

Summer 2020

PHYS 121-451: Physics II

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Physics 121 Course Syllabus - Spring 2020 Version 1_1

Instructor:

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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. The topics covered are listed below.

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, 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 mid-term exams, a final exam, scores on homework assignments, and class participation scores.

Materials for Physics 121:

- **Textbook (Abbreviation: Y&F): "University Physics", 13th Edition, authors Young & Freedman (Pearson, 2012). We use Chapters 21 to 31 in Volume 2. The 13th edition is available as an E-text sold online or at the NJIT bookstore bundled with an access code good for the 13th edition homework system. The ISBN is 9780321741257. Used hard copies will be available at the bookstore and/or from online booksellers; there will be no new hard copies of the 13th edition text. Many students are comfortable using only the e-text. We are not using the newer 14th or 15th editions of this text this term.**
- **Mastering Physics Online Homework System:** Each student must obtain an access code kit that allows access to the online homework system specifically for the 13th 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 to be supplied by each instructor. Homework assignments will be posted

on-line in Mastering Physics and will be automatically graded. Specific information will be available directly from all the instructors, and/or their web sites. The access code kit must be for the 13th edition specifically.

- The older “Mastering Physics” platform that we are using (the one you may have used in previous terms) is reached for login using the following url: <http://www.masteringphysics.com>. We are NOT using the newly-introduced “Modified Mastering Physics” platform, reached through a different url.
- **Web Sites:** Instructors may post lecture notes, problems, grades, etc. on their web sites. So check there often. Janow’s web site is at <http://web.njit.edu/~janow>; check there for lectures, sample exams, grades, and more.

Grading

Final Letter Grades will be based on a **term average** for the semester’s work that includes the three mid-term exam scores, the final exam, the term’s homework score and class participation. Here are the approximate weights to be used for calculating term averages:

- 40% two mid-term exams (20% each)
- 30% for the final exam
- 10% class participation
- 20% homework.

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, and D or F below 50%.

Examinations: There will be three mid-term exams plus a comprehensive final exam. Extra credit problems will not be offered on any of these. The schedule is:

- Exam 1: Thursday, July 9, 5:45 - 8:45 PM
- Exam 2: Thursday, July 23, 5:45 - 8:45 PM
- Final Exam: Thursday, July 30, 5:45 - 8:45 PM

The final exam is cumulative. There will be no make-up exams.

Missed Exams: Students who miss an exam will receive a score of zero for that exam. Students who miss two or more exams will automatically fail the course.

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.
- Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.

Attendance will be taken at all classes. 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).

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 (page 4) lists the topics covered, text readings, and homework assignments, exam dates, etc. week by week throughout the term. Some of the information may be tailored to your own section’s 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.

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.
- **Students who do not submit homework are automatically lowering their term average by 20%.**

Practice Problems: "Practice problems" (abbreviated "PP") are posted for each week. These are the solved homework assignments from two earlier textbooks. They are referred to as **PP01** for week 01, **PP02** for week 02, etc. You can find them under Fall 2019 Physics 121 on Janow's web site (<http://web.njit.edu/~janow>).

Class Participation: Students are expected to initiate and participate in class discussions by asking and answering questions, 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.

Specific Information for the Mastering Physics (MP) homework system:

- You need a valid Mastering Physics account and access code to sign up for the course your instructor sets up on MP. The course ID is **MPSHRESTHA6506545** for you to use when enrolling in that specific class. Use your NJIT email address as the logon ID for your account. Input your name exactly as it appears on NJIT's records: last name first, followed by a comma and your first and possibly middle name. Likewise, enter your 9 digit NJIT ID where indicated.
- 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.

Tutoring:

The Physics Dept usually provides drop-in tutoring on a regular schedule (to be posted). More information will be available from your instructor or the Physics Department office on the 4th floor of Tiernan shortly after the term starts. Physics tutoring is also available through the Learning Centers.

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, Summer 2020, Course Outline

** PP = Solved practice problems posted on <http://web.njit.edu/~janow>

Chapters	Labs
Electric Charge & Electric Field	INTRO MATLAB I
	MATLAB II
Gauss' Law	200E Charge & Force
Electric Potential	201 E-field
	202 Gauss Law
Capacitance and Dielectrics	203 Potential
Exam 1, July 9, Thursday	
Current, Resistance & EM Force	205 Capacitance
DC circuits	215 Ohms Law
Magnetic Field and Magnetic Force	217 RC Circuit
Sources of Magnetic Field	212 e/m for Electron
Electromagnetic Induction	210 Helmholtz
	223 Faraday's Law
Exam 2, July 23, Thursday	
Inductance	218 RL Circuit
	221 LC Circuit
Alternating Current	
Final Exam, June 30, Thursday	