



## Jordan Hu College of Science and Liberal Arts

### Department of Physics

---

#### Course Outline

#### Physics 121

#### Spring 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-Section and Instructors:

Course-Section	Instructor
Phys 121-002	Professor V. Shneidman
Phys 121-006	Professor H. Hijazi
Phys 121-008	Professor H. Hijazi
Phys 121-010	Professor B. Thomas
Phys 121-012	Professor Ch. Zhou
Phys 121-014	Professor Ch. Zhou

Phys 121-016	Professor Ch. Zhou
Phys 121-020	Professor V. Shneidman
Phys 121-022	Professor O. Gokce
Phys 121-024	Professor O. Gokce
Phys 121-028	Professor E. Vataj
Phys 121-030	Professor E. Vataj
Phys 121-032	Professor J. Opyrchal
Phys 121-102	Professor S. Piatek
Phys 121-104	Professor J. Stefan
Phys 121-106	Professor S. Piatek

**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 **9780135206348**. Students may also use the old 13<sup>th</sup> and 14<sup>th</sup> 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 (during lecture or recitation period, be prepared to have canvas app on phone, iPad or laptop. Note: Quizzes taken remotely will be disregarded and counted against you).

The cutoff percentages for various letter grades will be:

Percentage	Letter Grade
$\geq 85\%$	A
$\geq 75$	B+
$\geq 65$	B
$\geq 56$	C+
$\geq 50$	C
$\geq 45$	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, February 17, 2025; 4:15 -- 5:45 PM
- **Common Exam 2:** Wednesday, April 2, 2025; 4:15 -- 5:45 PM
- **Common Exam 3:** Monday, April 14, 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:** All Common Exams and the Final Exam will consist of multiple-choice questions. Students must submit both their completed exam and scantron card at the end of each exam. No partial credit will be awarded for multiple-choice questions. Although students are required to show their work, grading will be based exclusively on the answers recorded on the scantron card. It is the student's responsibility to ensure their responses are accurately marked on the scantron. Additionally, students must take the exam during their scheduled class time and in the assigned classroom.

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. 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 quiz will not be offered. Instead, the final exam grade will be considered for giving a grade for the missed test.

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

### **Accommodation of Disabilities**

Students who need academic accommodations in connection with a disability must initiate the request with NJIT Office of Accessibility and Resources (OARS). Students need to register with the Office of Accessibility in order to officially disclose their disability status to the College and to determine eligibility for appropriate reasonable accommodations (including any prior IEPs or 504s). Please contact OARS at the start of the semester (or as soon as possible) to coordinate any accommodation request/s: <https://www.njit.edu/accessibility/>, Room 201 (Kupfrian Hall) or email us at [OARS@NJIT.EDU](mailto:OARS@NJIT.EDU)

### **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](mailto:dos@njit.edu)**

- Students are required to agree to the NJIT Honor Code on each exam.
- Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.  
Interfering with an instructor's ability to conduct the class or the ability for other students to learn is considered as "Disruptive Conduct".

The use of any internet services other than following the instructor's course notes and e-textbook is disruptive for the instructor and the other students.

- **Students are strictly prohibited from using phones, earphones, headphones, smartwatches, wireless devices, laptops, or any messaging devices during exams.**
- Calculators without wireless capabilities are allowed during exams, but sharing calculators is not permitted.
- **Student recordings:** Unauthorized student recordings of class sessions are prohibited. If a student needs to record a class because of accommodation, they need to reach out to the Office of Accessibility Resources and Services (OARS).  
<https://www.njit.edu/registrar/njit-policy-recording-classes>
- If the student cannot be continuously present in the exam room for the entire duration of the scheduled exam for any physical/medical reason, the student needs to seek accommodation through OARS in order to take the exam separately.
- Needless to say, do not contact any "tutoring services" for help during an exam.

**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, Room 255 Campus Center). 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, January 28, and run through Wednesday, May 7, 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 Spring 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*
<b>Common Exam 1</b> <b>February 17, 2025</b>	-	<b>Covers: Vectors,</b> <b>Chapter 21</b>	
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,	Chapt.25 & Chapt. 26		25.3, 25.16, 25.18, 25.32, 25.47, 25.70,

Current, Resistance, DC Circuits, Intro to Kirchhoff's Rules		Sec. 25.1 - 5, Sec. 26.1 – 2	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
<b>Common Exam 2 – April 2, 2025</b>		<b>Covers: Chapters 23, 24, 25, 26</b>	
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*
<b>Common Exam 3- April 14, 2025</b>		<b>Covers: Chapters 27, 28</b>	
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			
<b>Final Exam</b>		<b>Comprehensive Exam Chapters 21 to 31</b>	

**\* The professor will discuss changes to the syllabus during class if they arise**



## Spring 2025 Academic Calendar

Date	Day	Event
January 20, 2025	Monday	Martin Luther King, Jr. Day
January 21, 2025	Tuesday	First Day of Classes
January 25, 2025	Saturday	Saturday Classes Begin
January 27, 2025	Monday	Last Day to Add/Drop a Class
January 27, 2025	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January 28, 2025	Tuesday	W Grades Posted for Course Withdrawals
February 03, 2025	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February 17, 2025	Monday	Last Day for 50% Refund, Full Withdrawal
March 10, 2025	Monday	Last Day for 25% Refund, Full Withdrawal
March 16, 2025	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March 22, 2025	Saturday	Spring Recess Ends
April 03, 2025	Thursday	Wellness Day - No Classes Scheduled - University Open
April 07, 2025	Monday	Last Day to Withdraw
April 18, 2025	Friday	Good Friday - No Classes Scheduled - University Closed

April 20, 2025	Sunday	Easter Sunday - No Classes Scheduled - University Closed
May 06, 2025	Tuesday	Thursday Classes Meet
May 07, 2025	Wednesday	Friday Classes Meet
May 07, 2025	Wednesday	Last Day of Classes
May 08, 2025	Thursday	Reading Day 1
May 09, 2025	Friday	Reading Day 2
May 10, 2025	Saturday	Final Exams Begin
May 16, 2025	Friday	Final Exams End
May 18, 2025	Sunday	Final Grades Due
May 19, 2025	Monday	Master's and PhD Candidate Commencement - Bloom Wellness and Events Center
May 21, 2025	Wednesday	Undergraduate Candidate Commencement - Prudential Center

*Updated by Dr. E. Vataj – January 2025*  
*Department of Physics, Physics 111 Course Syllabus, Spring 2025*