

Welcome!

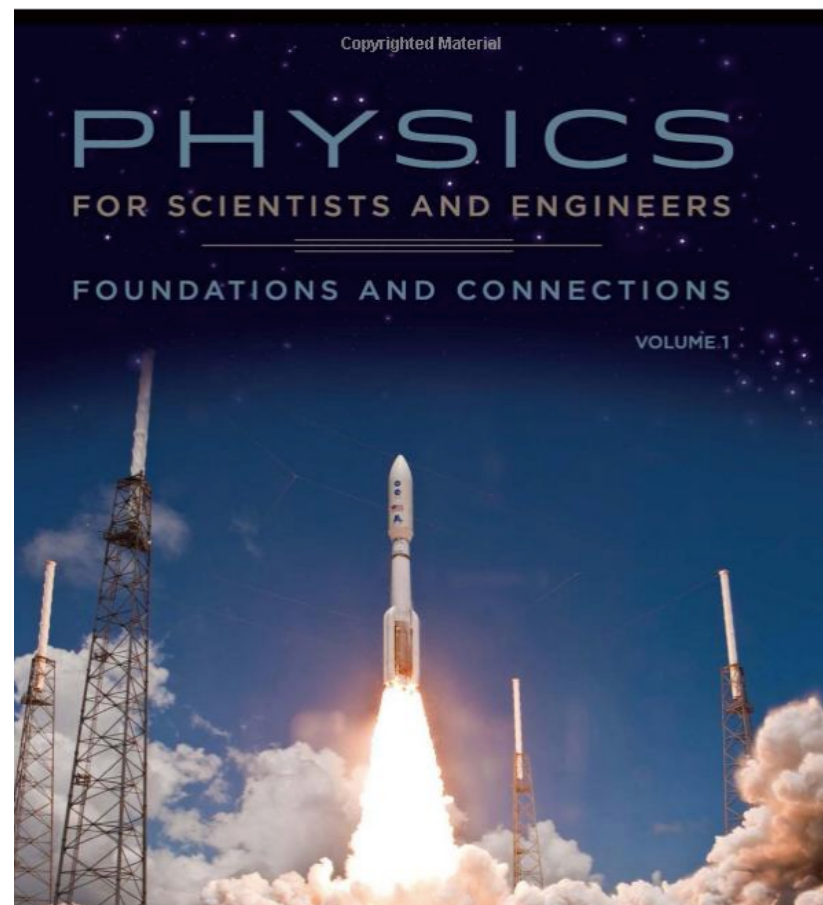
# Physics 253: Fundamentals of Physics I (Fall 2018)

This syllabus and course information can be found on Blackboard

## Some practical information

- Classes **MWF 12-1250 pm in Faraday 143**
- Physics for Scientists and Engineers: Foundations and Connections (Katz), 1st edition is the **required** textbook (full version or just volume 1)
- WebAssign account **mandatory**
- Best option is to purchase Cengage Unlimited, since it is an e-book that also comes with the **required WebAssign account**
- We will cover **chapters 1-14** this semester

Co-requisite:  
**MATH 229**



## **Sections (for lab, all in Faraday 233):**

**253A / 253AH:** Thursday 9:00 am - 11:50 am

**253B / 253BH:** Monday 6:00 pm - 8:50 pm

**253C / 253CH:** Tuesday 9:00 am - 11:50 am

**253D / 253DH:** Wednesday 9:00 am - 11:50 am

**253E / 253EH:** Tuesday 3:00 pm - 5:50 pm

**253F:** Thursday 6:00 pm - 8:50 pm

**253G:** Thursday 3:00 pm - 5:50 pm

1. How to talk and problem-solve like a physicist
2. The laws of motion (mechanics!)
3. Conservation laws (more mechanics!)

## 1. How to talk and problem-solve like a physicist

- i. Use significant figures and orders of magnitude to make estimates of physical quantities
- ii. Apply dimensional analysis to an equation involving units of length, time and mass
- iii. Use graphs and tables to record and read data
- iv. Use addition, subtraction, and scalar multiplication of vectors
- v. Convert vectors between angle/magnitude and component form

## 2. The laws of motion

- i. Give examples of Newton's three laws of motion in physical situations
- ii. Identify weight, normal force, tension, static friction and kinetic friction in mechanical problems
- iii. Draw a vector force diagram in two dimensions, and convert to component equations
- iv. Define position, displacement, velocity and acceleration
- v. Use one-dimensional kinematic equations for constant acceleration to solve for an unknown variable
- vi. Solve equilibrium and dynamic problems with inclined planes and pulleys
- vii. Use kinematic equations in two dimensions to solve for quantities in projectile motion

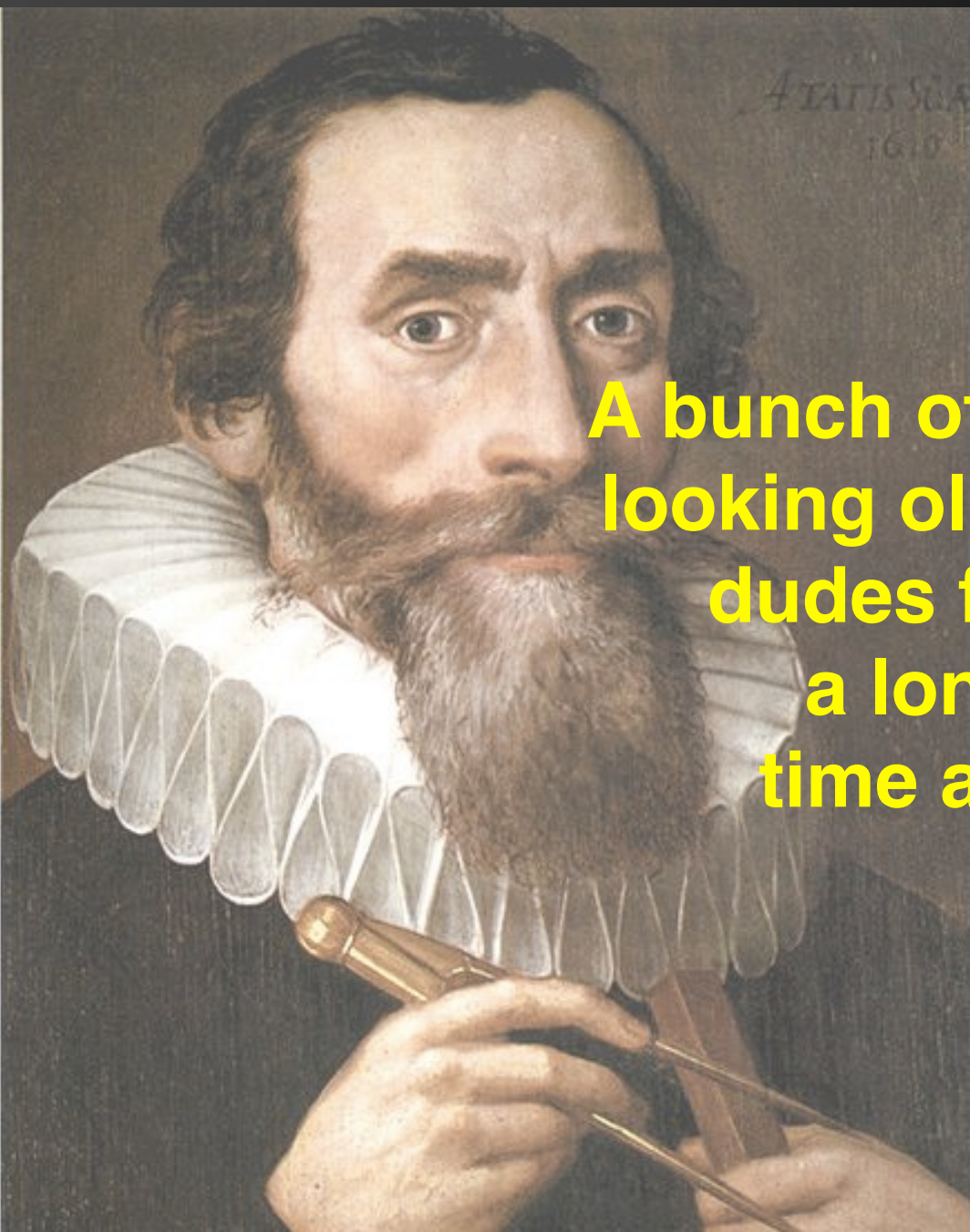
## 3. Conservation laws

- i. Define angular velocity, angular acceleration & centripetal force
- ii. Solve problems of horizontal and vertical circular motion
- iii. Give examples of Kepler's laws of planetary motion
- iv. Define work, kinetic energy, potential energy, and power and their relationships
- v. Solve equilibrium and dynamic problems with a spring
- vi. Identify conservative forces in mechanical problems and find the potential energy
- vii. Define momentum and impulse
- viii. Calculate the center of mass of a system of discrete masses or a simple symmetric object
- ix. Apply the conservation of momentum to solve problems of collisions between two objects
- x. Define torque, moment of inertia, and angular momentum and the relationship between them
- xi. Solve problems involving wheels rolling without slipping
- xii. Apply linear and rotational equilibrium conditions to solve statics problems

We'll keep busy  
this semester :)



# Starting out with mechanics - why study this?



**A bunch of stuffy-looking old white dudes from a long time ago**



- But... classical mechanics underlies all of newer, more modern physics
- The class will teach you key tools necessary for electricity and magnetism in the next course
- The material here also covers relevant physics for our every-day lives!

← → ↻ [www.symmetrymagazine.org/article/august-2014/lhc-physicist-takes-on-new-type-of-collisions](http://www.symmetrymagazine.org/article/august-2014/lhc-physicist-takes-on-new-type-of-collisions)



[signal to background](#)

August 21, 2014

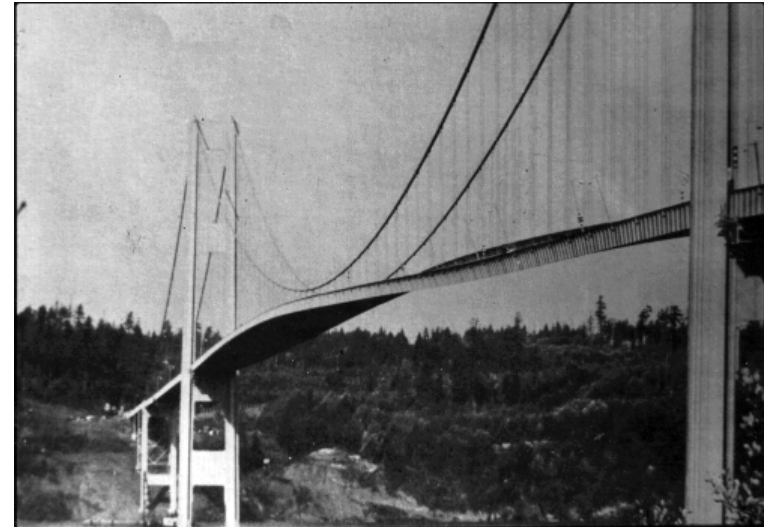
## LHC physicist takes on new type of collisions

A former Large Hadron Collider researcher brings his knowledge of high-energy collisions to a new EA SPORTS NHL hockey game.

Courtesy of EA SPORTS

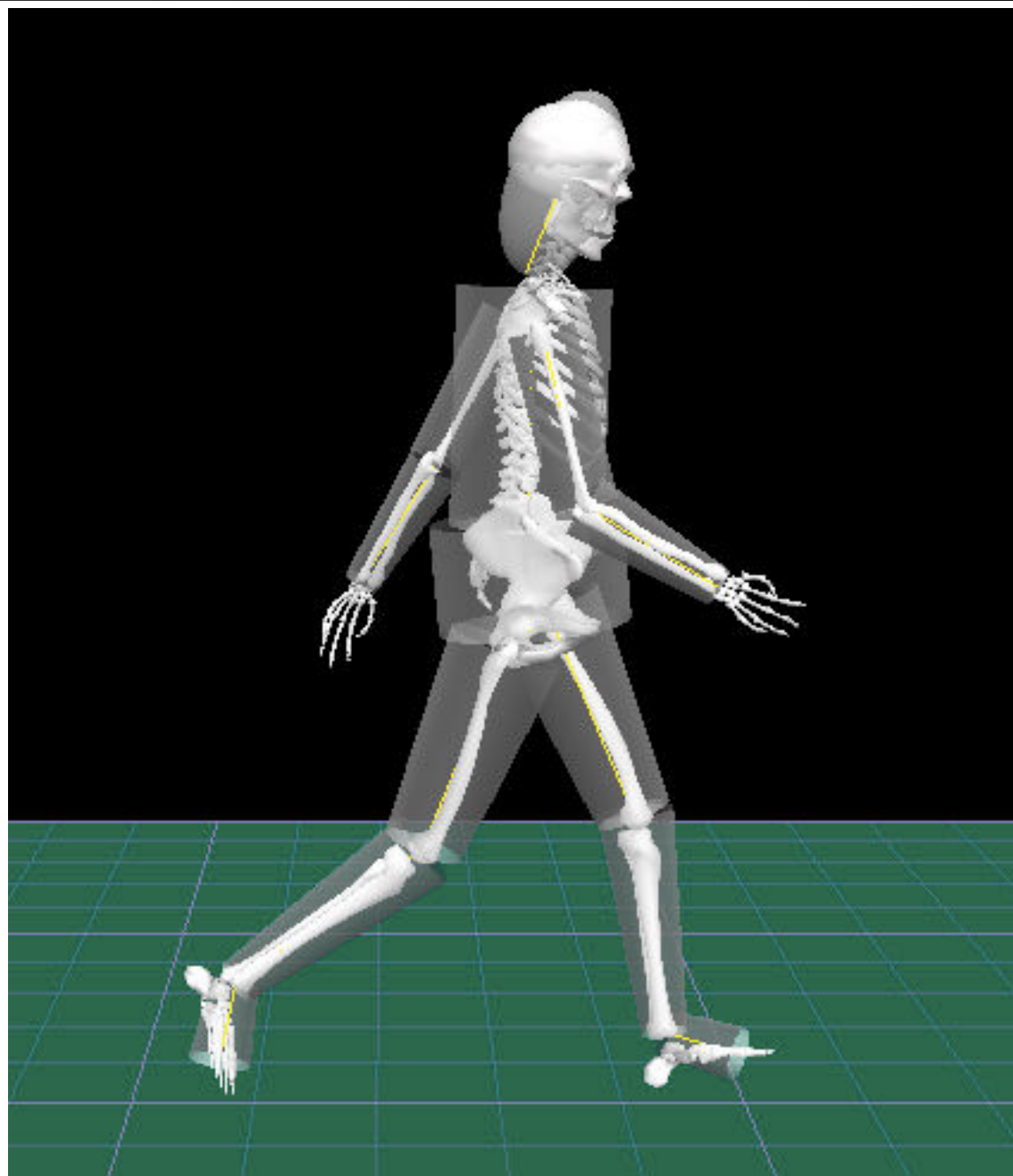
<http://www.symmetrymagazine.org/article/august-2014/lhc-physicist-takes-on-new-type-of-collisions>





[http://upload.wikimedia.org/wikipedia/commons/1/19/Tacoma\\_Narrows\\_Bridge\\_destruction.ogg](http://upload.wikimedia.org/wikipedia/commons/1/19/Tacoma_Narrows_Bridge_destruction.ogg)











- Problem sets every ~1 week, each with the same weight: combined total, 5% 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 65% of grade (exam 1: 10%, exam 2: 15%, exam 3: 15%, final: 25%)
  - Note on exams: you will need to master one set of skills to do well on your future exams. Final is cumulative (entire course)

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 WebAssign, 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
- 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 WebAssign and Cengage. I can always synch your grades manually every few weeks

- 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, when late homework not accepted
- It's your responsibility to remember to hit the submit button and to check that it's received!

- 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)

- 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
  - How to do well on quizzes? **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



## Class structure

- We have several Learning Assistants (LAs) in the classroom with us this year! **Let's meet them now**
- This class is not going to be a usual physics course. You should all have a **group number** randomly assigned to you in Blackboard
  - New to the course and don't have one? It's OK, but **email me**
- You are expected to sit with your group every class. **Let's organize this now by group number**
  - We'll aim to **finalize groups** by the beginning of next week

# Class structure

- Every chapter in class (which you will **read in advance before doing your quiz!**) will begin with a **short** lecture by me on the first day, and problem-solving or short lectures every class after that
- We will have at least 20 minutes of group work every class. You are expected to discuss and to work with your group together, and to submit answers together.
  - **Bring paper, pens, pencils and calculators to class**
  - Ideally at least one person in every group has a working phone or laptop? If not, let me know
  - Answers to be submitted via google forms that are linked to blackboard. If you need to upload photos, you can do that, too

# Class structure

- While you work on problems, the LAs and I will roam the room to help you out and to check on your progress
  - We don't expect to see you checking your **Instagram** feed or **Snapchatting** with a friend across the room. If we do, I reserve the right to deduct points for your class grade
- Have trouble working in your group? I hope not, but if so, please let me and/or the LAs know ASAP
- The Google form will include questions on attendance. We expect you to be honest - if you are not, and we find out, I reserve the right to deduct points for your class grade
- There is one form per chapter, so you can submit multiple times each chapter, but one submission per group per day (you should be working together)

- How will your prof use the google forms?
  - **Answer 1**: To check attendance if needed
  - **Answer 2**: To make you work on problems. I can use answers to determine if the class is having trouble on a specific type of problem
- The goal of the in-class problem solving is to get you to become good, efficient problem solvers? Why?
  - **Answer 1**: So you can be good physicists and engineers
  - **Answer 2**: So you can do well on the exams

- What do I do if we're stuck on a problem?
  - **Answer 1:** Discuss and work on it as a group. Pause and think and scribble
  - **Answer 2:** Raise your hand and get the attention of one of the LAs or me
  - **Answer 3:** Work on another problem and come back to this later
  - **Answer 4:** Bring it up later during office hours or the help room or with your TAs before or after lab!
- How do I work in a group?
  - **Answer 1:** Together, always

- What happens if we don't submit work?
  - **Answer 1**: It is a sign that you are not taking this work seriously, and likely won't do well on the exams or in the class
  - **Answer 2**: I reserve the right to deduct points from everyone in your group
  - **Answer 3**: I am not setting time limits or asking you to finish a certain number of problems each day because this is for your benefit and (until the exam) you should work at your own group pace. But you should expect to submit some answers every day

We have no quiz for the first chapter, 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

- 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



- 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
- Lots of useful electronic resources
- 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). And it's needed for filling out google forms
- You can take a **single** "cheat sheet" of material with you to each exam, but no other paperwork

- Cell phone ringers need to be turned off during class, and shouldn't be used during lecture
  - 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, other than for filling out answers
  - 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

## On cheating and plagiarism

- Cheating on in-class work is silly. You aren't getting graded, so all you are doing is hurting yourself
- 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

- 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: Faraday 219, 1-2 pm Monday and Wednesday (just after class), or by appointment
- Preferred method of communication: email ([jahred.adelman@niu.edu](mailto: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)
  - I will see attendance from the google forms, and will be much more open to working with you if you have troubles if you have been coming to class
- 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

## 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!



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, your group or with lab, it’s your responsibility to contact me and/or your lab TAs and/or the LAs 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

# Tentative schedule

Date	Chapter we'll be covering during class (or exam)	Homework/quizzes (Due before class begins) and Exam
Aug 27	1	
Aug 29	1	First Quiz (How to Use WebAssign)
Aug 31	2	Quiz Chapter 2
Sept 5	2	
Sept 7	2	Homework Chapter 1
Sept 10	3	Quiz Chapter 3
Sept 12	3	Homework Chapter 2
Sept 14	4	Quiz Chapter 4

Date	Chapter we'll be covering during class (or exam)	Homework/quizzes (Due before class begins) and Exam
Sept 17	4	
Sept 19	4	Homework Chapter 3
Sept 21	<b>EXAM 1 (Chapters 1-4) in class, Homework Chapter 4 due before class</b>	
Sept 24	5	Quiz Chapter 5
Sept 26	5	
Sept 28	5	
Oct 1	5	
Oct 3	6	Quiz Chapter 6

Date	Chapter we'll be covering during class (or exam)	Homework/quizzes (Due before class begins)
Oct 5	6	Homework Chapter 5
Oct 8	<b>EXAM 2 (Chapters 1-6) in class, Homework Chapter 6 due before class</b>	
Oct 10	7	Quiz Chapter 7
Oct 12	7	
Oct 15	7	
Oct 17	8	Quiz Chapter 8
Oct 19	8	
Oct 22	8	Homework Chapter 7

Date	Chapter we'll be covering during class (or exam)	Homework/quizzes (Due before class begins)
Oct 24	9	Quiz Chapter 9
Oct 26	9	
Oct 29	9	Homework Chapter 8
Oct 31	10	Quiz Chapter 10
Nov 2	<b>EXAM 3 (Chapters 7-9) in class, Homework Chapter 9 due before class</b>	
Nov 5	10	
Nov 7	10	
Nov 9	11	Quiz Chapter 11

# Tentative schedule

Date	Chapter we'll be covering during class (or exam)	Homework/quizzes (Due before class begins)
Nov 12	11	
Nov 14	11	Homework Chapter 10
Nov 16	12	Quiz Chapter 12
Nov 19	12	Homework Chapter 11
Nov 26	12	
Nov 28	13	Quiz Chapter 13
Nov 30	13	
Dec 3	13	Homework Chapter 12

Date	Chapter we'll be covering during class (or exam)	Homework/quizzes (Due before class begins)
Dec 5	14	Quiz Chapter 14
Dec 7	14	Homework Chapter 13
Dec 10	<b>10-11:50 am FINAL (Chapters 1-14, Comprehensive)</b> Homework Chapter 14 posted for practice, but will not count towards final grade when it is computed	



## Disability statement

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](mailto:drc@niu.edu). Also, please contact me privately as soon as possible so we can discuss your accommodations. Please note that you will not be required to disclose your disability, only your accommodations. The sooner you let me know your needs, the sooner I 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 :)



## About me

- 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

