Physics 119: Introductory Calculus-based Electromagnetism and Quanta: Lecture/Studio Format
Fall 2017

Lecture: Phillips Hall 215
M and W: 9:05-9:55 AM
Midterms: Phillips Hall 215
Select Fridays: 9:05-9:55 AM

Studio: Phillips Hall 206
M and W: 10:10 AM-12, 12:20-2:10, and 2:30-4:20
Friday Q&A: Phillips Hall 215
9:05-9:55 AM

Physics Tutorial Center:
Phillips Hall 237
Additional Help M-F

Lecturer: Dr. W
Office: Phillips 182
jweinber@physics.unc.edu
Office Hrs: Tuesday 10-12AM and by appt.

Studio Instructors:
(501) Ben Levy and Nick Konz
(502) Dr. Mersini-Houghton and Travis Broadhurst
(503) Brandon Yurst and Josh McKenney
Office Hours on Sakai

Course Description:

Physics 119 is the second semester of a calculus-based introductory physics course. Course content includes fundamental principles of electricity and magnetism: Coulomb's law, Gauss's Law, Ampere's law, and Faraday's law. Together, they constitute Maxwell's equations, which lead to electromagnetic oscillations and waves, and make possible eerie behavior such as diffraction and interference. We will also talk about electrical circuits, which manipulate charge flow, and about optics, which is the manipulation of E&M waves. The course will then shift to modern physics, covering introductory quantum theory, including particle-wave duality, Heisenberg's uncertainty principle, and the Schrödinger wave equation. This course uses an instructional format called lecture-studio. In this format, laboratory and recitation are fully integrated and synchronized to the lectures in a setting that fosters cooperative and hands-on learning. Except for exams, you will be working in small groups to complete your tasks. The format of this course is identical to that of PHYS 118.

Pre and co-requisites

PHYS 116 or 118 and concurrent MATH 233 or permission of the instructor

Course Objectives:

1. Identify the basic physical quantities and units of electricity, magnetism, optics, and quantum mechanics;
2. Understand the physical concepts and laws of electricity, magnetism, and optics, as well as the basic principles of quantum mechanics and their applications.
3. Apply the physical concepts and laws to qualitative physics problems;
4. Use mathematical and logical reasoning to analyze and solve quantitative physics problems; and
5. Explain and interpret the results of solving physics problems and relate the calculated results to measured experimental results.

Class schedule:

The instructor reserves to right to make changes to the syllabus, including assignment due dates and test dates. These changes will be announced as early as possible. A separate daily schedule is posted on Sakai with additional information.

Course Format:

Lecture sessions – There will be two 50-minute lectures, consisting of demonstrations, traditional instruction, discussions, in-class voting questions, and collaborative problem-solving. Students are required to bring their iClickers to **all** lectures, and to finish reading assignments and warm-up exercises in advance of lecture. Lecture attendance is expected and will

be tracked via responses to clicker questions. Students will **not** be penalized for incorrect answers during lecture. At the end of the semester, we will drop one day of attendance scores. This will include excused absences.

On Fridays, students can attend an optional Question and Answer problem solving session during the standard lecture time/location.

Carolina students have diverse backgrounds and we understand that some students have already taken similar physics classes and may not want to attend each lecture. For the lecture section, we will use the highest of your lecture attendance (clicker) grade or your final exam score as your lecture attendance grade. **Please Note: the instructors will make announcements during lecture that may not be posted online. If you decide to forego lecture, it is your responsibility to get the announcements.**

Studio sessions – There will be two, 2-hour studio sessions each week. Students will be divided into groups of three and almost all activities will be performed in these groups. The groups will be assigned and may be changed by the instructors after each midterm exam. Students are expected to come to studio having completed their warm-up assignments, and will complete hands-on activities (various labs), problem-solving activities (long recitation style questions and shorter group worksheets), and conceptual questions. Data, results, summaries and conclusions are to be recorded in your lab notebooks, and reports of various kinds will be submitted throughout the term for credit. Specific instructions will be provided for each studio section and will be posted to Sakai. The Lessons tab on Sakai details each studio's plans. Studio attendance is required for all students.

Course Expectations:

- Follow the attendance policy
- Adhere to the Honor Code and the Campus Code (http://studentconduct.unc.edu/students/rights-responsibilties)
- Be prepared for class. This includes reading the appropriate text material, completing warm-up assignments **before class** (on MasteringPhysics) and completing all assignments (homeworks on MasteringPhysics as well as laboratory assignments) by their due dates; and
- Participate actively in lecture and studio sessions.

Required Materials:

"Physics for Scientists and Engineers: A Strategic Approach" 4th ed. (with Modern Physics) by Randall Knight

- ISBN-13: 978-0-133-94265-1

MasteringPhysics: http://masteringphysics.com

- Course ID: MP119FallWEINBERGWOLF2017

i>clicker + or **i>clicker2: http://www1.iclicker.com/student-response-devices**

- Available at the bookstore or on-line – we will not allow the use of i>clicker GO for smartphones or laptops during lecture

Scientific or graphing calculator

- Cells phones, tablets and any device that can connect to the Internet cannot be used as a calculator and are forbidden to be visible during an exam. Student caught violating this policy should expect to receive the maximum punishment allowed by the University, including (but not limited to) receiving an F on the exam.

Lab book: Quad-ruled (quadrille) notebook for labs: 8"x10", ~90 sheets (sewn binding)

- You may continue using your lab book from 116 or 118 if it is less than half filled

MasteringPhysics:

Homework will be assigned on a regular basis via MasteringPhysics. **No late homework will be accepted.** Each module has an associated homework assignment with six problems plus additional (no credit) practice problems. The practice problems can be used for exam studying or additional practice at any time throughout the semester. At the end of the term, we will drop your lowest homework score.

In addition, you will find WarmUp assignments on MasteringPhysics. These warmups should take approximately 15 minutes to complete and comprise multiple choice and short answer questions. These quick check-ins are designed to check your reading comprehension of the textbook and preparation for any lab activities in studio. These are due before each lecture class at 8:00 AM and will cover material needed for both the lecture and its associated studio. **No late warm-ups will be accepted.** At the end of the semester, we will drop your lowest two warm-ups.

While both types of assignments are found in the same MasteringPhysics course, only those labeled "Homework" will be averaged together for the homework component of the semester grade. The WarmUps are worth much less in your final grade calculation and contribute to your participation grade.

Reading:

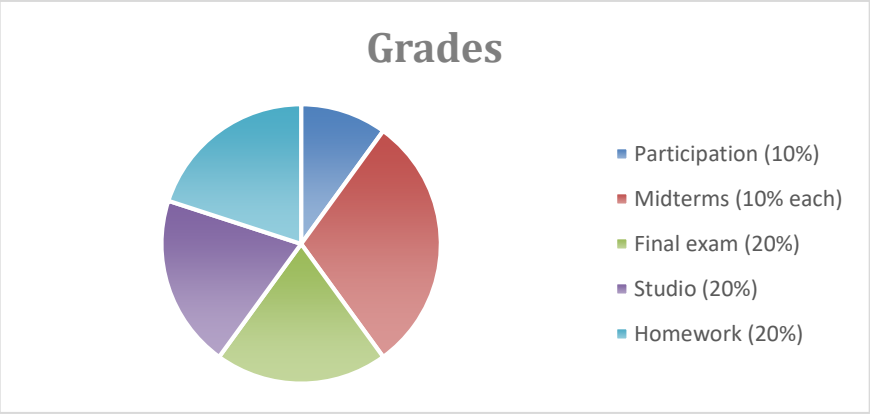
There will be a reading assignment from the textbook for each lecture. You are expected to read the assigned sections of the textbook before coming to lecture, since all of the activities that day will be based on the assumption that you have read the assignment. Please see Sakai's General Resources for tips on reading the text book efficiently and effectively.

In Studio Work:

The "laboratory" and "recitation" portions of this course are integrated and synchronized with the lecture portion of the course. Mini-labs (tangibles) and problem-solving activities (ponderables) will be performed in nearly every studio session. Raw data, notes, and results are to be recorded in your lab notebook. You will submit ***one*** full individual lab report during the semester; the remainder of the activities will have shorter write-ups, such as summaries, abstracts, or worksheet style questions and responses. These deliverables will be a mix of individual and group work. Conceptual questions will routinely be asked in class and responses will be polled and discussed. Your participation in studio will be graded daily – actively working with your group members on data collection and problem-solving will ensure a perfect participation credit grade. Students with perfect studio attendance may still get less than 100% on participation for issues such as arriving late, leaving early, off-topic cell phone or computer use, or not cooperating with group members.

Late Policy:

Unless you have made arrangements with Dr. Weinberg-Wolf prior to the due date or have a university excused absence, you will lose ***10 percentage points*** on studio assignments not turned in at the specified time on the due date. An additional 10 percentage points will be deducted for every 24 hours period past the due time. Assignments more than 5 days late will not be accepted.



Exams:

To encourage cooperative learning, each member of a studio assigned group that earns an **average** *of 85 or better on a mid-term exam will receive a 5-point bonus on that exam.*

There will be 3 midterm exams (with a short practicum component in the studio near the exam date) and 1 final exam for the course. The midterms will be on **Fridays: September 22nd, October 13th, and November 10th, from 9:05-9:55 AM.** The final exam for the class is on **Saturday, December 9th from 8-11 AM**. The final exam will be cumulative.

The three midterm exams will take place during lecture class-time on Fridays. You will be tested on material from all aspects of the course. The studio preceding each midterm (Weds, Sept 20th, Oct 11th, and Nov 8th) will include an approximately 30-minute **practicum** related to studio activities as part of each midterm exam (worth 25% of each midterm exam grade). The three in-class midterm exams will be closed-book. We will provide a sheet of constants, common integrals, and important equations for each exam. That sheet of useful information is also available for you to see in advance on Sakai. Use of calculators is permitted in all exams. No cell phones are permitted under any circumstances.

GRADING SCALE

A 93-100
A- 90-92
B+ 87-89
B 83-86
B- 80-82
C+ 77-79
C 73-76
C- 70-72
D+ 67-69
D 60-66
F 59 and below

NO ROUNDING

Grading is based on demonstrated mastery of the course objectives. We will not grade on a curve and **you are not competing with your classmates for a limited number of A's and B's.** In principle, if everyone achieves the requirements for an A, then everyone will earn an A! However, previous experience suggests that this is unlikely, and our department encourages instructors to aim for a median grade of B-/C+ so that about half the students in a course will likely receive grades of A or B. Consequently, the level of difficulty of the course is structured with this in mind.

Attendance/ make-up policy:

Valid excuses include:

- Severe illness with doctor's note
- Participation in University-sanctioned event with supporting documentation.
- Travel for other classes

Pre-planned personal trips or family vacations are not valid excuses.

Students who miss lecture or studio sections must fill out the Excused Absence Request form (posted on Sakai) and deliver it to Dr. W with supporting documentation. Students who submit the required documentation and are excused from lectures or studio by the instructors will not be penalized for missed assignments. However, **there are no make-up lectures, or studios**, and the student is responsible for understanding the missed content. For excused absences only, make-up exams may be taken the Monday following an exam day at 7AM. This excused absence **must be** arranged in advance with the instructors of the course. Oversleep? It occasionally happens even to the best of us! Contact your instructor ASAP and take the exam during the makeup time with an automatic 20% deduction.

Unexcused absences will result in a score of zero for any lecture attendance or studio activities of that date. Only students with exceptional excuses will be allowed to take the Final Exam at a time different from that scheduled, and an Academic Dean must grant permission. Polices regarding this are available in the Undergraduate Bulletin

Instructional Philosophy:

Through this course, you will have the opportunity to analyze the physical world around you and improve your critical thinking skills. The instruction for this course places significant emphasis on qualitative physical reasoning as an important foundation to quantitative problem solving. Numerous studies conducted over multiple decades have consistently pointed to the same conclusion: No matter how eloquent or entertaining we are lecturing, you won't learn much unless your mind is actively engaged with the material. Achieving this level of active engagement is virtually impossible if all we do is lecture at you. Therefore, you should expect that there will be daily collaborative group activities during both lecture and studio. These collaborative activities are designed to actively engage you and your classmates with the material and help prepare you for the exams. **We expect you to bring a pen or pencil, paper, and your iClicker with you to every lecture.** Laptops in lecture are not required and will be actively discouraged.

Note that the instructors will act more as "coaches" who facilitate student learning, as opposed to "lecturers" who transmit knowledge without necessarily requiring thought or action on the part of the students. Since the instructional focus is on learning rather than teaching, students are expected to take more responsibility for their own learning than might be required in a more traditional lecture format. At the same time, frequent course assignments are designed to keep students "on track" through the learning process. To the extent possible, the instruction is aimed to meet a variety of learning styles. Performing the required reading and warm-up exercises will be essential for your success in this class.

Most students who take this introductory physics course will not pursue advanced physics degrees. Consequently, you will not be required to memorize lots of physics equations, but you will be required to comprehend and apply physics concepts to a variety of situations. The reason that many students find physics difficult is that it goes **beyond** memorization by requiring higher level thinking skills. Learning physics is also like learning a foreign language since new words and symbols must be understood and applied correctly within the context of various physical situations. To this end, a variety of teaching techniques will be used throughout the semester. Mastery of physics is also a bit like learning a musical instrument – you must practice, practice, practice to build problem solving skills. You will find helpful information about the course in general and study tips on Sakai.

Science is a group activity. Active, current physics research is done in experimental/theoretical and computational research groups and in collaborations of many different sizes. Working in groups will help you develop skills that will benefit you throughout life. By discussing the concepts and problems with others you will discover alternative ideas and solutions. You will also have the opportunity to teach others what you have learned. Nothing tests your understanding of an idea better than trying to explain it clearly to someone else. You are strongly encouraged to study together!! However, any work submitted individually for a grade must be your own work. Any group assignments will receive group grades.

Honor Code:

Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code: http://studentconduct.unc.edu/students/rights-responsibilities

In this course, you will often be collaborating with other students, so you will be sharing data, results and ideas. However, you are encouraged to think independently before comparing results, and any written conclusions that are submitted independently and not as a group, must be in your own words.

Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's life and work. If you have any questions about the Honor Code, please consult with someone in the Office of the Student Attorney General or the Office of the Dean of Students.