You have been handed a word for which there are three other words that group with it.

Find the three people that hold the words that group with yours and sit at a table together.

For example, if your word was “North,” then the other members of your group might be holding the words “East,” “West,” and “South.”

Marshmallow Challenge

- You have been handed: a box of dry spaghetti, a marshmallow, and a paper lunch bag.

- Rolls of masking tape have been placed in each corner of the room.

- Your group has 18 minutes to construct the tallest free-standing structure that will support one (1) marshmallow.

- We will tell you when there's 9, 6, 3, 2, 1, and 0.5 minutes left.

Welcome to
Physics 183 Section 4

Projects and Practices in Physics

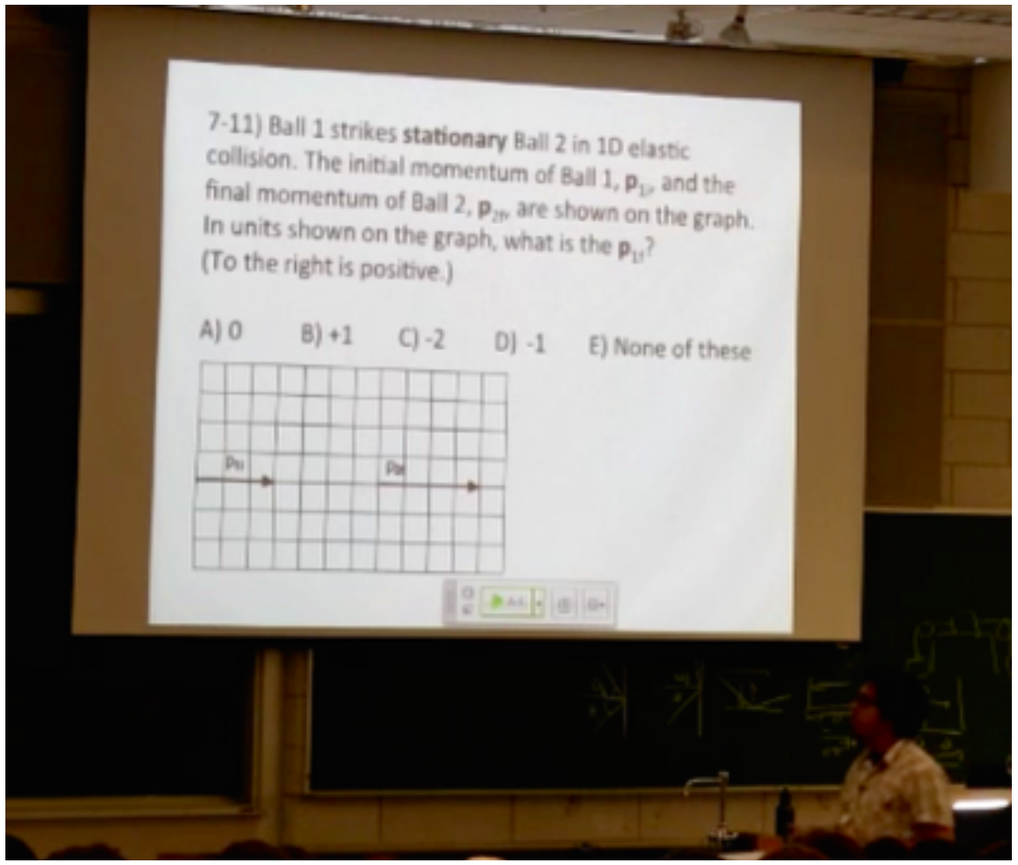
Your Instructors

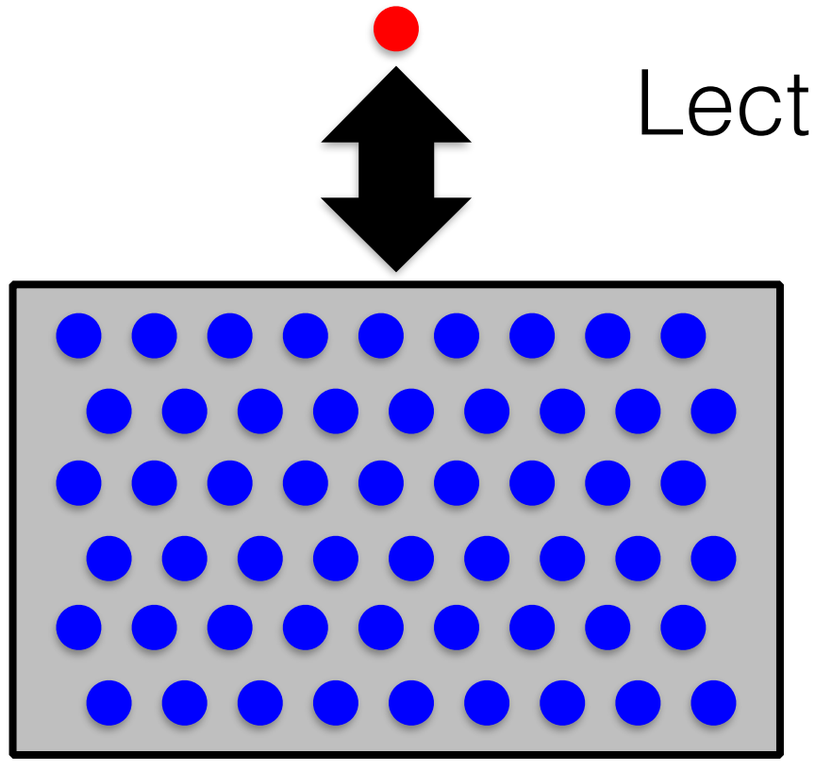
- Prof. Danny Caballero - caballero@pa.msu.edu (1310A BPS)
- Dr. Paul Irving - pwirving@msu.edu (1310D BPS)
- Mr. Mike Obsniuk - obsniukm@msu.edu (1310B BPS)
- Prof. Stuart Tessmer - tessmer@pa.msu.edu (1312C/4237 BPS)

What do employers want?

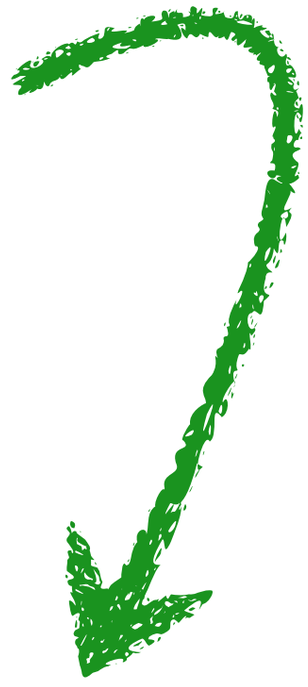
1. Ability to work in a team
2. Ability to make decisions and solve problems
3. Ability to plan, organize and prioritize work
4. Ability to communicate verbally with people inside and outside an organization
5. Ability to obtain and process information
6. Ability to analyze quantitative data
7. Technical knowledge related to the job
8. Proficiency with computer software programs
9. Ability to create and/or edit written reports
10. Ability to sell and influence others

Forbes, 2013

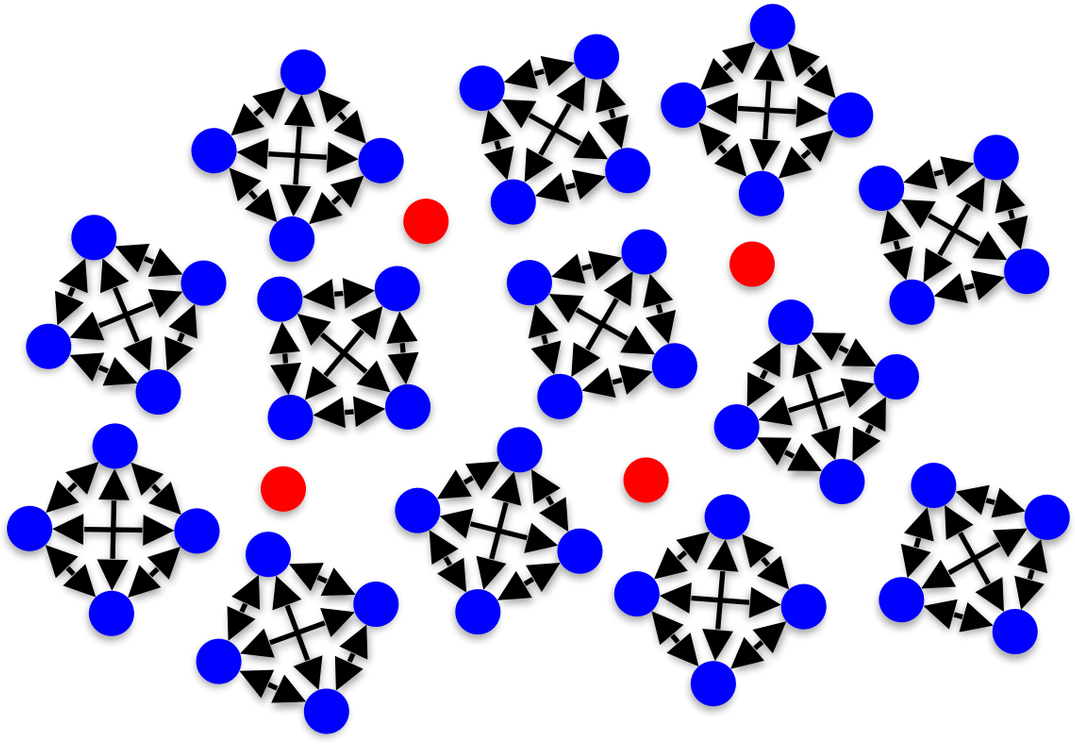




Lecture

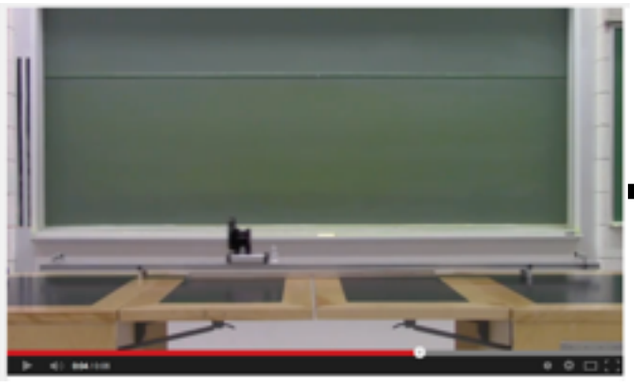


Problem-based Learning + Computation



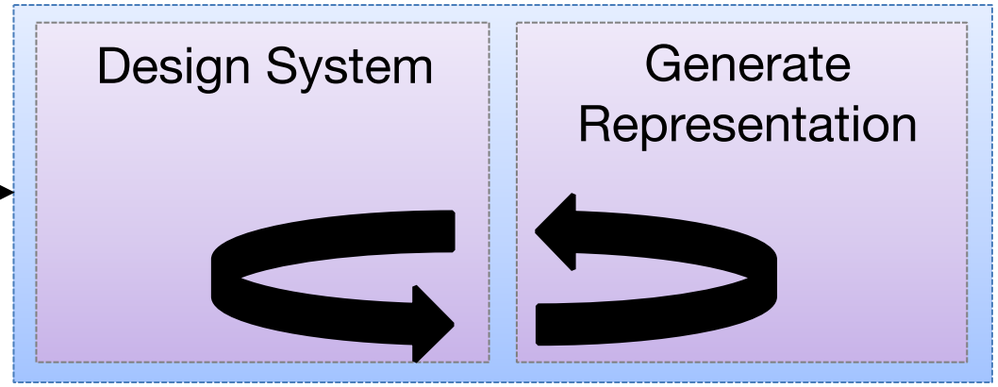
Supporting How You Learn To Practice Science

Real World



Creating

Model World



Validating

Outcomes

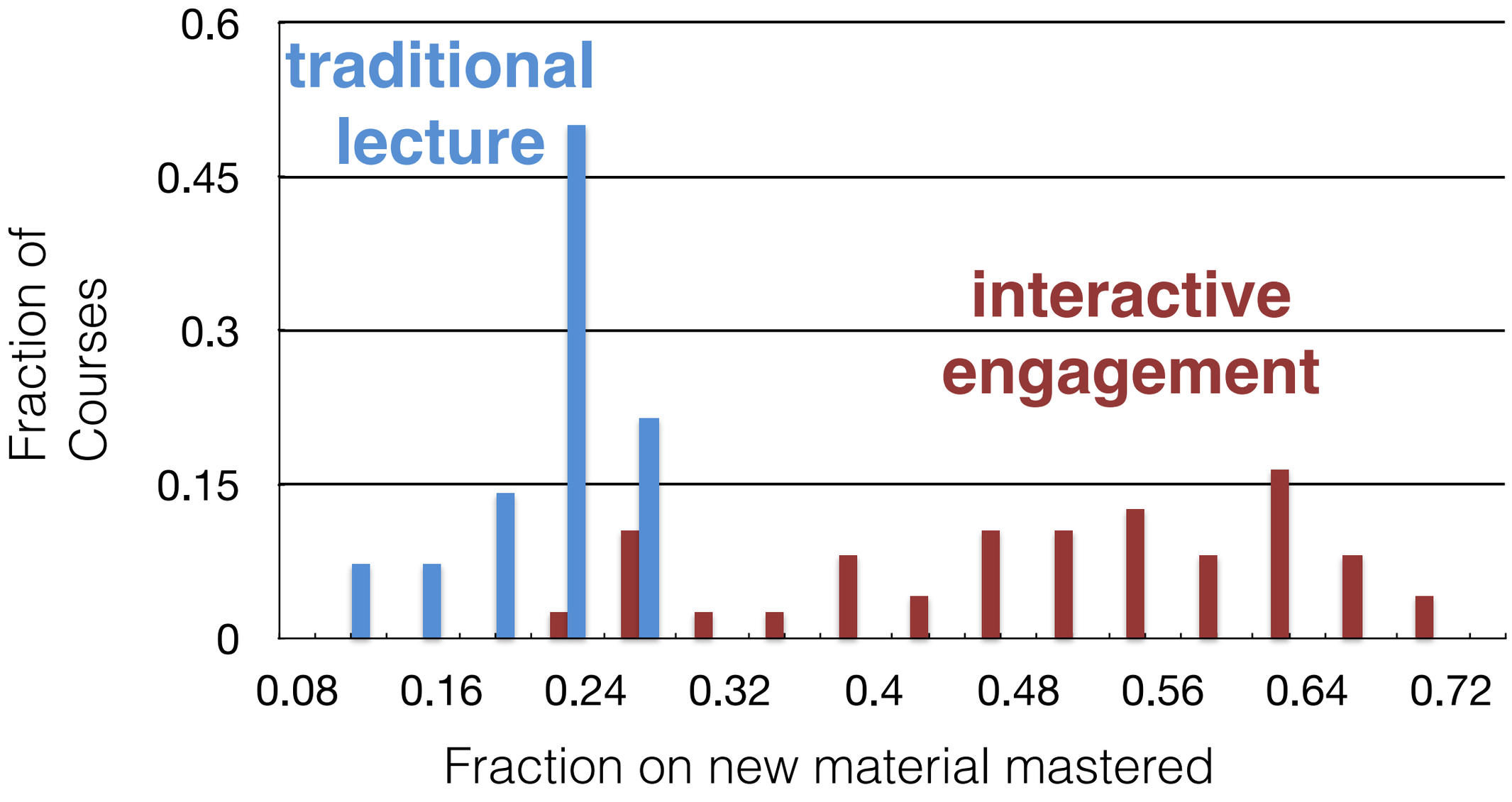
Predicting

What are you going to learn in the course (in addition to physics)?

1. **Ability to work in a team**
2. **Ability to make decisions and solve problems**
3. **Ability to plan, organize and prioritize work**
4. **Ability to communicate verbally with people inside and outside an organization**
5. **Ability to obtain and process information**
6. **Ability to analyze quantitative data**
7. **Technical knowledge related to the job**
8. **Proficiency with computer software programs**
9. Ability to create and/or edit written reports
10. Ability to sell and influence others

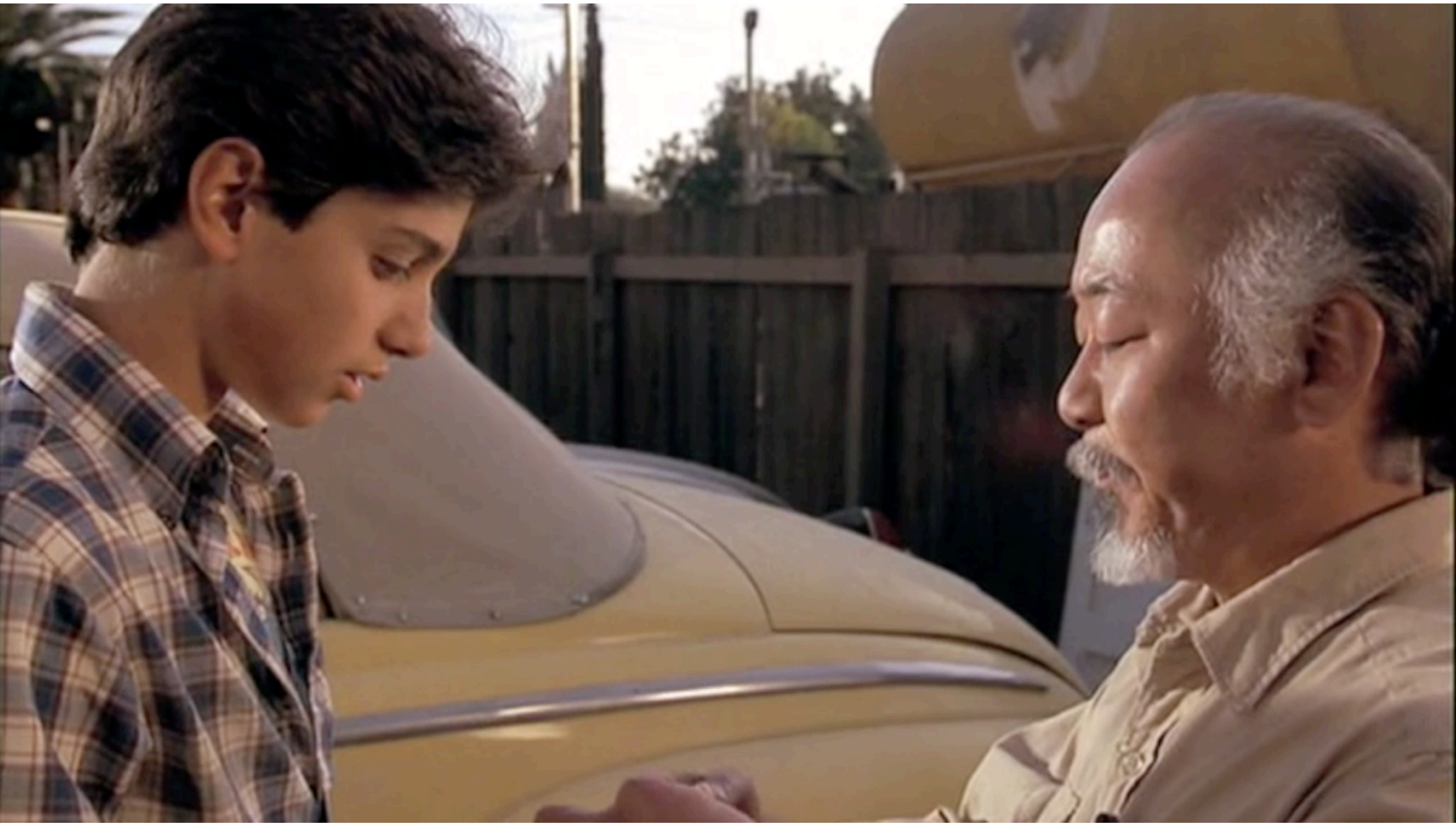
Forbes, 2013

You will also learn physics more deeply



Hake, Am. J. Phys., 66, 64 (1998)

Although sometimes, it might not feel like it.



Projects and Practices in Physics (P^3)

- Introductory Calculus-based Mechanics where (weekly) you will solve complex problems in groups of 4

- Supported by pre-class homework and course notes + the internet (and instructors)
  - no need to bring your own computer

- Important concepts and sub-problems appear on post-class homework

- Individual and Collaborative Exams

Pre-class Reading & Homework

- Course Notes and Videos (No Book Necessary!)
  - http://pcubed.pa.msu.edu - read, watch videos, and take your own notes
    Send any typos and questions to us!
- Pre-class Homework
  - http://loncapa.msu.edu - due Mondays at 8pm; short conceptual homework assignments

Class Meetings

- Working in groups of 4 to solve complex physics problems.
    - We will facilitate your work: ask questions, prompt discussions, et cetera
- Typically, you will solve a problem on Tuesday, then be shown Thursday's problem, which extends Tuesday's.
    - You will have to conduct some research on a concept between Tuesday and Thursday's class to present to your group.

Class Meetings

- Your in-class work will be assessed by us on a 4.0 scale:
    - How well do you help your group to ensure that all members develop an understanding of the physics (Group Understanding)?
    - How well do you help your group manage itself in terms of the discussion and use of ideas (Group Focus)?
    - How well do you develop your own understanding of the physics (Individual Understanding)?
- You will be given feedback from us each week along with your grade.
- Far more details are in the “How will group work be assessed/ graded?” document

Supporting Your Success

Facts

Lacking

Organize your whiteboard work

Approximations & Assumptions

Representations

Read and interpret new programs

```
#Objects
track = box(pos=vector(0,0,0), size=vector(10,0.1,1), color=color.white)
fancart = box(pos=vector(-4.75,0.15,0), size=vector(0.5,0.19,0.3), color=color.red)
fancartMotionMap = MotionMap(fancart, 10, 10, markerScale=2)

#Parameters
fancart.mass = 0.3
fancart.p = vector(0.15,0,0)

#time and time step
dt = 0.5
t = 0

#calculation loop
while t < 10:

    rate(25)

    Ffan = vector(0.025,0,0)

    fancart.p = fancart.p + Ffan*dt
    fancart.pos = fancart.pos + (fancart.p/fancart.mass)*dt
    fancartMotionMap.update(t, fancart.p)

    t = t + dt
```

Post-class homework

- http://loncapa.msu.edu - due Sundays at 8pm; short homework assignments that emphasize core concepts and sub-problems.

- This homework will be available all week, so you can work on it anytime.

- We are taking great care to make sure your out-of-class work is no more than other 183 students!

Three In-class Exams and a Final

- Individual Portion
    - Open-ended, hand-graded exams that you will complete by yourself
    - Similar to pre-class and post-class homework
- Collaborative Portion
    - Open-ended, hand-graded exams that you will complete in your group
    - Much simpler versions of your in-class work
- Mock exams will be available at least one week before the exam day

Grading Information

- Pre-class HW: 10%
- In-class group work (drop lowest 2): 20%
- Post-class HW: 20%
- 3 in-class exams (ind. 75%, group 25%): 30%
- Final exam (ind. 75%, group 25%): 20%
- Total: 100%

We will not grade on a curve

Course score (p)	**Earned Grade**
• p > 92%	• 4.0
• 92% > p > 84%	• 3.5
• 84% > p > 76%	• 3.0
• 76% > p > 68%	• 2.5
• 68% > p > 60 %	• 2.0
• 60% > p > 52%	• 1.5
• 52% > p > 44%	• 1.0
• p < 44%	• 0

Other important information

- Class Hours (12:40pm - 2:30pm Tuesday and Thursday) - class participation is essential to your success!

- Help session hours (Friday? 1310 BPS) - we will decide soon.

What's next?

- Today: Two surveys
- Monday: First pre-class homework is due!
- Tuesday & Thursday: Constant and relative velocity problems
- Next Sunday: First post-class homework is due!

NOTE: Next week's pre-lecture material (the momentum principle) is much longer, so start early!