted on Canvas course.

Verify Enrollment Duration: During the registration process, double-check the duration of your enrollment to ensure that it covers the entire duration of the semester.

- NJIT Canvas System: lecture notes, problems, grades, etc. are posted on Canvas (PHYS 121-). So check there often.

Grading

Final Letter Grades will be based on a **term average** for the semester's work that includes the three common exam scores, the final exam, the term's homework score, in-class quiz scores, and participation measures for attendance.

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** 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, October 06, 2025;   4:15 -- 5:45 PM
• **Common Exam 2**: Monday, November 03, 2025;   4:15 -- 5:45 PM
• **Common Exam 3**: Monday, November 24, 2025;   4:15 -- 5:45 PM

• **Comprehensive Final Exam** TBA, 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.

Quizzes

In-class quizzes covering the preceding or current work will 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.

If your instructor assigns quizzes through Canvas, you must have the Canvas app installed on your laptop. Quizzes taken remotely will not be accepted.

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. In order 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, Central King Building (CKB), Room L71 (Lower Level)** 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.

In the event that the above qualification is met, a separate make-up test for the missed common exam will not be offered. Instead, the portion of the final exam relevant to the contents of the missed test 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

It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course.

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"

- Students must affirm the NJIT Honor Code on each exam.

- Eating in the classroom is prohibited. Beverages are allowed only in containers with secure lids and must not cause distractions. Designated breaks will be provided for courses of extended duration.

- Internet use is permitted solely for accessing the instructor's course notes and the official e-textbook. All other internet activity is prohibited.

- Phones, earphones, headphones, smartwatches, wireless devices, laptops, and messaging devices are strictly prohibited during exams.

- Only calculators without wireless capabilities are permitted. Calculator sharing is prohibited.

- Unauthorized recordings of class sessions are prohibited. Students must follow NJIT's Policy for Recording Classes: NJIT Recording Policy.

- Students unable to remain in the exam room for the full scheduled duration due to a documented medical or physical condition must seek accommodation through OARS.

- Contacting or receiving assistance from tutoring services or other unauthorized sources during an exam is strictly prohibited.

- **By enrolling in this course, students acknowledge that examination rooms may be recorded to protect both the integrity of the exams and the students themselves.**

- Student use of artificial intelligence (AI) is permitted in this course as a study tool. It is not permitted to be used in exams, quizzes, and other assignments, as doing so would undermine student learning and achievement of course learning outcomes. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

Attendance will be taken at all classes and 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, Central King Building (CKB), Room L71 (Lower Level)). Students may sign in only for themselves on attendance sheets; do not sign in for absent students.
Attendance sheets are the official university documents; signing the attendance sheet on behalf of another student is considered as "Misuse of Documents". No student shall intentionally furnish false information nor shall a student forge, alter, destruct, or misuse any university documents or data.

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. 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. Some of the homework problems will usually be covered in recitation class and the final HW 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. 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 struggling with the course, do not wait for a miracle, reach out to your instructor by visiting them in person or emailing them for assistance.

Additionally, you can get support from tutors at the Physics Tutoring Center, located in CKB G12. In-person tutoring sessions will begin on **Tuesday, September 09,** and run through **Thursday, December 11, 2025** (the last day of class). The tutoring schedule will be available at: 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.

Physics 121 Class Schedule for Fall 2025

Topic	Text Studies	Notes	Recommended Problems
Week 01, Vectors, Coulomb's law	Chapt. 1 Chapt. 21	Instructor Notes Sec. 21.1-3	1.42, 1.43, 21.3, 21.4, 21.15
Week 02, Electric Field	Chapt. 21	Sec. 21.4 – 7	21.25, 21.27, 21.38, 21.40, 21.57, 21.67, 21.79, 21.83, 21.86
Week 03, Gauss' Law	Chapt. 22	Sec. 22.1 – 5	22.4, 22.9, 22.14, 22.22, 22.23, 22.29, 22.42, 22.52*
Common Exam 1 – October 06		**Covers: Vectors, Chapter 21, 22**	
Week 04, Electric Potential	Chapt.23	Sec. 23.1 – 5	23.3, 23.4, 23.8, 23.10, 23.14, 23.69, 23.71*
Week 05, Capacitance	Chapt.24	Sec. 24.1– 6	24.3, 24.4, 24.11, 24.18, 24.20, 24.23, 24.33, 24.39, 24.51
Week 06, Current, Resistance, DC Circuits, Intro to Kirchhoff's Rules	Chapt.25 & Chapt. 26	Sec. 25.1 - 5, Sec. 26.1 – 2	25.3, 25.16, 25.18, 25.32, 25.47, 25.70, 26.5, 26.7
Week 07, Multi-loop and RC Circuits	Chapt.26	Sec. 26.2 – 5	26.22, 26.25, 26.28, 26.37, 26.44, 26.48, 26.54

Common Exam 2 – November 03		**Covers: Chapters 23, 24, 25, 26**	
Week 08, Charges & Currents in Magnetic Fields	Chapt. 27	Sec. 27.1 – 8	27.1, 27.5, 27.14, 27.25, 27.33, 27.59, 27.64*
Week 09, Sources of Magnetic Field. The Biot-Savart Law, Amperes Law	Chapt.28	Sec. 28.1- 7	28.4, 28.10, 28.14, 28.21, 28.23, 28.29, 28.33, 28.38, 28.42, 28.42, 28.64
Week 10, Faraday's Law of Induction,	Chapt. 29	Sec. 29.1 – 5	29.2, 29.6, 29.7, 29.10, 29.15, 29.18, 29.22, 29.24, 29.29, 29.33, 29.48*
Common Exam 3 – November 24		**Covers: Chapters 27, 28, 29**	
Week 11, Inductance, RL Circuits,	Chapt. 30	Sec. 30.1 – 6	30.3, 30.5, 30.8, 30.11, 30.21, 30.33, 30.42, 30.60
Week 12, LC & LRC Circuits, EM Oscillations, AC Circuits,	Chapt. 31	Sec. 31.1 – 3	31.2, 31.4, 31.5, 31.5, 31.10, 31.11, 31.13
Week 13, Driven AC Circuits	Chapt.31	Sec. 31.4 - 6	31.25.31.27, 31.30, 31.36, 31.50
Week 14, Review			
Final Exam		**Comprehensive Exam Chapters 21 to 31**	

<u>* The professor will discuss changes to the syllabus during class if they arise</u>

Fall 2025 Academic Calendar

Sept	1	Labor Day. University Closed
Sept	2	First Day of Classes
Sept	8	Last Day to Add/Drop a Class
Sept	8	Last Day for 100% Refund, Full or Partial Withdrawal

Sept	9	W Grades Posted for Course Withdrawals
Sept	15	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
Sept	29	Last Day for 50% Refund, Full Withdrawal
Oct	2	Wellness Day. No Classes
Oct	20	Last Day for 25% Refund, Full Withdrawal
Nov	10	Last Day to Withdraw from Classes
Nov	25	Thursday Classes Meet
Nov	26	Friday Classes Meet
Nov	27	Thanksgiving Recess Begins. No Classes
Nov	30	Thanksgiving Recess Ends
Dec	11	Last Day of Classes
Dec	12	Reading Day
Dec	13	Saturday Classes Meet
Dec	14	Final Exams Begin
Dec	20	Final Exams End
Dec	22	Final Grades Due

Updated by Dr. E. Vataj – September 2025
Department of Physics, Physics 121 Course Syllabus, Fall 2025