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
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](image1)

![Moodle](image2)
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.
  3. An audio file version of the lecture in .mp3 format.
  4. A video file version of the lecture in .m4a format.

PHYS 1110
Lecture 18

Upcoming Agenda
- 2D Motion

The PHYS 1110 Podcast
General Physics 1

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 initial 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 215 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.

![Image of a parade with Mickey Mouse and other characters]
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.

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Summary

• You want your students to have a complete and satisfying online experience.
  o Know your audience, what they can and cannot (will not) do.
  o 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!