



**Physics 8: The Physics of Everyday Life**

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Spring 2006

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## Course Goals

- Explore what physics has to say about the world we live in
  - Physics has A LOT to say!!
- Understand how some of our technological gizmos work
  - TV, radio, cell phones
  - Computers
  - Microwave ovens
  - GPS
  - Electricity generation and use
- Look at the physics of living
  - Food, exercise, radiation/cancer

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## Course Goals, continued

- Learn to be more aware of physics in our lives
  - Bi-weekly questions **force** you to do this
- Watch lots of cool demonstrations
- Ask lots of questions
  - Let curiosity run free
- Explore the physics of our perceptions
  - Sound, light, temperature
- Steer the course to match your interests
- Decide that physics is way cool, and **not** the worst course you ever had in college

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## Course Structure/Grading Scheme

- 25% based on weekly homework
- 10% based on bi-weekly question/observation submissions
- 30% based on midterm exam
- 35% based on final exam
- **Up to 15%** based on classroom participation
  - As determined via transmitter activity
  - Applied to lowest exam score as “automatic” points
  - Example: 80% attendance gets you 12% credit, so midterm would be worth 18% **or** final worth 23%

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## Question/Observation Submission

- This is a course about **curiosity**
- Bi-weekly questions/observations get you to participate in this feature of the course
  - Something you've always wondered about
  - Something you recently noticed
  - Something that class prompted you to think about
- Goal is to increase your awareness, observational skills
  - We're immersed in physics: easy to ignore, but also easy to see!
  - You'll begin to think more deeply before shoving problem aside
- Submission via WebCT (establish SOON!)

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## Question/Observation Examples

- Why do my cheerios cluster together in a little flotilla?
- Why does spaghetti get flexible right away when cooking, but takes a long time to be soft enough to eat?
- I've seen wheels on cars on the freeway at night appear to spin backwards, but have never noticed this during the day. Maybe it has something to do with the lighting...
- When I turn off my TV, the picture collapses into a small point in the center of the screen. I think this is cool, but would like to know why.
- More examples appear on website:
  - <http://physics.ucsd.edu/~tmurphy/phys8/questions.html>

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## Transmitters

- We will use in-class response system to engage the class
- This system has the following advantages:
  - Stimulates discussion among students
  - Provides practice on quiz-like questions
  - Gives students feedback about what they do/don't get
  - Gives instructor feedback about what has/hasn't been covered well
  - Provides mechanism for participation credit
  - Keeps class awake!
- Purchase at Bookstore (or acquire from other student)
  - Only the 13-button remotes work
- Register your number via WebCT "quiz"

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## WebCT Access

- WebCT provides a means to:
  - Access grades
  - Submit bi-weekly questions/observations
  - Register transmitter
  - Communicate with students, TA, professor in chat forum
  - Links to course website, assignments, online lectures
  - Homework solutions
  - Etc.
- How do you access it?
  - Unless you're an extension student, you will automatically get an account about one day after registering for the class
  - your password is the same as your ACS password for e-mail
  - see instructions linked from course website

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## Resources

- **Fellow students!**
  - You are encouraged to work together on HW, studying, etc.
- **Website:**
  - <http://physics.ucsd.edu/~tmurphy/phys8/phys8.html>
  - Assignments, lectures, announcements, etc.
  - WebCT site
- **Teaching Assistant**
  - Matthew LeBourgeois: office: Mayer Hall 2101: Wed. 2–3PM; discussion & problem sessions
- **Professor**
  - Tom Murphy: SERF 336: Thu. 11:00 AM–noon
- **Text**
  - *How Things Work: The Physics of Everyday Life*, 3<sup>rd</sup> edition, by Bloomfield

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## Extra Sessions

- **Discussion section: Wednesday 4:00–4:50 PM in Center 214**
  - Led by Matt
  - Focus on understanding concepts, mock quizzes, help with homework, actual discussion!!
- **Problem session: TBA**
  - Focus on solving problems of the type seen in homework and on quizzes
  - More quantitative than discussion section

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## How much Math?

- **The course is mostly conceptual/qualitative**
- **But part of the power of physics is its quantitative description of our world**
  - Some experiments in physics show adherence to model to 14 digits of precision!!
- **We'll dabble in the numbers, but it's never more complicated than  $\times$ ,  $+$ ,  $-$ ,  $+$ ,  $y^x$ , and maybe averaging**
- **Sometimes we must rearrange an equation:**  
 $V = IR$  becomes  $I = V/R$
- **There will be some seat-of-the-pants estimation problems too**
  - This may prove to be the hardest aspect, but not because of the math—it'll be because this is unfamiliar turf...

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## Expectations

- **Attend Lectures and Discussion Sections**
- **Participate!**
  - If it doesn't make sense, **ask!** Everyone learns that way.
  - Don't be bashful about answering questions posed.
  - In-class voting system should make this fun
- **Do the work:**
  - It's the only way this stuff will really sink in
  - exams become easy
- **Explore, think, ask, speculate, admire, enjoy!**
  - Physics can be fun, enriching, beautiful

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## Any Questions on Course Structure?

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## A Crude Roadmap

- **First couple weeks covering physics basics**
  - Motion, energy, force, power, electric forces, etc.
  - We'll pick up other physics as we go
- **The energetics of life**
  - Eating, exercising, fighting air & water
- **What can we see?**
  - Light, color, weird natural phenomena
- **What *can't* we see?**
  - Other electromagnetic radiation & application to cell phones, TV, radio, microwave ovens, heat (infrared), GPS
- **What can we hear?**
  - What is sound? How do speakers, CDs, ears work?

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## Roadmap, continued

- **How do we handle information?**
  - Digital storage, logic, computers, compression
- **How do we get work done?**
  - Generating electricity
  - Using electricity to do work: basic circuits
  - The insides of our electronic devices
- **Last part of course can follow student interest**
  - Topics of interest can come from bi-weekly Q/O, voting via transmitter, e-mail to professor, spontaneous class discussions
  - Keep your eyes open for things you'd like to know more about
  - Look at your book to stimulate ideas

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## What kinds of things will you learn?

- How to look at circuit diagrams without being frightened
- How to look at your broken radio and point out resistors, transistors, capacitors, diodes, ICs
- How your remote control works (and see it work!)
- How the music you hear is recorded, digitized, stored, replayed
- How TV signals carry video information that you then see on the screen as an image
- How binary logic works and how this is implemented in computers as transistor blocks
- How much energy you'll use keeping your house warm

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## Assignments

- **Check out the course website:**  
<http://physics.ucsd.edu/~tmurphy/phys8/phys8.html>
- **Establish WebCT connectivity & register transmitter**
- **Read Chapter 1 of book**
  - You can skip sections on velocity, position of falling balls, as well as section on projectile motion (pp. 15–21)
- **Transmitters will start counting for credit Tuesday 4/11**
- **First HW will be due Thursday 4/13**
- **First Q/O due Friday, 4/14 by 6PM via WebCT**

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