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Spring 2020

## PHYS 121-016: Physics II

Gareth Perry

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**COURSE OUTLINE**  
**PHYSICS 121 – Section 016**  
**Spring 2020**

**INSTRUCTOR:** Dr. Gareth Perry, Department of Physics, New Jersey Institute of Technology

**CLASSROOM:** TIER 108

**CONTACT:** [gperry@njit.edu](mailto:gperry@njit.edu), 973-596-5802

**OFFICE:** TIER 104C (office hours held in TIER 101)

**OFFICE HOURS:** Monday: 10 – 11 AM, Thursday: 1 – 2 PM in TIER 101 (in conference room)

**COURSE ID** (for masteringphysics.com): **MPPERRY1210120**

**PREREQUISITE** (with a grade of C or better): Physics 111 of 111H, and Math 111 or 111 H.

**COREQUISITE:** Physics 121A (the lab course) and Math 112 (Calculus II).

**FAILURE TO MEET EITHER CO-Requisites or PRE-Requisites will result in student being dropped from class.**

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 MATERIAL:** Access to electronic version of the textbook and online homework can be obtained through purchasing of: **Mastering Physics with Pearson eText -- Standalone Access Card -- for University Physics with Modern Physics (by Young & Freedman), 13<sup>th</sup> edition, ISBN 9780321741257.** This can be purchased when you sign up via [www.masteringphysics.com](http://www.masteringphysics.com).

Use: **MPPERRY1210120** when asked for the Course ID. This code corresponds to this course (and section) specifically. Note: only the card for the 13<sup>th</sup> edition will allow you the access eText and homework. You must login through masteringphysics.com (other addresses, even from the same publisher, can bring you to the wrong course). The hardcopy version of this book is out of print and is no longer offered by the publisher. This course will cover Chapters 21 to 31 in the text. 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.

Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system. Specific Information for the **Mastering Physics (MP)** homework system: you will have to create an account on the MP platform. You need a valid Mastering Physics access code to sign up for the course your instructor sets up on MP.

Dr. Perry will post lecture slides, quiz keys, and other important information on the course's NJIT canvas site.

**ATTENDANCE:** It is expected that students will attend all lectures. Attendance will be taken on a regular basis and at all exams. More than 3 unexcused absences (in total) are excessive. If you have excusable absences contact the Dean of First Year Students. If you must withdraw from the course, do it officially through the Registrar. Do not simply stop attending and taking exams: that forces the instructor to assign a course grade of "F".

**HELP:** Visit or email the instructor if you are having trouble with the course; do not simply hope for a miracle and fall behind. Make use of the Physics Tutoring Center, located in Central King Building (CKB) in Room G12. The Physics Dept. office on the 4<sup>th</sup> floor of Tiernan has specific information on tutoring as well. Physics tutoring is available through the CAPE organization, and possibly elsewhere.

**GRADING:** Your final letter grade in Phys 111 will be based on a composite score for term's work that includes the common exam scores, the final exam, lecture quizzes and the homework score.

1) **Common Exams** Three common exams will be given during the semester. The exam schedule is:

- **Common Exam 1:** Monday, February 24, 2020, 4:15 – 5:45 PM
- **Common Exam 2:** Monday, March 30, 2020, 4:15 – 5:45 PM
- **Common Exam 3:** Monday, April 13, 2020, 4:15 – 5:45 PM

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 their instructor PRIOR TO their absence. In order to be qualified to receive a "make-up" common exam score (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, this documentation should be presented to the **Dean of Students - (973) 596-3466, Room 255 Campus Center**. BOTH the Physics 121 instructor and Dean of Students must concur in permitting a "make-up" 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.

2) **Lecture Quizzes** In-class quizzes covering the preceding or current work will be given during lectures. 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.

3) **Homework** Assignments will be posted on-line using the Mastering Physics Homework System, as described on the previous page.

4) **Final Exam** A Comprehensive Final Exam will be given during the Final Exam Period.

5) **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 homework
- **10%** for the in-class quizzes

The cutoff percentages for various letter grades will be:

Percentage	Letter Grade
> 85%	A
85 - 75	B+
75 – 65	B
65 - 56	C+
56 - 50	C
< 50	D or F

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

**HONOR CODE STATEMENT:** NJIT has a zero-tolerance policy for cheating of any kind and for student behavior that disrupts learning by others. Violations will be reported to the Dean of Students. The penalties range from a minimum of 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, assignment, quiz, etc. for the course.**

Turn off all cellular phones, wireless devices, computers, 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. Creating noise or otherwise interfering with the work of the class will not be tolerated.

**LEARNING OUTCOMES:** For this course, which is the first of the introductory Physics series, you can expect to be assessed on the following learning 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, and in-class quizzes.

### COURSE SCHEDULE:

TOPIC	TEXT STUDIES	Notes
Week 1 (January 21 – 27) <i>Vectors, Intro to Fields</i> <i>Electric Charge and Force</i>	Instructor Notes Chapter 21.1 – 3	
Week 2 (January 28 – February 3) <i>Electric Fields</i>	Chapter 21.4 – 7	
Week 3 (February 4 – 10) <i>Gauss' Law</i>	Chapter 22.1 – 5	
Week 4 (February 11 –17) <i>Electric Potential</i>	Chapter 23.1 – 5	<i>Dr. Perry will be absent for the February 12 and 14 lectures. Dr. Kim is tentatively scheduled to cover those lectures. Dr. Perry will reschedule his Thursday office hours to earlier in the week.</i>
Week 5 (February 18 – 24) <i>Capacitance</i>	Chapter 24.1 – 6	
<b>Common Exam 1 – February 24</b>		<b>Covers Week 1 – 3 inclusive (Vectors and Fields, and Chapter 21 and 22)</b>
Week 6 (February 25 – March 2) <i>Current, Resistance, DC Circuits, Intro to Kirchhoff's Rules</i>	Chapter 25.1 – 5 and 26.1 – 2	
Week 7 (March 3 – 9) <i>Multi-loop and RC Circuits</i>	Chapter 26.2 – 5	
Week 8 (March 10 – 23) <i>Charges and Currents in Magnetic Fields</i>	Chapter 27.1 – 8	

<b>March 15 – 23</b>	<b>No class</b>	<b>Spring Break</b>
Week 9 (March 24 – 30) <i>Sources of Magnetic Fields. The Biot-Savart Law, Ampere's Law</i>	Chapter 28.1 – 7	
<b>Common Exam 2 – March 30</b>		<b>Covers Week 4 – 6 inclusive (Chapters 23, 24, 25, and 26.1)</b>
Week 10 (March 31 – April 6) <i>Faraday's Law of Induction</i>	Chapter 29.1 – 5	
<b>Friday, April 10</b>	<b>No class</b>	<b>Good Friday Holiday</b>
Week 11 (April 7 – April 13) <i>Inductance, RL Circuits</i>	Chapter 30.1 – 4	
<b>Common Exam 3 – April 13</b>		<b>Covers Week 7 – 9 inclusive (Chapters 26.2-5, 27, and 28)</b>
Week 12 (April 14 – 20) <i>LC and LCR Circuits, EM Oscillations, AC Circuits</i>	Chapter 30.5 – 6 and 31.1 – 2	
Week 13 (April 21 – 27) <i>AC Circuits, Resonance</i>	Chapter 31.3 – 6	
Week 14 (April 28 – May 5)	REVIEW	
<b>Final Exam</b>		<b>Comprehensive: Chapters 21 -- 31</b>