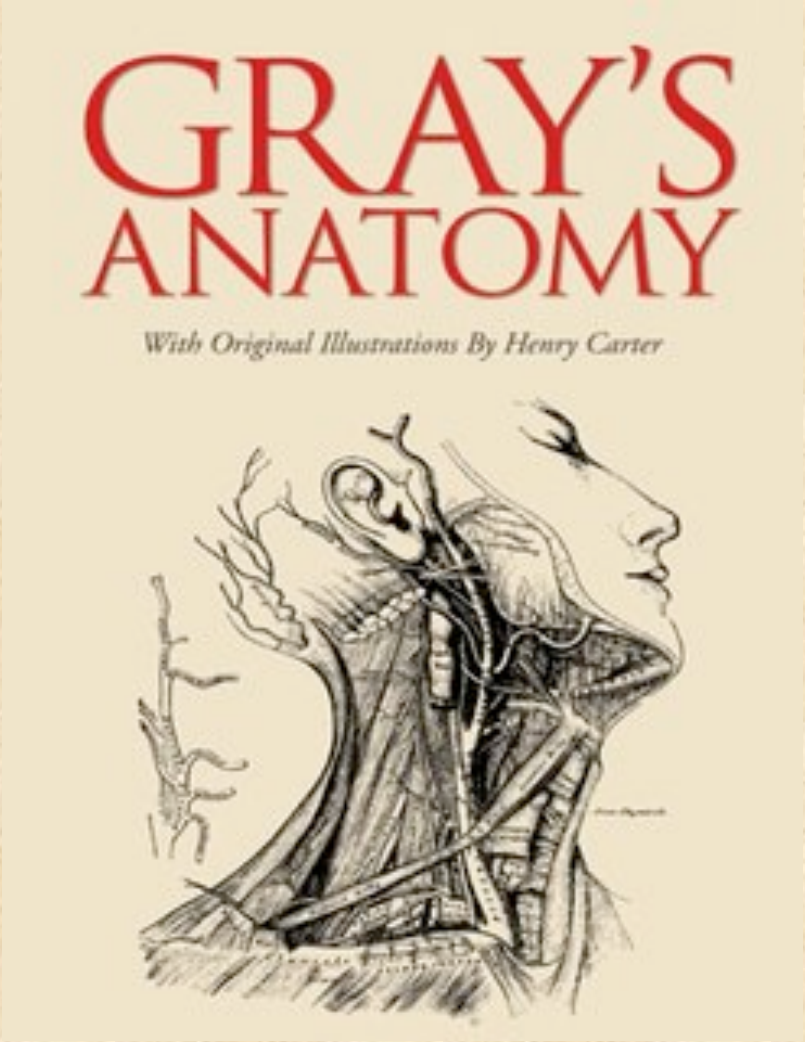


Anatomy of An On-line Physics Course

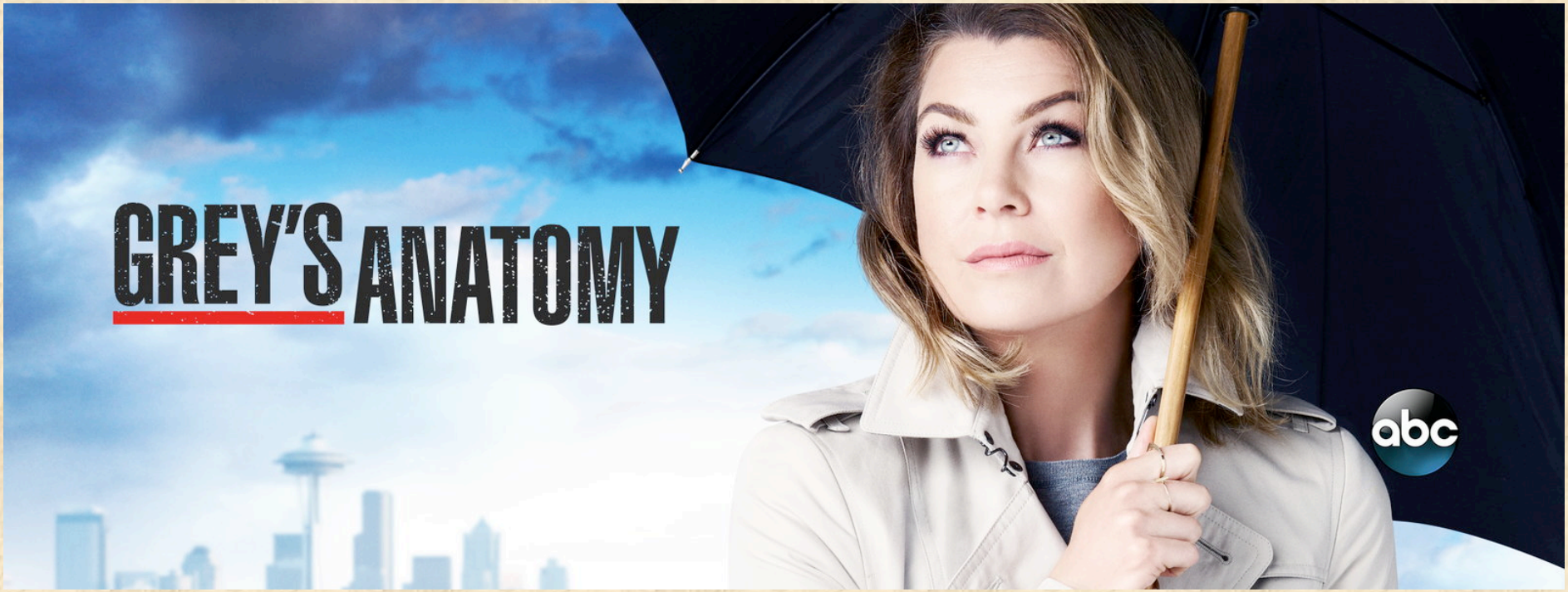
The Spectrum of Physics

CO / WY AAPT 2016

Dr. Andrew Young

Upcoming Agenda

- Live course as a template
- Content delivery
- Assessment
- Labs
- Global Overview

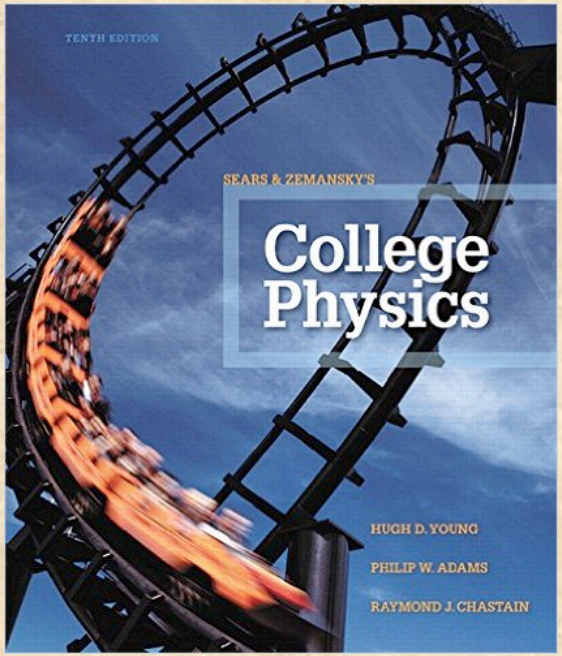


Teaching The Live Course

- Andrew Young. Casper College Instructor Since 2005
- Taught Liberal Arts Astronomy, Liberal Arts Physics, Physics 1 and 2 (Algebra and Calc based) ?

My Live Physics Course Setup

- Textbook
- Online assessment system (MasteringPhysics) for homework
- Online learning management software (Moodle)
- Lab manuals (using in-house content and re-purposed/re-mastered material)
- Live Lectures
- Live Tests



Mastering PHYSICS

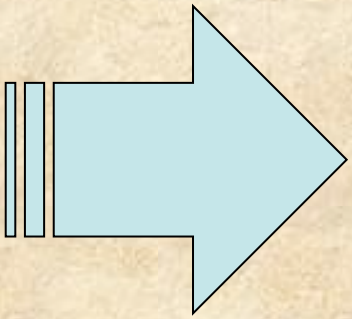
moodle

Teaching The On-line Course

•Content and assessment has been vetted through many iterations of the live course.

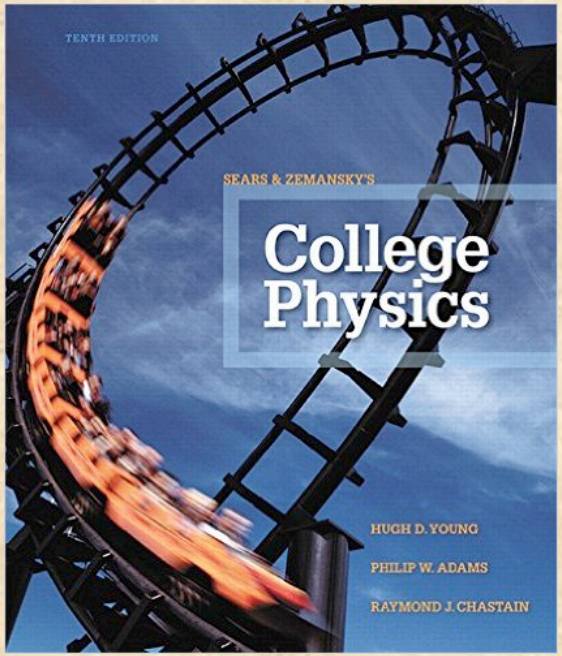
•1 to 1 translation as much as possible

•High degree of replication or equivalence



Physics Online Course Setup

- Textbook
- Online assessment system (MasteringPhysics) for homework
- Online learning management software (Moodle)
- Lab: Boxed, converted live, simulation software
- Lectures various media forms.
- Online Tests

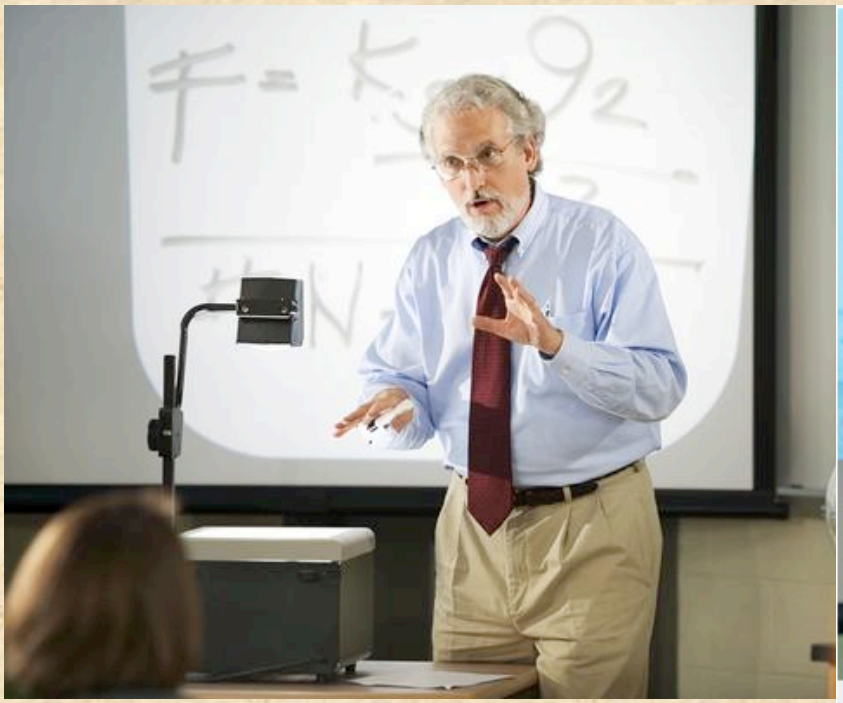


Mastering PHYSICS

moodle

Nature of Education

- What role does the traditional lecturer serve?
- Presentation of material
- Clear manner
- Coherent
- Ordered
- Relatable

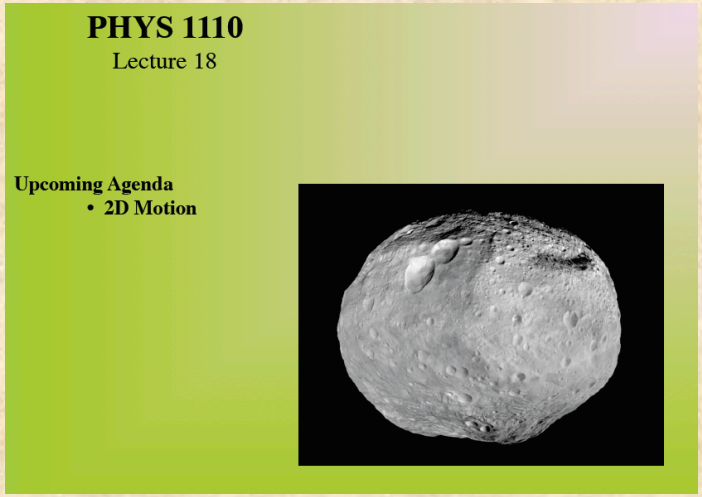


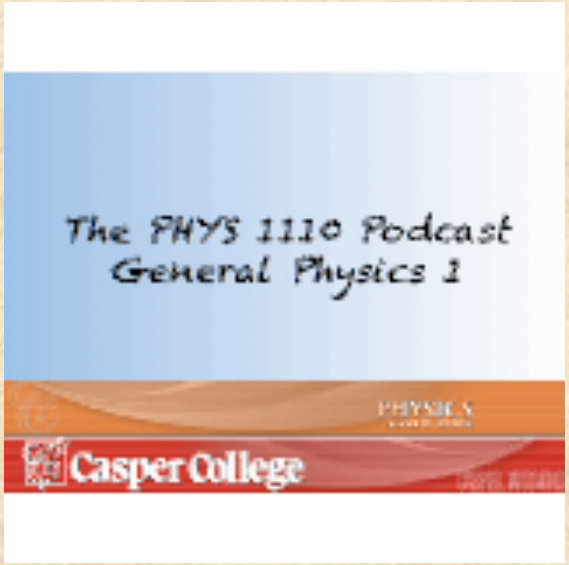
UD's Jennifer Biddle has been named a 2013-14 Distinguished Lecturer by the U.S. Science Support Program.

Content Delivery

•A student now has available for review:

1. My powerpoint lectures in .pdf form.
2. My transcript in .pdf form.
3. An audio file version of the lecture in .mp3 format.
4. A video file version of the lecture in .m4a format.





PHYS1110PodcastLecture18Transcript

4.
If a golf ball rolls off a cliff, the x velocity does not change. You get a parabolic path where the y velocity starts off at 0, and increases as it falls more and more to the ground. There is acceleration in the y-direction, but no acceleration in the x direction.

5.
If you start at some height and hit a golf ball at some angle and some initial velocity, it will still undergo a parabolic path. This is pretty much a common theme for any object you hit, at any angle, at any height, at any starting velocity.

6.
Here is an example. A runner is running with a javelin. The runner's initial velocity is 5 meters/second. The runner, as he is running, throws the javelin at 22 meters/second at an angle of 15 degrees above the horizontal. The runner was running up to the ledge of a cliff when he threw the javelin. The cliff is 217 meters above the ground. The runner also jumped up at 2 meters/second as he was throwing the javelin.

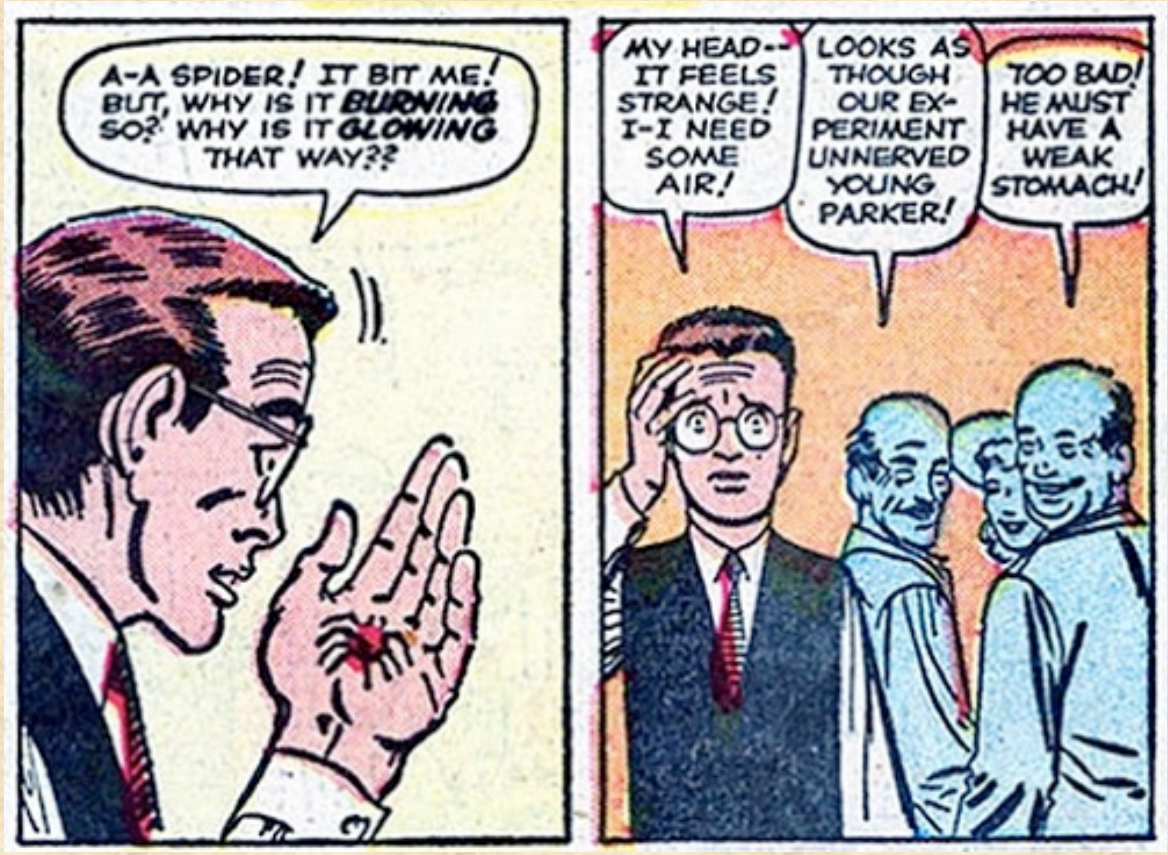
Mind you, I haven't asked you a question yet. This is all the set up. Hopefully, you drew a very nice elaborate diagram of the situation.

Assessment

•Having access to information does not mean knowledge.

•Being able to obtain content is great, but a purchase of a textbook or having a link to a wiki page does not mean mastery of material.

•We have so much science accessibility through our digital formats, but not everyone is turning into a physicist.



Assessment: Classic format

•Weekly homework problems assigned from a textbook.
•7 or so problems, even numbers, since odd has the answers.
•Students write down their work, submit a stapled homework assignment at the beginning of class.
• -5 points if not stapled (faculty don't carry staplers), and turn in at the beginning of class, otherwise students spend time in class working on the assignment.
•1 or 2 exams a semester, essay based or multiple choice, depending on student numbers.

Assessment: Instructor side

•Several hours of joy for the next few days grading student's work.
•Spend more time on the ones with intense writing. Automatic 0 for blank replies.
•Assign a grade value, move on to the next one.
•Perhaps you have a TA who does this for you.

Assessment: Electronic Homework

- What can you do?
  - Assign problems due on separate days rather all on one.
  - Assign random problems to students.
  - Randomize number values to students.
  - Use publisher content or create your own problems with internal editing system.
- What do students gain?
  - Rapid feedback
  - Accurate feedback
  - Multiple attempts at a problem (with declining point value per attempt)
  - Hints (where available) on various problems
- What do you receive?
  - An immense amount of metadata with high fidelity on student's work habits and mastery level of specific topics.

Goals of Laboratory Exercises

•You just spent several hours a week in the lecture hall talking to your students about the importance of these new science laws and formulas.

•What are you going to do next? You are going to the lab.

On-line Laboratory Methodology

- eScience (Boxed labs)
- LabPaqs from Hol Science (Boxed labs)
- Flash simulations/Video experiments (Publisher content from Pearson, PHET)
- Live labs converted to Online format.

Challenges and Improvements Ahead

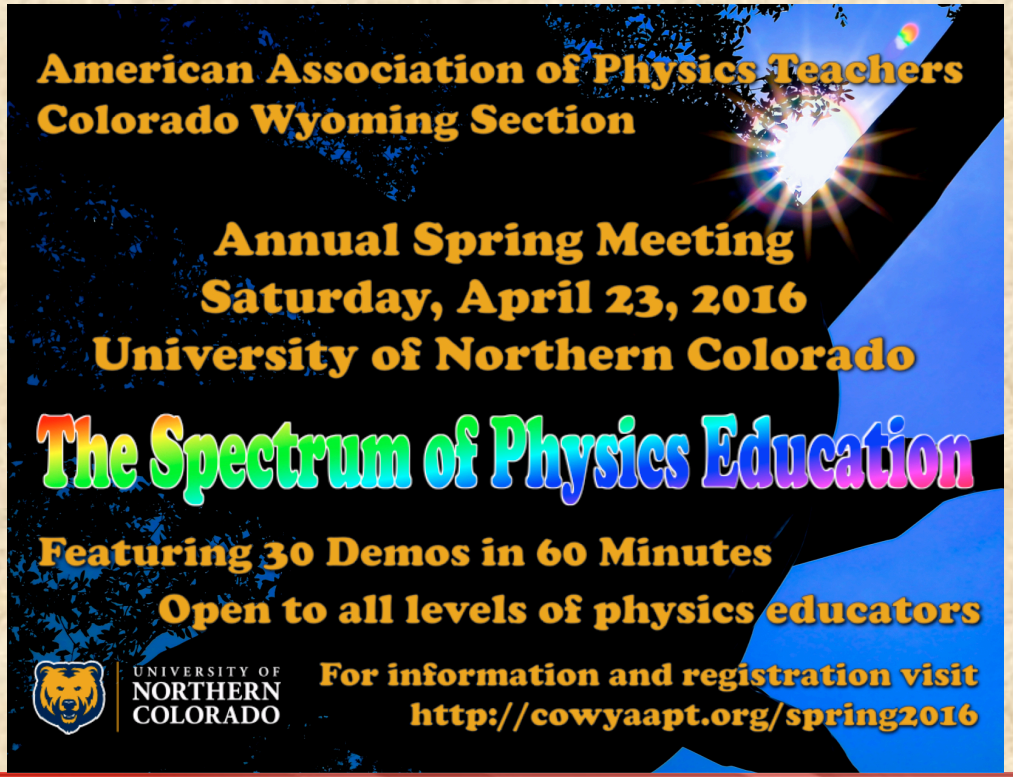
- Sharpen lab focus/objectives/outcomes
- Better rubric for grading labs
- Better lab report response/guidelines
- Group work
- Real time instructor contact
- Improve personal rapport
- Better alignment between on-line and live course.

Summary

- You want your students to have a complete and satisfying online experience.
  - Know your audience, what they can and cannot (will not) do.
  - Honest and critical review of your own work.
- Define the experience a student will have.
- Your ideas must have good execution.
- Robustness, directed, self-explanatory.
- Be specific and be explicit about what you want your students to do and how to do it.
- Don’t make it a nebulous process.

Thank you

- Thank you to the University of Northern Colorado for hosting.
- Thank you to all the fine presenters today.
- Thank you for attending the talk!



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