PHYSICAL SCIENCES 112

You are sitting in SECTION 3

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1 Handout

Syllabus - 5 Steps from Stars to Atoms
- Also lab schedule Go This Week

Questions for Review & Study
- Weekly Reading Assignments
- Questions to Prepare (Write)
- Exam Schedule Week of
  Week of
- Final Exam Thurs. 8-10 AM
- Schedule for Take-Home Expts. "THExp"

March 7
April 18
May 19
Course Administration

1. Full, or nearly full section - seats!
   - Need to take attendance to find out who's not coming + make room.

2. Office Hours:
   Propose Tuesday: 9-10 AM PH3-103
   I will also make myself available after class on Thursdays - but...

3. What you need for class:
   1. Textbook "Physics, the Reasoning"
   2. Lab Book "Physical Science Laboratory"
   3. Calculator with "sin" "cos" "tan" functions
Grading for the course:

45% “Being a Scientist”
- 30% - Labs you do in sections
- 15% - Take Home Experiments

55% “Understanding Science”
- 15% - Exam 1
- 15% - Exam 2
- 25% - Final Exam

Also, periodically I will assign extra-credit “Mini” experiments to be applied to exam grades. There is one for today, due Thursday!
1. How thick is a piece of paper?

Write a sentence telling how you intend to do the measurement, and then tell me how thick is a piece of paper?

You can work together—but each has to do their own work—and tell me who you worked with.

Worth: +5 extra-credit points on Exam 1.
Rationale for Grading:

45% is experiments: lab and the exp:

- Observation
- Exp. 1: naked eye census of stars
- Exp. 2: measuring the size of the earth

- The moon (this one takes a month)
- Exp. 4: start now
- Exp. 5: bouncing ball
- Exp. 6: electricity
- Exp. 7(a): images of the sun

Physical science is nothing without a reference to nature!

Asking questions is, of course, an important human activity.

Getting answers from nature is what makes science scientific.

Only way is to think up, do, and think up more experiments.
ORGANIZATION OF SYLLABUS:

ONE CONNECTED STORY EXPLANATION

WHERE ARE WE?
10,000 YEARS
What can we tell by looking at patterns in the sky? Day/night, seasons, changing shape of the moon? Planets

WHAT ARE THE RULES?
500 YEARS
Is there ONE set of rules that works on a table top, on a ship, out in space - everywhere - or do we need to settle for "that's just the way it is"?

ENERGY TRAVELS! Same rules for planets + people?
300 "Empty space" filled with gravity?? Waves??

500-200 YEARS
Does all this work even when you can't "see" atoms?

100 YEARS
What has had to change in the story because of atom bombs - the speed of light?

How will any of this affect you - your children etc.?
Experiment? Why? What?!

What: A careful attempt to set up a simplified set of circumstances that will have an unequivocal result.

Why: When nature is answering the questions, you won't get tricked, fooled, bamboozled, taken ...

Decide a question: Does a piece of chalk always fall if you release it? Is there a way to "drop" it "up"?

Experiment: Try it — lets.
So, what went wrong?

You did not have all the facts.
You just can't "think about it" and come up with the answer - you have to do it.

I tried to fool you - but nature can't.

You don't have to rely on experts or anyone else - you can go and do the experiment for yourself. Democratic
“Nature is not malicious.” --- A. Einstein
“But, I am!” --- G. Pickett
This class is about learning the methods of science

- Experiment - getting answers
- Theory - asking questions

Ideas change fast: "Photo Electric Effect"

Einstein Nobel prize in 1904 → Richard Feynman 1948 →

In 1967 a theory proposed to correct it;
1983 the experiment was done.

Ideas change fast but method has stood for 5000 years:


Believe your results!

Important for you, your students, this country
Take Home Exp. #1: Naked-Eye Observation of Stars

What is the angle between these stars?

"Pinky = 1° wide"

"Knuckle-to-Knuckle = 10° wide"

"Index-to-Pinky = 15° wide"