College Physics I: 1511
Mechanics & Thermodynamics

Professor Jasper Halekas
Van Allen Lecture Room 1
MWF 8:30-9:20 Lecture

Announcements

- No Labs or Discussions Week One!
  - Labs and Discussions will both start next week

This Week

- Today: Syllabus Day!
- Wednesday: Math Review
- Friday: Displacement/Velocity/Acceleration

Why Physics?


$F = Ma \rightarrow a = \frac{F}{M}$
Release
Start
$d = l\alpha$
$v^2 = 2ad$
$R = \frac{v^2 \sin(2\theta)}{2g}\left(1 + \sqrt{1 - \frac{2\Delta h g}{v^2 \sin^2\theta}}\right)$
$M = 0.1\,kg,\ g = 9.8\,m/s^2$
$\Delta h = 0.5m,\ R = 8m,\ \theta = \frac{\pi}{4}$
$l = 0.5m,\ \alpha = \frac{\pi}{4}$
$\therefore F = \ldots$
POW!
PHYSICISTS ALWAYS LOSE SNOWBALL FIGHTS.
www.foxtrot.com
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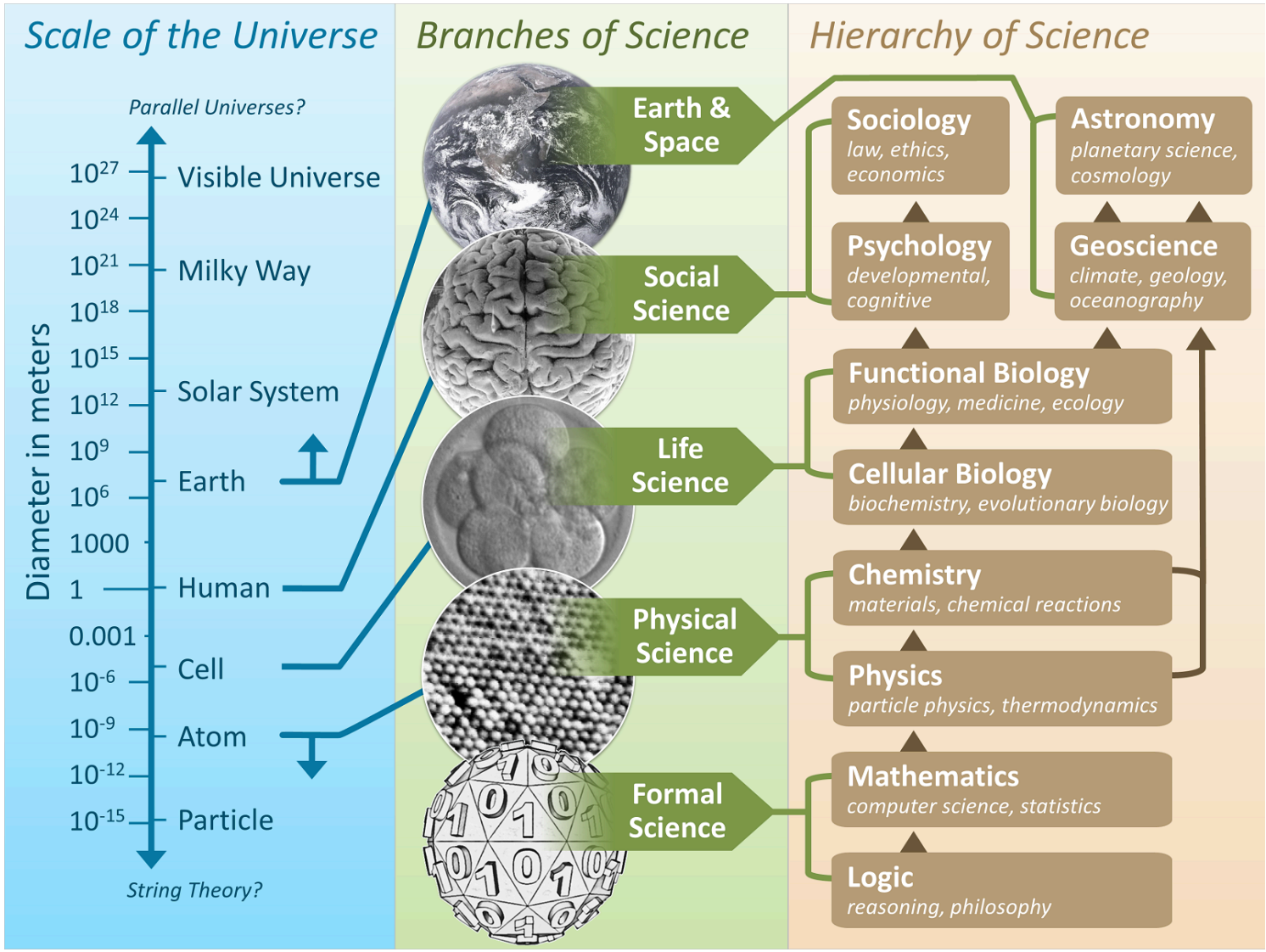
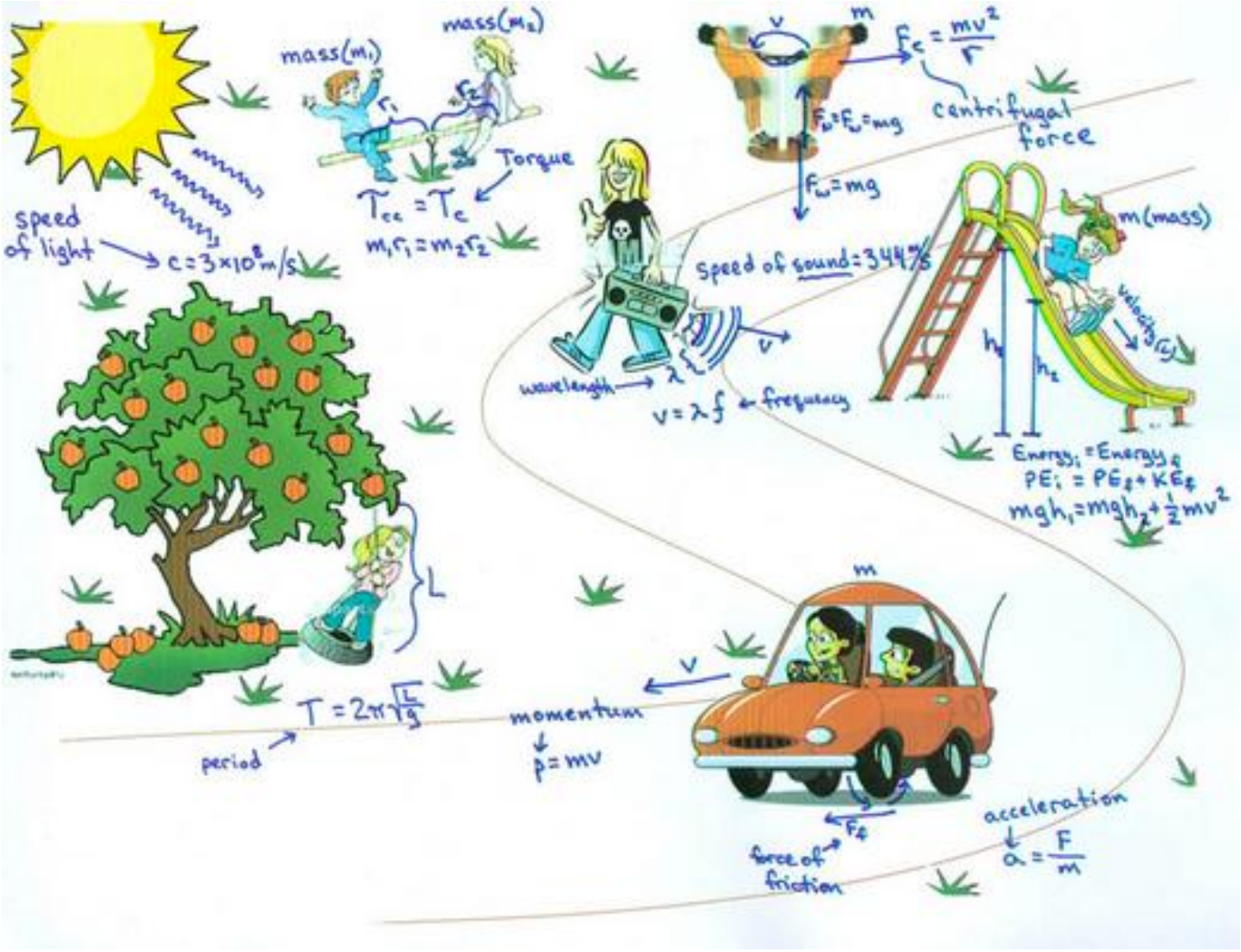
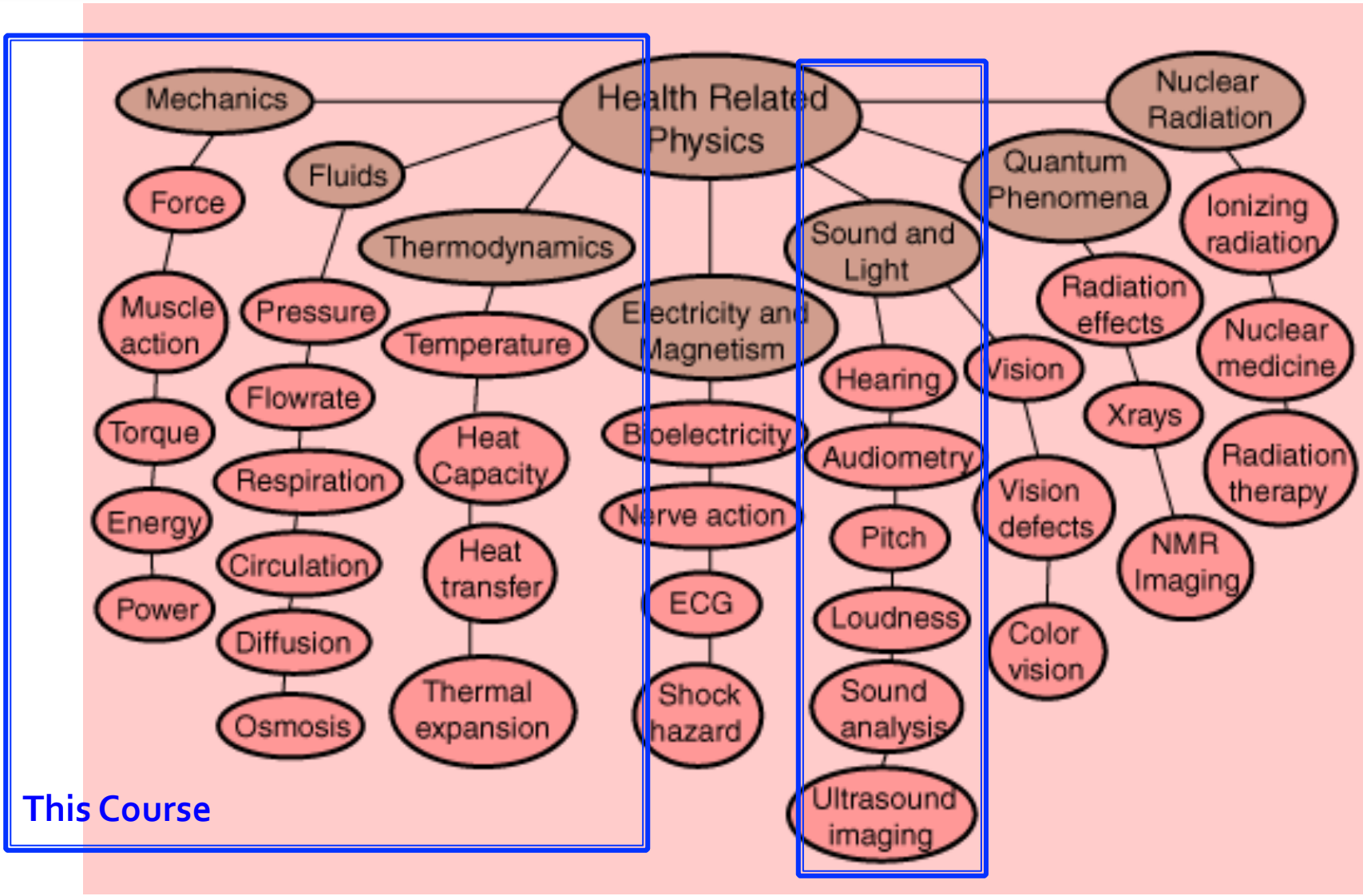
No Really, Why Physics?



Physics in Everyday Life



Physics and Medicine



MCAT Subjects Covered in This Class

Translational Motion (PHY)

- Units and dimensions
- Vectors, components
- Vector addition
- Speed, velocity (average and instantaneous)
- Acceleration

Force (PHY)

- Newton's First Law, inertia
- Newton's Second Law ($F = ma$)
- Newton's Third Law, forces equal and opposite
- Friction, static and kinetic
- Center of mass

Equilibrium (PHY)

- Vector analysis of forces acting on a point object
- Torques, lever arms

Work (PHY)

- Work done by a constant force: $W = Fd\cos\theta$
- Mechanical advantage
- Work Kinetic Energy Theorem
- Conservative forces

Energy of Point Object Systems (PHY)

- Kinetic Energy: KE = ½ mv^2; units
- Potential Energy
  - PE = mgh (gravitational, local)
  - PE = ½ kx^2 (spring)
- Conservation of energy
- Power, units

Periodic Motion (PHY)

- Amplitude, frequency, phase
- Transverse and longitudinal waves: wavelength and propagation speed

Fluids (PHY)

- Density, specific gravity
- Buoyancy, Archimedes' Principle
- Hydrostatic pressure
  - Pascal's Law
  - Hydrostatic pressure; $P = \rho gh$ (pressure vs. depth)
- Viscosity: Poiseuille Flow
- Continuity equation ($A \cdot v$ = constant)
- Concept of turbulence at high velocities
- Surface tension
- Bernoulli's equation
- Venturi effect, pitot tube

Gas Phase (GC, PHY)

- Absolute temperature, (K) Kelvin Scale
- Pressure, simple mercury barometer
- Molar volume at 0°C and 1 atm = 22.4 L/mol
- Ideal gas
  - Definition
  - Ideal Gas Law: $PV = nRT$
  - Boyle's Law: PV = constant
  - Charles' Law: V/T = constant
  - Avogadro's Law: V/n = constant
- Kinetic Molecular Theory of Gases
  - Heat capacity at constant volume and at constant pressure (PHY)
  - Boltzmann's Constant (PHY)

Sound (PHY)

- Production of sound
- Relative speed of sound in solids, liquids, and gases
- Intensity of sound, decibel units, log scale
- Attenuation (Damping)
- Doppler Effect: moving sound source or observer, reflection of sound from a moving objec

Think Green

Imagine the impact of everything you do, multiplied by 300!

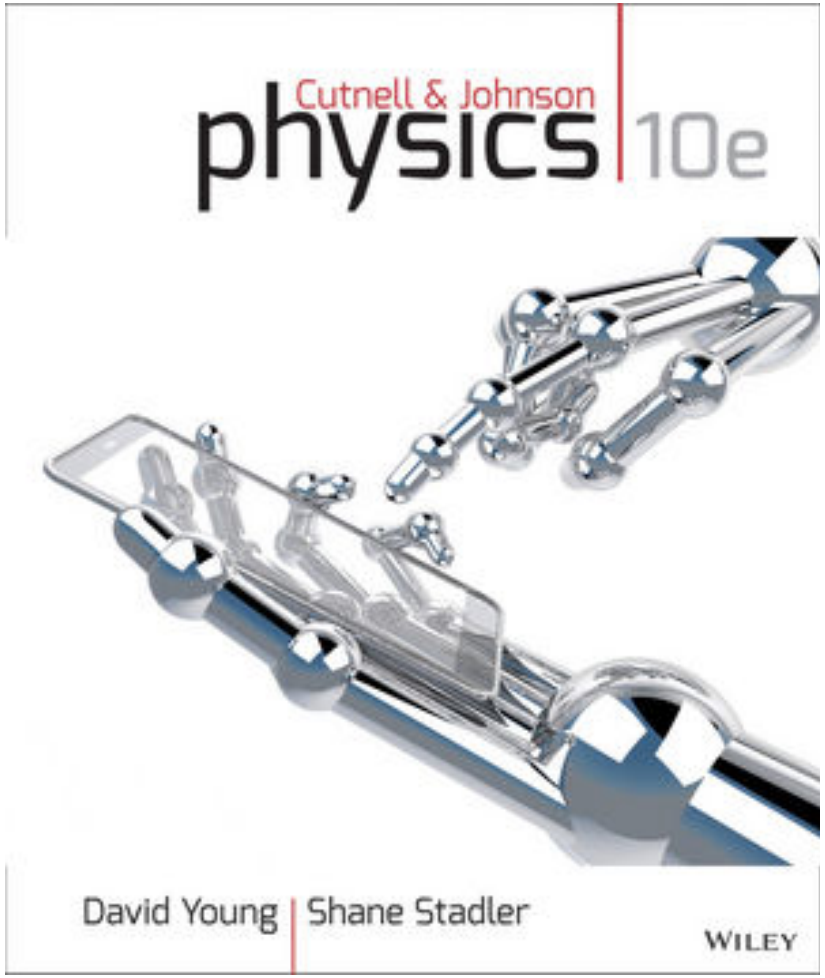
Resources: Web Pages

- Web Pages:
  - Main Web Page
    - http://www.physics.uiowa.edu/~jhalekas/teaching/cphysI_2016/index.html
      - Hosts syllabus, schedule, class notes, etc.
  - ICON:
    - https://uiowa.instructure.com/courses/8615
      - Used for little other than grades – links to other sites
  - WileyPLUS:
    - http://www.wileyplus.com/class/528183
      - Used for all homework

Resources: Class Notes

- Notes from each class (both PPT and blackboard material) will be merged and placed online in PDF form within one day after the class
  - Can be found on the main class web page, on the "Notes" tab

Resources: Textbooks



Textbook can be purchased anywhere

Make Sure you Register for 10th edition Wiley Plus! This is required for homework!

Wiley Plus online includes electronic versions of textbook chapters

Lab Manual:

Required: "Experiments in Mechanics, Wave Motion and Heat"

Must be purchased at bookstore

Resources: People

- Please come to me and/or your lab and discussion TAs if you have questions!

- Also, help is available in the 3rd floor Tile Room, which is staffed regularly with physics TAs who can help you

Contacts/Office Hours

- **Instructor:** Jasper S Halekas
- **Office:** 414 Van Allen Hall
- **Phone:** (319) 335-1929
- **E-mail:** jasper-halekas@uiowa.edu
- **Office Hours:**
  - Tuesday 2:00-3:00pm,
  - Wednesday 9:30-10:30pm,
  - Thursday 4:00-5:00pm
  - *Or by Appointment*

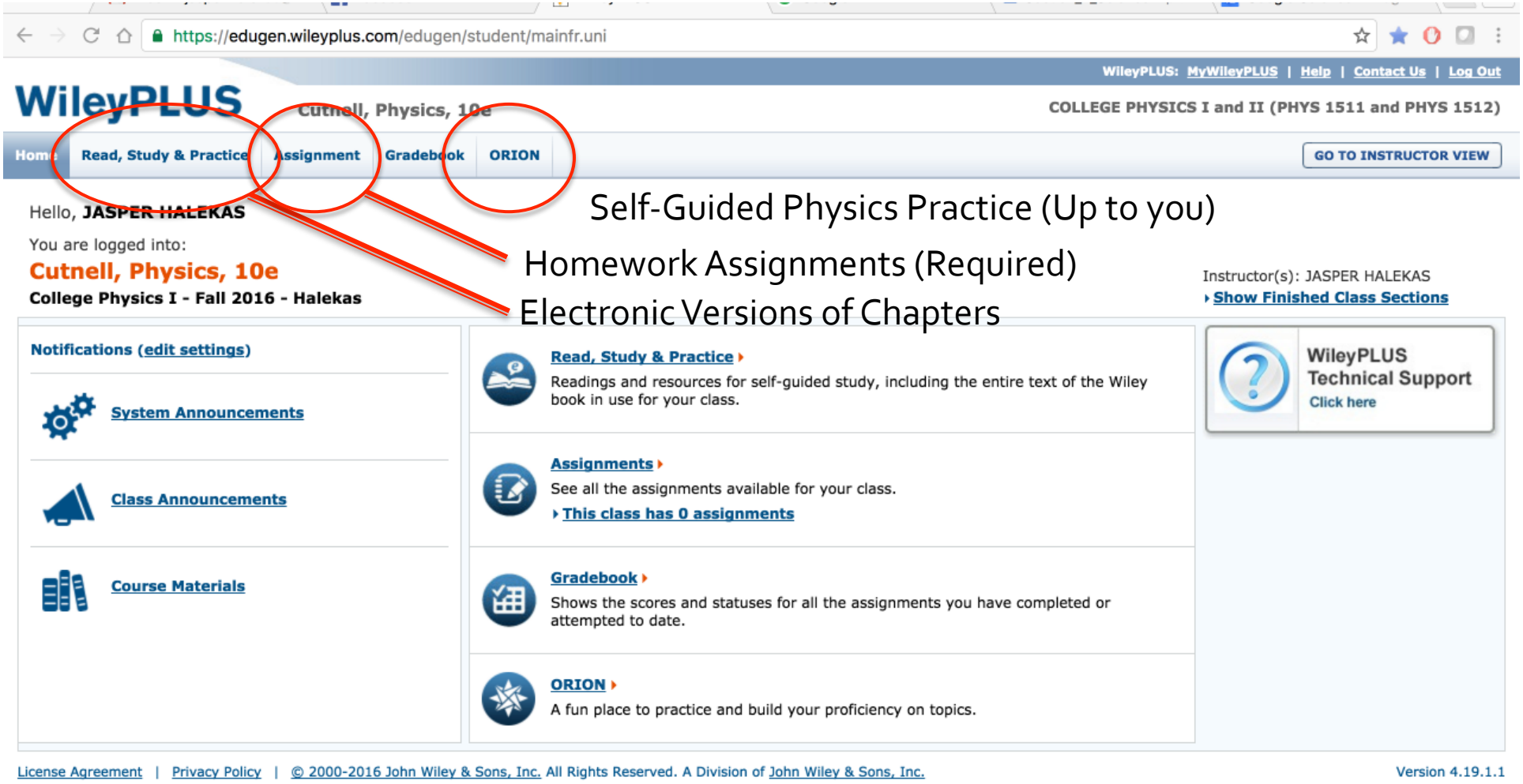
Reading

- Reading should be completed before lecture.
- There are no reading quizzes, but reading ahead is highly recommended, and will make lecture and discussions more productive.
- Tests may include material not explicitly covered in class.

Homework

- Weekly homework assignments are to be completed online using WileyPLUS. All assignments must be completed online by 11:00pm on Thursdays.
- You are allowed to work with other students on the homework, but each student must calculate the solutions to his/her own questions and submit the answers on WileyPLUS.
- WileyPLUS homework is electronically graded – ensuring a totally level playing field.

Wiley Plus



Self-Guided Physics Practice (Up to you)

Homework Assignments (Required)

Electronic Versions of Chapters

Wiley Plus

- Common Issues:
  - Not carrying enough decimal places through in mathematical calculations
    - Math problems require the answer to be within 2% of the exact numerical value
  - Grading problems
    - If you believe your problem was misgraded, tell me and I will fix it!
  - Browser issues
    - When in doubt, log out and clear all cookies, then log back in
    - When all else fails, contact Wiley Plus tech support

Homework

- Homework will include conceptual (one chance per problem) and mathematical (three chances per problem) questions
- There will be 12 math and 12 conceptual assignments
  - Only the top 11 scores for each will count toward the final grade
- There are practice (ungraded) math and conceptual assignments available now on Wiley Plus

Labs

- The laboratory assignments are a key part of the course, to be held under the supervision of your teaching assistant, who will also grade the laboratory reports.
  - Remember to complete pre-lab questions before lab!
- Only 9 of 10 labs will be counted toward grading, however, there will be ***absolutely no*** make-up labs.

Participation

- Participation will be tracked by your response to questions through student response systems during lecture. These questions are un-graded, so any response counts as participation.
  - We will start using student response systems on Friday
  - Extra credit points will be assigned as follows:

>60% participation	0.5% of overall points
>80% participation	1.0% of overall points
>90% participation	2.0% of overall points

~~Clickers~~ Student Response Systems

- Student response systems are not required
- Student response systems are an opportunity to earn extra credit
- Make sure to register your Turning Point account through ICON if you want to get credit!
- This semester, the University of Iowa is transitioning to personal device-based response systems (any wi-fi enabled device can be used). You must register online in ICON by selecting Student Response, then Turning Account Registration from the course modules. If you already have a physical clicker, you can exchange it for a license from TurningPoint. Students should go to the IMU Bookstore only for these exchanges. Detailed information and FAQs are available at http://its.uiowa.edu/srs/.

SRS Questions Are:

- Anonymous to the rest of the class
  - [Only I know who you are]
- Not graded (any answer counts the same)
- Do not count against you
  - Participating in the clicker questions gives you a chance to gain extra credit
    - 100% participation is not required
    - 90% = 100% for the purposes of extra credit
    - This allows for a few unavoidable absences, dead batteries, etc.

Why are we using SRS?

- To give you a chance to practice tricky concepts and check your understanding in real time – physics is tricky!
- To give me feedback on what you get and what you don't – I'm not perfect!
- Because SRS questions can (should) be fun!
- Because peer-reviewed research shows that students in the worst classes that use clickers and other interactive learning techniques learn more than those in the best classes that don't

Tests/Grading

- **Exam Schedule:** **Two Midterm Exams:**
  - Friday, Sep. 30 — Ch. 1-6
  - Friday, Nov. 4 — Ch. 7-11
  - Final Exam, TBD Date — Ch. 1-16
- **Grading:**
  - Homework — 20%
  - Labs — 20%
  - Two Midterms — 15% Each
  - Final Exam — 30%
  - Participation — Extra Credit (up to 2%)

Exams

- Midterm exams will be held during regular class hours on the dates specified above. The final exam will be two hours, scheduled during finals week at a time to be announced.
- Exams will be closed book, multiple-choice
  - You will be provided an equation sheet with your exam
  - Calculators are allowed, but absolutely no computers/ phones
- No make-up exams other than in legitimate extenuating circumstances with **prior** approval!
  - If you do not contact me in advance you **will not** earn full credit for the exam

Exam Format

- A common complaint: Exam questions are not exactly like homework questions (true!)
- Exams are a mix of conceptual and math questions, but with numbers simplified so no calculator is required (though you can have one if you wish)
- We will do a lot of review before each test, and will go over some "exam-like" questions
- I will also be posting lots of sample questions from previous exams before each test, so you should have a very good idea of what tests will look like

Grading: How it Works

- Student A has the following scores:

Category	Score	Percentage	Weight	Class Points
Homework	99/110	.900	20	18
Labs	870/900	.966	20	19.32
Midterm 1	10/15	.667	15	10
Midterm 2	9/15	.600	15	9
Final	18/30	.600	30	18
Participation	36/42	.857	up to 2	1.0
Total				75.32/100

Student A has 75.32 class points. These will determine his/her class rank, which will be used along with the curve to determine his/her grade.

Grading: How it Works

- CLAS recommends the following grade distribution for elementary courses:
  - A 15%, B 34%, C 40%, D 8%, F 3%.
  - A similar curve will be used in assigning final grades – this curve may be adjusted slightly depending on the overall performance of the class

- For example:
  - If 75.32 was a class rank of 85/304 = 28th percentile, Student A would get a B grade by this curve.

Cheating

- **Don't!**
- Cheating is a major disservice to you and your classmates
- If you are caught, it will affect your grade, and you could face disciplinary action

Not Cheating (Okay!)

- Studying together
- Working together on homework
  - (but not submitting someone else's answers)
- Asking for help from TAs
- Hiring a tutor
  - (but explore other avenues first – there is lots of help available without paying for it)

Cheating (Not Okay!)

- Submitting someone else's work on a lab, homework, or a test
  - This includes hiring someone else to do homework or take a test for you
    - (we will check IDs!)
- Allowing someone else to copy your work
- Bringing notes, phones, etc. to tests
  - (we will have proctors with sharp eyes!)

Communication

- Please let me know if you have questions, comments, complaints, or are struggling with particular concepts. This class is for you, and I am here to help.
  - Students may communicate with me by phone, e-mail, or in person
  - Students with issues or questions should if possible raise them in person by attending office hours or by scheduling an appointment
  - If you prefer to give me anonymous feedback there is a comments envelope on my door

Ask Questions!

- The fact that I ask SRS questions in part to get feedback does not mean that you should not also ask other questions in class, discussion, or office hours
- If you have a question, others may also have the same question
- Don't be afraid to speak up!

Schedule

Physics 1511 College Physics I 2016 Schedule

Dates	Week	Reading (Due Monday unless noted)	Homework Due Thursday	Lab	Notes
August 22-26	Week 1	Chapter 1.1-2.3 (*Wednesday*)	No Homework	No Lab	No Discussions Week One
August 29-Sep 2	Week 2	Chapter 2.4-3.4	HW 1 Online	M1	
Sep 5-9	Week 3	Chapter 4.0-4.8 (*Wednesday*)	HW 2 Online	No Lab	*Holiday 7/5*
Sep 12-16	Week 4	Chs. 4.9-5.4,5.7	HW 3 Online	M2	
Sep 19-23	Week 5	Chs. 6.1-6.6, 10.1, 10.3	HW 4 Online	M4	
Sep 26-30	Week 6	No Reading	No Homework	No Lab	Midterm 1 Friday 9/30 Ch. 1-6
Oct 3-7	Week 7	Chapter 7	HW 5 Online	M5	
Oct 10-14	Week 8	Chapter 8.1-8.6	HW 6 Online	M6	
Oct 17-21	Week 9	Chapter 9, 10.4	HW 7 Online	M7	
Oct 24-28	Week 10	Chapter 11	HW 8 Online	M9	
Oct 31-Nov 4	Week 11	No Reading	No Homework	No Lab	Midterm 2 Friday 11/04 Ch. 7-11
Nov 7-11	Week 12	Chapter 12-13	HW 9 Online	H1	
Nov 14-18	Week 13	Chapter 14	HW 10 Online	H2	
Nov 21-25	Thanksgiving				*Turkey Week!*
Nov 28-Dec 2	Week 14	Chapter 15	HW 11 Online	W1	
Dec 5-9	Week 15	Chapter 16	HW 12 Online	No Lab	
Dec 12-16	Finals Week	No Reading	No Homework	No Lab	Final Exam Date TBD Ch. 1-16

Let's Learn Physics!