

Physics 121 Course Syllabus – Spring 2018

Prof. George Georgiou
207 Microelectronics (in bridge between ECE and FMH)
973-596-5690 (office)
georgiou@njit.edu (preferred contact method)

Section 102: Tuesday 6-9 Tier. 108

Office Hours: Tuesday 4-5:30 or by arrangement (send email)

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, or Math 132 (Calculus-I).

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 7th Edition) can be purchased at the NJIT bookstore. The most up-to-date lab schedule will be posted at <http://web.njit.edu/~smm8166>.

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 BiotSavart 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, field maps, 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 your own answers, explain and interpret your solutions to problems in a way that shows understanding, and identify and appraise the range of applicability of your results, and their limitations.
- 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 small class participation scores.

Materials for Physics 121:

Textbook (Abbreviation: Y&F):

“University Physics”, 13th edition, Young & Freedman (Pearson 2012).

We use Chapters 21 to 31 in Volume 2, which are published as bound books or 3 hole binder or E-text versions. Alternatively, you can read any textbook covering calculus-based electromagnetics. The NJIT bookstore has hard copy Y&F texts bound with the access code to Mastering Physics.

Each student must obtain an access code kit for Mastering Physics that permits use of the online homework system. Each student must enroll in the Mastering Physics (MP) course for his/her Physics 121 section (more later) using a course identifier code to be supplied by each instructor.

Any access code kit must be for the right text, specified above, so check before you buy. Also be careful where you buy the access code. Sites like Amazon sometimes sell expired codes. Codes can be safely bought at masteringphysics.com

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.

I will NOT use “iClickers”.

Rather I will use periodic in-class exams with ~2 workout problems to evaluate student understanding. These will be a percentage of your grade.

Base lecture notes and worked-out problems are available at <http://web.njit.edu/~janow>

Email will be sent if there are significant differences between what we do in class and what is in the base notes.

Email will also be the preferred communications method

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 measures of participation related to clicker use and attendance. Here are the approximate weights to be used for calculating term averages:

48% for all three common exams (16% each)

32% for the final exam

20% for the total of homework plus short in-class quizzes plus participation measures, with the total 20% value distributed at instructors’ discretion and announced during the first week of class.

The conversion of term average values to letter grades will use the following cutoff values:

- A >85%, B+ 75-85%, B 65-75% for B, C+ 56-65%, C 50-56%, D 45-50%, F <45%.

Examinations: There will be three multiple choice Common Exams plus a comprehensive multiple choice Final Exam. Extra credit problems will no longer be offered on any of these. The schedule is:

| | |
|---------------------------------------|----------------|
| Common Exam 1: Monday, February 12 | 4:15 – 5:45 PM |
| Common Exam 2: Monday March 19 | 4:15 – 5:45 PM |
| Common Exam 3: Monday, April 9 | 4:15 – 5:45 PM |
| Comprehensive Final Exam TBD May 4-10 | 2.5 hours long |

The final exam will emphasize the weeks of work after common exam 3, but also cover the whole course. In-class quizzes covering preceding or current work may also be given during lectures and/or recitations, and the grades may count toward your final course grade. There will be no make-up quizzes and normally no make-up common exams.

Missed Exams: Students who miss a common exam will receive a score of zero for that exam unless they present a valid excuse within 7 days of the exam. Students with two or more missing, unexcused common exams automatically fail the course. Students expecting to be absent from a common exam should discuss their situation with their instructor PRIOR TO their absence. Conflict makeup common exams are usually held from 6:00 to 7:30 PM on the exam day.

HOMEWORK:

Register on masteringphysics.com for [MPGEORGIU121102s18](#)

Course Policies

Attendance will be taken with the periodic in-class quiz. More than 3 unexcused absences (in total) is excessive.

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 course grade of "F".

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.

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. Be sure to do the homework problems and more. It is impossible to succeed in physics courses without working a lot of problems. It will not help to use someone else's solutions, although it sometimes helps to form study groups so long as there is real discussion and independent thought.

Each work unit begins with a lecture and includes a related homework assignment and perhaps some (optional) tutorials. The homework problems are usually covered in recitation class and the latest submit date is 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.

Base Lecture notes are available at <http://web.njit.edu/~janow>

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.

Students who do not submit homework are automatically lowering their term average.

Class Participation: Students are expected to participate regularly in class discussions by asking and answering questions. When students participate in an active learning environment engagement increases, as does understanding of the material and success in the course.

Specific Information for Mastering Physics (MP) homework system:

You will have to create an account on the MP system if you do not have one already. You can not sign up for the course your instructor sets up on MP until you have a valid Mastering Physics access code. So acquire one early and contact your instructor if this is a problem. Your instructor will announce a Mastering Physics course identifier for you to use when enrolling in your specific class. Use your NJIT email address as the logon ID for your account.

The Mastering Physics login is <http://www.masteringphysics.com>. Click on "Student" in the upper left of the box. Respond "yes" that you have an access code (create an account if you do not already have one). 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 number announced by your instructor, and your login ID and password. Instructors cannot access forgotten logins or passwords.

Help: If you are having trouble in this course visit or email your instructor; do not simply hope for a miracle and fall further behind. All instructors have office hours and will meet with students at other mutually convenient times.

Tutoring:

The Physics Dept may provide drop-in tutoring on a regular schedule (to be posted). More information will be available from your instructor or the Physics Department office (463 Tiernan) after the term starts. Don't wait to seek tutoring.

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.

Counseling:

The Center for Counseling and Psychological Services is committed to assisting students experiencing high levels of personal challenge and stress.

Physics 121 Class Schedule for Spring 2018

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

| Lecture Topics and Classes | Text (Y&F) Readings | Recitations & Assignments** (exact due dates to be announced) | Labs |
|--|---------------------------------|---|----------------------------|
| Monday, January 15 | No Class | Martin Luther King | |
| Week 01 (Tuesday, January 16) Lecture 01: Vectors, Intro to Fields | Instr. Notes | Begin HW01 and PP01 | INTRO MATLAB I |
| Week 02 (Tuesday, January 23) Lecture 02: Electric Charge & Force | Sec. 21.1 - 3 | Begin HW02 and PP02 | MATLAB II |
| Week 03 (Tuesday, January 30) Lecture 03: Electric Field | Sec. 21.4 - 7 | Begin HW03 and PP03 | 200E Charge & Force |
| Week 04 (Tuesday, February 6) Lecture 04: Gauss' Law | Sec. 22.1 - 5 +REVIEW | Begin HW04 and PP04 | 201 E-field |
| Common Exam 1: February 12 Monday, 04:15 - 5:45 P. M. | | Covers Lectures + HWs 01, 02, 03, 04 Vectors & Fields + Ch. 21 + Ch 22 | - |
| Week 05 (Tuesday, February 13) Lecture 05: Electric Potential | Sec. 23.1 - 5 | Begin HW05 and PP05 | 202 Gauss Law |
| Week 06 (Tuesday, February 20) Lecture 06: Capacitance | Sec. 24.1- 6 | Begin HW06 and PP06 | 203 Potential |
| Week 07 (Tuesday, February 27) Lecture 07: Current, Resistance, DC Circuits, Intro to Kirchhoff's Rules | Sec. 25.1 - 5, Sec. 26.1 - 2 | Begin HW07 and PP07 | 205 Capacitance |
| Week 08 (Tuesday, March 6) Lecture 08: Multi-loop and RC Circuits | Sec. 26.2 - 5 +REVIEW | Begin HW08 and PP08 | 215 Ohms Law |
| Spring Recess - March 11-18 | NO CLASS | | |
| Common Exam 2: Monday, March 19 04:15 - 5:45 P. M. | | Covers Lectures + HWs 05, 06, 07 Chapters 23, 24, 25, & 26.1 | |
| Week 09 (Tuesday, March 20) Lecture 09: Charges & Currents in Magnetic Fields | Sec. 27.1 - 8 | Begin HW09 and PP09 | 217 RC Ckts. |
| Week 10 (Tuesday, March 27) Lecture 10: Sources of Magnetic Field. The Biot-Savart Law, Amperes Law | Sec. 28.1- 7 | Begin HW10 and PP10 | 212 e/m for Electron |
| Monday April 2 | | Last Day to Withdraw | |

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| Week 11 (Tuesday, April 3) Lecture 11: Faraday's Law of Induction | Sec. 29.1 - 5 +REVIEW | Begin HW11 and PP11 | 210 Helmholtz |
| Common Exam 3: Monday April 9 Monday, 04:15 - 5:45 P. M. | | Covers Lectures & HW 08, 09, 10 Chapters 26.2-5, 27, 28 | - |
| Week 12 (Tuesday, April 10) Lecture 12: Inductance, RL Circuits (normal Monday Lectures) | Sec. 30.1 - 4 | Begin HW12 and PP12 | 223 Faraday's Law |
| Week 13 (Tuesday, April 17) Lecture 13: LC & LCR Circuits, EM Oscillations, AC Circuits | Sec. 30.5 - 6 Sec. 31.1 - 2 | Begin HW13 and PP13 | 218 RL Ckts. |
| Week 14 (Tuesday, April 24) Lecture 14: AC Circuits, Resonance | Sec. 31.3 - 6 | Begin HW14 and PP14 | 221 LC Ckts. |
| Tuesday, May 1 | NO class | Friday Schedule | 221 LC Ckts. |
| Reading Days: Wed-Thurs. May 2-3 | No classes | Review Sessions | |
| Final Exam: after Reading Day | | Comprehensive final exam: Chapters 21 - 31 | |

Spring 2018 Calendar

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|-------------|--|
| January 16 | Tuesday First Day of Classes |
| January 22 | Monday Last day to Add / Drop Class. Last day to Withdraw with 100% Refund |
| March 11-18 | Sun-Sun SPRING RECESS – NO CLASSES (University Open) |
| March 30 | Friday Good Friday – NO CLASSES (University Closed) |
| April 2 | Monday Last day for Withdrawal |
| May 1 | Tuesday Last Day of Class, Friday Classes Meet |
| May 2-3 | Wed. – Thurs. Reading Days |
| May 4-10 | Fri. – Thurs. FINAL EXAM Period |
| May 12 | Saturday Final Grades Due. |

Common Exams

PHYS 121

Monday 4:15-5:45pm – 2/12/18, 3/19/18, 4/9/18