NJIT New Jersey Institute of Technology

Jordan Hu College of Science and Liberal Arts

DEPARTMENT OF PHYSICS

COURSE OUTLINE **PHYSICS 121** **Summer 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.
- 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).

Course-Section and Instructors:

Course-Section	Instructor
Phys 121-021, 9:00AM-11:50AM	Professor Y. Chen
Phys 121-121, 6:00 PM- 8:50 PM	Professor E. Vataj

Office hours will be announced in class by each section instructor

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 midterm, a final exam, scores on homework assignments, in-class quizzes.

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 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:

- **16%** Exam 1
- **16%** Exam 2
- **32%** Final Exam
- **16%** Homework
- **20%** Quizzes

The conversion of term average values to letter grades will use the following cutoff values: **85% for A, 75% for B+, 65% for B, 56% for C+, 50% for C, 45% D and F below 40%.**

Exams

- Exam 1 and Exam 2
- In class Lecture Quizzes (during recitation period, be prepared to have canvas app on phone, iPad or laptop. Note: Quizzes taken remotely will be disregarded and counted against you).

- Comprehensive Final Exam 2.5 hours long

The final exam will emphasize the work covered after the exam 1 and 2, but also re-caps the whole course.

Exam 1 & 2 and Final Exam are scheduled to be taken in person.

No online Exams will be provided.

Note: Exams 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.

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 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 exams automatically fail the course. Students who anticipate an absence from a 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 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 exam. Students who miss exams that do not present documentation within 7 days of the exam will receive a score of zero for the exam.

In the event that the above qualification is met, a separate make-up test for the missed quiz will not be offered. Instead, the final exam grade will be considered for giving a grade for the missed test.

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 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.

- Turn off all phones, wireless devices, laptops, and messaging devices of all kinds during classes and exams.

- Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.

- **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).

- 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

Students are encouraged to take advantage of their instructor's scheduled office hours for academic support.
Additional assistance is also available through the Physics Tutoring Center, located in FMH 110. In-person tutoring will be offered from **Wednesday, July 9 through Thursday, August 7, 2025**, during the following times:
Days: Monday, Wednesday, and Thursday
Hours: 12:00 PM – 6:00 PM
No appointment is necessary; students are welcome to drop in during any of the open sessions.

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PHYSICS 121 Section ___ Class Schedule for Second Summer Session 2025

	Lecture Topics and Classes	Text (Y&F) Readings	Recommended Problems
Jul 09	Lecture 01: Vectors, Intro to Fields Lecture 02: Chapter 21, Electric Charge & Force	Instructor Notes Sec. 21.1 – 3	1.42, 1.43, 21.3, 21.4, 21.15
Jul 10	Lecture 03: Chapter 21, Electric Field	Sec. 21.4 – 7	21.25, 21.27, 21.38, 21.40, 21.57, 21.67, 21.79, 21.83, 21.86
Jul 14	Lecture 04: Chapter 22, Gauss' Law	Sec. 22.1 – 5	22.4, 22.9, 22.14, 22.22, 22.23, 22.29, 22.42,
Jul 16	**Exam 1: Vectors and Chapters 21-22** (90 minutes)		
Jul 17	Lecture 05: Chapter 23, Electric Potential	Sec. 23.1 – 5	23.3, 23.4, 23.8, 23.10, 23.14, 23.69
Jul 21	Lecture 06: Chapter 24, Capacitance	Sec. 24.1– 6	24.3, 24.4, 24.11, 24.18, 24.20,24.23, 24.33, 24.39, 24.51,
Jul 23	Lecture 07: Chapter 25, Current, Resistance	Sec. 25.1 – 5	25.3, 25.16, 25.18, 25.32, 25.47, 25.70
Jul 24	Lecture 08: Chapter 26, DC Circuits, Intro to Kirchhoff's Rules Multi-loop and RC Circuits	Sec. 26.1 – 5	26.5, 26.7, 26.22, 26.25, 26.28, 26.37, 26.44, 26.48, 26.54,
Jul 28	**Exam 2: Chapters 23, 24, 25 and 26** (90 minutes)		
Jul 30	Lecture 09: Chapter 27, Charges & Currents in Magnetic Fields	Sec. 27.1 – 8	27.1, 27.5, 27.14, 27.25, 27.33, 27.59
Jul 31	Lecture 10: Chapter 28, Sources of Magnetic Field. The Biot-Savart Law, Amperes Law	Sec. 28.1- 7	28.4, 28.10, 28.14, 28.21, 28.23, 28.29,
Aug 04	Lecture 11: Chapter 29, Faraday's Law of Induction	Sec. 29.1 – 5	29.2, 29.6, 29.7, 29.10, 29.15, 29.18, 29.22, 29.24, 29.29, 29.33,

Aug 06	Lecture 12: Chapter 30, Inductance, RL, LC & LCR Circuits, EM Oscillations	Sec. 30.1 – 6	30.3, 30.5, 30.8, 30.11, 30.21, 30.33, 30.42, 30.60
Aug 07	Lecture 13: Chapter 31, AC Circuits, Resonance Review for the final	Sec. 31.1 - 6	31.2, 31.4, 31.5, 31.5, 31.10, 31.11, 31.13
Aug 11	**Final Exam: August 11**	**Chapters 21 - 31**	**Comprehensive final exam: Chapters 21 - 31**

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

Second Summer Session: July 8, 2025- August 11, 2025

Jul	8	Second Summer Session Begins
Jul	11	Last day to Add/Drop for Second Summer Session
Jul	11	100% Refund Ends
Jul	12	W Grades Posted for all Withdrawals from Second Summer Session
Jul	12	80% Refund Begins
Jul	13	80% Refund Ends
Jul	14	60% Refunds Begins
Jul	15	60% Refund Ends
Jul	16	40% Refund Begins
Jul	17	40% Refund Ends
Jul	18	20% Refund Begins
Jul	19	20% Refund Ends

Jul	22	Last day to withdraw from a class in Second Summer Session
Aug	11	Last Day of Classes – Second Summer Session
Aug	14	Final Grades Due

Updated by Dr. E. Vataj – July 2025
Department of Physics, Physics 121 Course Syllabus, Summer 2025