

# General Physics III

Spring 2016

PHYS 283

Tuesday, Thursday, 2:00 – 3:15 pm

LaTourette Hall (Faraday West) Room 200

## **Instructor:**

Professor George Coutrakon

Office: Faraday Hall 218

Office hours: Tuesday 3:30 – 4:30 pm & Thursday 3:30 – 4:30pm.

email: [gcoutrakon@niu.edu](mailto:gcoutrakon@niu.edu)

## **Course description:**

Classical optics, special relativity, theory of quantum mechanics (QM) using calculus and simple differential equations. Applications of QM to atomic and solid state physics will also be included.

## **Web site:**

There are two websites for this class. General course information is available on Black Board web site <http://www.webcourses.niu.edu>. The class is also using an on-line homework system provided by Pearson education called “MasteringPhysics”. You can access this web page through <http://www.masteringphysics.com/>. In order to use the mastering physics page you need to either purchase an access code (about \$66) or use the free access code that came with your textbook. You can also purchase the access code and an electronic copy of the textbook for about \$110. We need to start with Ch. 34 and Ch.35 which is not in Vol. 3 textbook but is available for the \$110 e-text. If you purchased the book for a previous class such as 253 or 273 your code should still be valid. Once you have an access code you need to enroll in this class with the course code COUTRAK283.

## **Prerequisites:**

Math 230 (Calculus II), and Phys 273 (General Physics II, Electricity and Magnetism)

## **Textbook:**

Physics for Scientists and Engineers with Modern Physics, 4<sup>th</sup> edition, by Giancoli. We will be covering the third volume (Chapters 36 – 40) as well as two chapters from volume 2 (Chapters 34 and 35). If you do not already have volume 2 from PHYS 273, you can save money by just printing chapters 34 and 35 from the e-text available on the MasteringPhysics page.

## **Homework (HW):**

There will be weekly homework assignments assigned through “Mastering Physics”. Homework will generally not be accepted late without a very good reason. Occasionally, the student may have given the correct answer which MP did not recognize. These are reviewable by me. Do not panic. Print your answers out and submit to me by hand.

Students are also expected to read the chapter or section from the textbook indicated on the syllabus for each week before attempting the problems on that section.

I will transfer grades from MP to Black Board about every 5 weeks and you should check for accuracy when they are transferred.

**Grading:**

The approximate weighting of grades is given below.

Homework	50%
Exams (2):	25%
Comprehensive Final Exam:	25%

Grades will be on the +/- system and will be based on the total point score for HW and tests. The grading curve will have the mean grade between B- and B+ depending on my evaluations of HW and test scores. For example, last semester the mean total score was 69.5 out of 100 total weighted points and this mean score was at the border between B- and B. After the curve is established, there will be a grade adjustment based on attendance. This adjustment is designed to increase the grade by 1/2 of a letter grade for those students reasonably close to the next higher grade if their attendance is more than 80%. There will be a corresponding penalty for attendance less than 60%. Students arriving more than 15 minutes late will not get credit for that day's attendance. Cell phone usage is not allowed during class.

**Exams and final exam:**

The exam dates will be posted on the Announcements in Blackboard. For Fall 2015 the 2 mid term exams will be on Sept. 24 and Nov. 5th. Only material covered up to the exam date will be included. Students should bring a calculator and #2 pencil(s) to all exams. Cell phone calculators are not acceptable. Students may also bring one page of handwritten notes single sided for midterm exams, double sided for the final exam. All relevant equations will be supplied at the time of the test. No other materials are allowed. Students who miss an exam with a valid written excuse from a doctor, ROTC officer or sports coach may take a make-up exam. Make-up exams may not be the same exam the rest of the class took.

**Final exam:**

The final exam will cover all topics for the semester and will be given in December at the time assigned by the university.

**Cheating:**

Students found to have cheated on exams will receive a grade of F for that exam. Cheating on attendance will result in a 4% drop in the grade total. All incidents or suspected incidents of cheating will be reported to the university judicial office.

**Incomplete grades:**

Incompletes will only be given under extraordinary circumstances such as extended illness or call-up to active military duty.

**Students with disabilities:**

Academic accommodation will be provided as detailed on the Disability Resource Center web page: [http://niu.edu/disability/accessibility\\_statement/index.shtml](http://niu.edu/disability/accessibility_statement/index.shtml). In addition, students requesting accommodation are strongly encouraged to contact me early in the semester.

### Tentative Calendar:

	Tuesday		Thursday	
Jan	19	Optics (Ch.24)	21	Optics (Ch. 34)
	26	Optics (Ch. 34)	28	Optics (Ch. 35)
Feb	2	Optics ( Ch. 35)	4	Optics (ch. 35)
	9	Michaelson Morley Exp	11	Relativity (Ch36)
	16	Relativity ( Ch. 36)	18	1st Midterm Exam
	23	Relativity (Ch.36)	25	Relativity (Ch.36)
March	1	Relat. And Energy units	3	Early Quantum (Ch.37)
	8	Early Quantum (Ch. 37)	10	Early Quantum ( Ch. 37)
	22	Early Quantum(Ch.37)	24	Quantum (Ch 38)
	29	Quantum (Ch. 38)	31	Quantum (Ch. 38)
April	5	Quantum ( Ch. 39)	7	2nd Midterm Exam
	12	Atomic physics (Ch. 39)	14	atomic physics(ch.39)
	19	atomic physics(Ch.39)	21	Solid State (Ch.40)
	26	Solid state (Ch.40)	28	Solid State ( Ch. 40)
May	3	Review	5	Review
Finals	10	Final exam		

Final Exam May 10, Spring Break is week of March 15.

## How to Succeed in the Course

**Study textbook/class notes and work problems at least 6 hours per week. These are difficult topics which cover over a dozen Nobel Prize winning experiments. It takes concentration and time to get the concepts and apply them to problem solving. Work on problems with a partner only after trying them yourself. Work some extra odd number problems in Giancoli that have solutions in the back. Use the help desk or see me if you are having trouble with concepts or problems. The test questions will be similar in nature to the HW problems, so they are good to review before tests.**

Your goals for the course should be:

- 1) To understand the concepts which form the basis of modern physics; specifically relativity and quantum mechanics.
- 2) To understand the applications of these concepts to particles, nuclei, atoms, molecules and solids.
- 3) To obtain ability to set up the conceptual picture for problem solving and perform numerical calculations of quantities related to these concepts.
- 4) To use critical thinking to solve non-trivial problems related to modern physics.

The lectures, textbook readings, and homework problems are all designed to help you achieve these goals. Homework counts for 50% of your grade and is the most important part of learning and comprehension. It is also the best preparation for exams. Homework answers will be posted as soon as the homework is due. Late homeworks will only be accepted with a medical excuse signed by a physician with appropriate dates.

The hardest part of this course is mastering goal 4. Here are a few hints:

- 1) Don't just read the book; understand what you are reading. This means reading a little and then stopping and thinking about what you just read. Make notes of your own on paper and re-derive equations on paper to test your comprehension.
- 2) Read each chapter at least twice. You will be amazed at how much easier the chapter seems the second time you read it through.
- 3) Don't ask for help with the homework problems, but, rather, ask for help with the concepts you need to do the homework problems.
- 4) Give yourself enough time. You should expect to spend a minimum of 6 hours a week outside of class: 50% time reading/studying the material and 50% time solving assigned problems.
- 5) Persevere and study with classmates; particularly in solving problems. Some aspects of this course are difficult so you should work with someone that you can discuss problems with.
- 6) Have fun! I wouldn't be teaching this course if I didn't love modern physics. It's one of the greatest intellectual achievements of the modern age. There is a lot of really cool stuff here.