Welcome!

Physics 211
General Physics II
(Spring 2018)

This syllabus and course information can be found on Blackboard
Some practical information

• Classes **Tues/Thurs 11-12:15 in FW 200**
• College Physics (Giambattista, Richardson), 4th edition 2012 is the **required** textbook (full version or just volume 2)
• **PHYS 210 or 253** prerequisite
• We will cover chapters **16-27** this semester
Sections (for lab, all in Faraday 103):

**210A**: Wednesday 6-8:50 pm

**210B**: Monday 6-8:50 pm

**210C**: Wednesday 9-11:50 am

**210D**: Friday 12-2:50 pm

**210E**: Wednesday 12-2:50 pm
Aim for students (that would be you!) to:

1. Develop an understanding of the basic concepts and principles in physics.
2. Develop critical thinking skills and a scientific approach to problem solving.
3. Develop and use mathematical formulations of physical principles.
4. Prepare for the MCAT and other professional exams.
More specific course topics

1. Electricity!
2. Magnetism!
3. Light and special relativity!
4. Early quantum physics!

Note that in the interest of time we will not cover every subject in every chapter, and we may not finish the last chapters of the book. If you are taking this course for a professional exam, I strongly encourage you to study the extra material.
1. **Electricity (Chapters 16-18)**
   i. Describe the actions of like and unlike charges near each other.
   ii. Use Coulomb's law to find the force on a charge.
   iii. Define electric field, field lines, and equipotential lines.
   iv. Describe the relationship between electric potential and electric field.
   v. Find the stored charge and energy on one or more capacitors in a circuit.
   vi. Describe the differences between an open circuit, closed circuit, and equivalent circuit.
   vii. Identify batteries, resistors and capacitors in a circuit diagram.
   viii. Use Ohm's law and and Kirchhoff's rules to find unknown voltages or currents in a circuit.
   ix. Define the relationships between current, voltage, and electrical power.
   x. Describe the behavior of a circuit with resistors and capacitors.
2. Magnetism and AC (Chapters 19-21)
   i. Describe the magnetic field around a magnetic dipole and a wire with current.
   ii. Find the force on a charged particle moving in a magnetic field and electric field
   iii. Use Ampere's law to find the magnitude of a magnetic field.
   iv. Describe the principles behind motors, generators, and transformers.
   v. Use Faraday's law and Lenz's law to find the induced emf and current in a wire
   vi. Identify inductors and ac power sources in a circuit diagram.
   vii. Define reactance, impedance and resonance in an AC circuit.
3. **Electromagnetic waves, light and optics (Chapters 22-25)**

   i. Identify the regions of the electromagnetic spectrum.
   ii. Find the energy stored in an electromagnetic field.
   iii. Describe polarization and its effect on intensity.
   iv. Define the relationship between light waves and rays.
   v. Identify the speed of light and its relation to the index of refraction.
   vi. Use Snell's law and the laws of reflection to find the angle of a light ray due to refraction and reflection.
   vii. Find the size and location of an image formed by a mirror or lens.
   viii. Describe the principles behind compound optical instruments.
   ix. Define refractive power in diopters and magnification.
   x. Find points of constructive and destructive interference.
   xi. Describe the difference between interference and diffraction.
4. Special relativity and early quantum physics (Chapters 26-27)
   i. Use the Lorentz factor to find the changes in measured time and distance.
   ii. Apply special relativity to find energy and momentum.
   iii. Describe the photoelectric effect and the photon.
   iv. Define the electron volt and Planck's constant.
   v. Use the Bohr model of the atom to find the energy of emitted and absorbed photons.
Phew!

We’ll keep busy this semester :)

Reminder of last semester (PHYS210)

A bunch of stuffy-looking old white dudes from a long time ago
Now what are we moving towards

• More modern physics!
• The language that we learned, the tools and the mathematical ideas that we studied last year, will continue to prove very useful this semester
• The material here covers relevant physics for our every-day lives!
Computers
Wireless communication
RUHE-EKG / 2 + 5s

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<tr>
<th>Parameter</th>
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<tr>
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<td>Behand. Arzt:</td>
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<tr>
<td>QRS Dauer</td>
<td>98ms</td>
<td>Systemauswertung:</td>
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<tr>
<td>QT/QTc</td>
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<td>Verdacht auf linksvent. Hypertrophie</td>
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<td>weil vergrößerte Summe aus R in [V5] + S in [V1] und</td>
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<td>18/25 ms</td>
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weil vorzeitiger formveränderter Schlag  
Sinustachykardie  
weil HF > 100 pro Minute und normale P-Wellen  
wohlbräuchlich abnormes EKG
Lasers for medicine, military and industry
MRI machines
Grading

• Problem sets every ~1 week, each with the same weight: combined total, 10% of grade
• Lab reports and lab work, with schedule and rules posted separately, 25% of grade
• Short online quizzes (to make you read the appropriate material in advance!) due before each we start each chapter in class, 5% of grade
  • Quizzes allow us to focus on problems, not basic material
• Tests: 4 per semester (3 + final), in class, schedule on syllabus, total of 60% of grade (exam 1: 10%, exam 2: 15%, exam 3: 15%, final: 20%)
  • Except for final, not explicitly cumulative, but you will need to master one set of skills before you will do well on your future exams. And skills from PHYS210 will be important
See lab syllabus - however, two important things to note:

(1) If you do not get a minimum of 60% on your total lab score, you will not be allowed to pass the larger course, even if you get a perfect score on everything else.

(2) It is up to you to ensure that your assignments are handed in correctly and received by the TA - when in doubt, email the TA!
On the homework

- Will be using McGraw-Hill Connect, connected to blackboard, for the homework
- You should make sure to sign up and that you can access the homework **AS SOON AS POSSIBLE**
- Let me know if you run into troubles
- MH-Connect can be … finicky. If you think your assignment was not graded correctly, **don’t panic**
  - Take a screenshot (showing that it’s your work) and come to office hours or send to me by email
  - **It is YOUR responsibility** to ensure that it is handed in and graded (you can take screenshots, with dates to be safe)
- Sign up using your NIU student email address to ensure correct synch to blackboard
  - If you still have trouble, contact McGraw-Hill. I can always synch your grades manually every few weeks
On the homework

SIGN UP ASAP

On the homework

• All due as on the syllabus
  • I will often but not always announce this in class - it’s up to you to stick to the schedule
  • Start the HW early! If you get stuck and need help, please go to the physics help room, ask your lab TAs, or talk to me
  • NO late homework will be accepted without penalty
    • Scores reduced by 10% for each day late except last assignment (chapter 26), when late homework not accepted. (No chapter 27 HW)
• It’s your responsibility to remember to hit the submit button and to check that it’s received!
On the homework

- Some of the homework questions will be relatively easier, some of the questions will be relatively harder
- That is OK! The homework is designed to make you think about the concept that we’re using. Not all of it should be easy!
- All homeworks get equal weight (and thus not all homework problems if one week has more problems or fewer problems)
On the quizzes

• Late quizzes are not accepted (defeats the point)
• All quizzes get equal weight (same idea as for HW)
• The idea is that you should read the book in advance of us covering a chapter or subject
  • This way, I spend less time regurgitating the book and more time going over interesting problems
  • We’ll generally go over the text quickly and then try and do extra problems, with some occasional problems from the book, too
  • I will try and focus more this semester on extra problems - READ THE BOOK
• As with HW, your responsibility to check that it is received, not mine
On the quizzes (aside)

- There is a lot of research on how best to teach physics
  - It is easier to learn than to teach!
  - **Large body of research evidence** shows that if you carefully **read the book in advance**, you will pick up more from the lectures and class time, and will do better in the course
- Quizzes are a way to motivate you to read the chapters before the appropriate class
  - I encourage you to email me when you finish the quizzes (before class) if a specific topic is unclear. You can always come to office hours, but I can also try and go over specific topics in class, as appropriate
On the quizzes (last note on them!)

We have no quiz for the first chapter (16), but I strongly encourage everyone to read it ASAP so that it’s easier to follow along as we go over the material! No reason to fall behind early
On the exams

- There will absolutely be no make-up tests, and tests cannot be taken at a different time for any reason unless you document this at the beginning of the semester (such as if you are an athlete).
- In the case of convincing and well-documented emergencies the missed test grade may be waived, however, do not assume this is automatic.
- I need to see some convincing evidence of a valid, good emergency. Faking an emergency is worse than missing an exam, and will be brought to the attention of the appropriate NIU personnel as potential academic misconduct.
Studying for the exams

• I posted the relevant questions from the Review and Synthesis for each exam as problems that you can do
  • They will of course not be used to calculate your grade in any way
  • These are a good way to study, and you can go over the MCAT problems in those sections, too
• Also suggest going over problems from class
• Can also go over non-assigned homework problems from the book
• And also go over assigned homework and quizzes
• Ask for help if any of the above are unclear!
On electronics

- No electronic devices of any kind allowed during tests
  - Calculators the sole exception during exams (but only a calculator, nothing beyond that), definitely useful to have, let me know if you do not have one
  - If you are spotted with your phone or other electric item out during an exam, you fail it
- It’s fine to use electronics during the course, as long as it is not distracting to me or to other students (if it is, I will ask you to stop)
- You can take a single “cheat sheet” of material with you to each exam, but no other paperwork
• Cell phones need to stay in your pocket and be turned off during class
  • If your phone rings, we will know it was you. It is distracting and thus unfair to your fellow students
• No texting or using your phone, anyway
  • I reserve the right to take points off of future exams if I spot you breaking this policy, even if only in class and not during the exam
• This is a serious subject - just avoid it at all costs!
• If you are spotted cheating on an exam, appropriate measures will be taken up with the Office of Community Standards and Student Conduct (this is serious, folks!)
• Plagiarism on lab reports is an equally serious offense. We will be using SafeAssign for your lab reports. This will spot your plagiarism, and you will be held accountable for it
Grading

• I reserve the right to curve the exams to improve grades, but do not consider it as guaranteed, and do not bother to ask for it

• After weighting components as listed previously, the grades will be:
  • A: 90-100%
  • A-: 85-90%
  • B+: 80-85%
  • B: 75-80%
  • B-: 70-75%
  • C+: 65-70%
  • C: 60-65%
  • D: 50-60%
  • F: 50% or less
Office hours

• Office Hours: Faraday 219, 12:30-1:30 pm Tuesday/Thursday, or by appointment
• Preferred method of communication: email (jahred.adelman@niu.edu)
  • You can always try and stop by, but you will have better luck if you set up an appointment or come during the above times
• I am not on campus every day
Attendance and class

• You should come to every class (shouldn’t need to ask this of you, but I state it anyway)
  • Please avoid food in the classroom as much as possible
  • Bottles and cans of liquid are OK (no straws!) so that we can all stay hydrated, but is otherwise disruptive to me and to others
  • Talk to me privately if this is a problem
• Would prefer that you pay attention in class to what I say instead of trying to write down every single thing on slides
More info on the labs

• If things are unclear, please ask for help! (You can ask me, or your TA, or one of the other TAs)
• Read the lab syllabus carefully
• You are expected to remain in the lab for the entire 2 hours 50 minutes
  • TAs will use extra time for recitation and going over additional problems
  • Do not plan on leaving early. Your TAs will inform you when it is OK to leave. If you leave early, you may not receive participation points for the lab
• Those acting in a disruptive or disrespectful manner can have points removed from lab grade
• Questions? Ask!
The plan of action: We’ll go over a full chapter of material without stopping or hopefully pausing for too many breaths, and when we finish (if there is time left before we have to move on), we’ll play with some animations and/or do some extra practice problems on the board.

BUT feel free to interrupt to ask questions, either by raising your hand or just shouting out
You should be checking your email and blackboard at least once per day

"I don’t check my email" or “I didn’t see that message on blackboard” are not valid excuses.

If you have trouble with homework, or with class, or with lab, it’s your responsibility to contact me and/or your lab TAs as far in advance as possible. Informing us early of troubles will do you a lot more good than not informing us or informing us after-the-fact.
<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter we’ll be covering during class (or exam)</th>
<th>Homework/quizzes (Due before class begins)</th>
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<td>EXAM 1 (Chapters 16-18)</td>
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| Nov 21     | **Exam 3 (Chapters 22-25),**

**NOTE: YOU ARE EXPECTED TO BE HERE EVEN THOUGH IT IS JUST BEFORE THE BREAK**

   | HW Chapter 25                                                                 |                                                      |
|------------|--------------------------------------------------------------------------------|-----------------------------------------------------|
| Nov 28     | 26                                                                             | Quiz Chapter 26                                      |
| Nov 30     | 26                                                                             |                                                     |
| Dec 5      | 27                                                                             | Quiz Chapter 27                                      |
| Dec 7      | 27                                                                             | HW Chapter 26                                        |
| DEC 12     | **Final exam (Chapters 16-27), 10-11:50 am**                                   |                                                     |
If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or drc@niu.edu. Also, please contact me privately as soon as possible so we can discuss your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.

My aim is for you to enjoy this course and to learn the material - please let me work with you so that we can achieve our goals.
About me

• I answer to “Jahred”, “Professor Adelman”, “Professor Jahred”, “Dr Adelman”, “Dr Jahred” and occasionally “Professor Dr. Adelman”, if needed

• But I **may not** answer to “hey you” or to emails that do not have an appropriate greeting (such as “Hello XYZ” or “Greetings, ABC”, etc)
For those who do not know me, I’m a particle physicist working on searches for new physics with Higgs bosons using the ATLAS experiment at the LHC (at CERN).

Ask me after class or during office hours about my research. I like to talk about it :)
I’ll try to update my teaching style as the semester goes on, based on my experience, observations and your feedback.

If I am going too fast... or too slow, or if my style (or handwriting) is incomprehensible, please speak up.