

# General Physics III

Fall 2018

PHYS 283

Monday, Wednesday , 3:30-4:45 pm

LaTourette Hall Room 200

## Instructor:

Professor George Coutrakon

Office: Faraday Hall Room 218

Office hours: Monday and Wednesday 1:00-2:00 pm

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**Textbook:** *Physics for Scientists and Engineers with Modern Physics* by Debora Katz, 1<sup>st</sup> edition. Chapters 35-42 will be focus of this course

## 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:

General course information is available on the NIU Black Board web site <http://www.webcourses.niu.edu> . The class will be using an on-line homework (HW) system provided by Cengage Learning called WebAssign. The WebAssign is integrated with Black Board so that you can create your account and access the WebAssign HW within Black Board. Cengage recommends going to the two video links to see how to get started. A video and Guide book are available using the following links

<https://play.vidyard.com/dAtEqvNNpKTogGj75zGtau>

[https://embed.widencdn.net/pdf/plus/cengage/kzimgyiizd/gui\\_webassign-bb-stu-quick-guide.pdf?u=c8lcjz](https://embed.widencdn.net/pdf/plus/cengage/kzimgyiizd/gui_webassign-bb-stu-quick-guide.pdf?u=c8lcjz)

In order to use WebAssign, you need to either purchase an access code that includes an electronic version of the text book (for about \$75, for the single term version) or use the access code that came with your textbook. Once you have an access code you need to enroll in this class through the Phys 283 Black Board page. Note there is also a 2 week grace period that allows you to start using WebAssign for HW before you make the purchase. That 2 week grace period will end Sept. 7.

## Prerequisites:

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

**Homework (HW):**

There will be weekly homework assignments through WebAssign that you can access from the NIU Black Board website. Homework will generally not be accepted late without a very good reason. Students biggest mistake is waiting to the last day to start the HW or forgetting to check due dates. For consistency, I will make all due dates either on Tuesday night or Friday night. Occasionally, the student may have given the correct answer which WebAssign 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 as shown in Black Board under Weekly Materials for the week it is being covered. It is never a good idea to attempt problems without reading the material first.

**Grading:**

The approximate weighting of grades is given below.

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

Grades will be on the +/- system and will be based on the Weighted Total point score in Black Board which includes all HW and three exams. In past semesters the grading curve had the break point between B- and C+ at or near the mean of all the Weighted Total scores for the class. For example, one semester the mean Total Weighted score was 69.5 out of 100 total weighted points and this mean score was at the border between B- and C+. 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 70%. Students arriving more than 15 minutes late will not get credit for that day's attendance. Cell phone usage is not allowed during class. One final important point, In order to get a at least a B-, you must have an average score on the 3 exams above 50%. No exceptions.

**Exams and final exam:**

The exam dates will be posted on the Announcements in Blackboard and in class. 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 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:** Note that midterm exam dates may change and will be announced 2 weeks before each exam.

	Monday	Wednesday
Week 1	Introductions and Optics (Ch.35)	Optics (Ch. 35)
Week 2	Optics (Ch. 35)	Optics (Ch. 36)
Week 3	Optics ( Ch. 36)	Optics (ch. 36)
Week 4	Michaelson Morley Exp (Ch36.6)	Relativity (Ch. 39)
Week 5	Relativity ( Ch. 39)	1st Midterm Exam
Week 6	Relativity (Ch.39)	Relativity (Ch.39)
Week 7	Relativity And Energy units	Early Quantum (Ch.40)
Week 8	Early Quantum (Ch. 40)	Early Quantum ( Ch. 40)
Week 9	Early Quantum(Ch.40)	Quantum (Ch 41)
Week 10	Quantum (Ch. 41)	Quantum (Ch. 41)
Week 11	Quantum ( Ch. 41)	2nd Midterm Exam
Week 12	Atomic physics (Ch. 42)	atomic physics(ch.42)
Week 13	atomic physics(Ch.42)	atomic physics(Ch.42)
Week 14	Solid state ( assigned reading)	Solid State
Week 15	Review	Review
Week 16	Final Exam Week	

Test dates subject to change. See instructor for uupdates.

## 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 and theories. It takes concentration and time to get the concepts and apply them to problem solving. Study examples in the text and work on problems with a partner only after trying them yourself. Work some extra odd number problems that have solutions in the back. Use the help desk, FH Room 251, or see me if you are having**

**trouble with concepts or problems. The test questions will be similar in nature to the HW problems and/or book examples, 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 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. Late homework 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) Study the examples. Similar problems are likely to appear on exams, just like HW problems.
- 3) Read assigned chapter sections twice. You will be amazed at how much easier the chapter seems the second time you read it through.
- 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.