



Agenda for today...

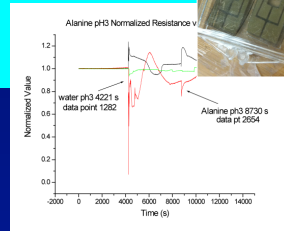
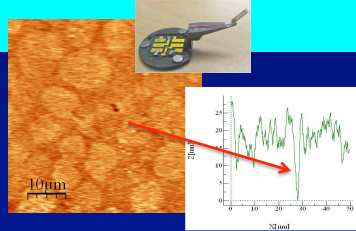
- Who is the instructor?
- What's this course about?
- What tools do we use?
- Get started with some measurements ...
learn a little stats

Phys 1021: Introduction, Pg 2

Who is the instructor?

Mark Reeves

- Education and training at University of Illinois, Naval research Laboratory
- At GW for 17 years
- Research interests: Condensed matter physics, Nanotechnology, Biophysics



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What do I do for fun?

.... Hiking



... Biking



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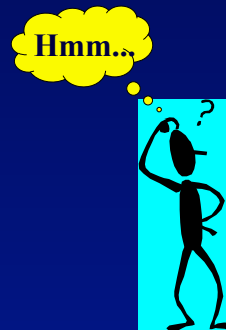
What is this course about?

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Thinking Physics

"Thinking Physics" means:

- investigating hypothesis
- scientific reasoning
- Quantitative modeling
- problem solving

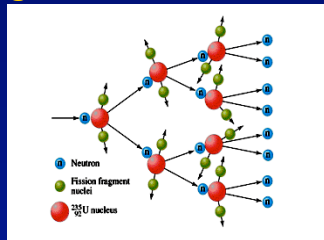
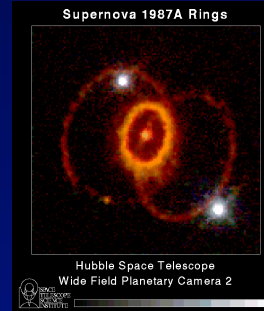


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What is Physics?

the study of the very big ...

fluids, magnetism,
semiconductors,
planetary orbits,
radioactivity, waves,
gravitation, sound,



... and

everything

in between ...

optics, electricity,
friction, relativity,
kinematics, heat,
torque, energy

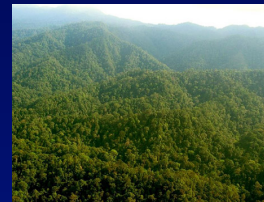
... to the very small

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What is Physics?

the study of the very big ...

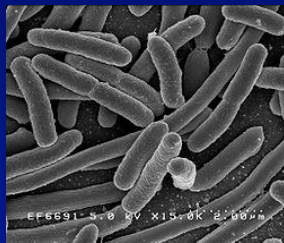
How much carbon
sequestered by photosynthesis
each year = 10^{14} kg (world-wide)



... and

everything

in between ...



... to the very small ...

How much carbon is produced an e.
coli bacteria in one cell cycle = 1×10^{-16} kg

Numbers are important ... accurate,
predictive models even more so

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How do we proceed?

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How do we proceed?

- *What do we do in class? –Almost no lectures!*
 - We practice **“Thinking Physics”**
 - Problem solving!
 - Analyzing and discussing physics concepts
 - Hands-on experiments
 - Cooperative group problem solving
- *Where do you get the material from?*
 - **Reading the book before class! (Warm-ups)**
 - **You will feel like you are learning a lot, if not all of the material, on your own**
.... This is intentional, you aren't in college to learn how to be taught in a classroom !

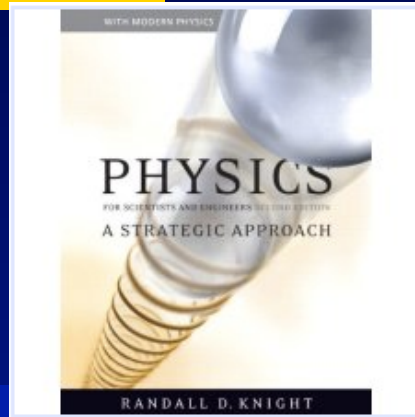
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Text book

This is a two semester course.

PHYS-1021 will cover Ch. 1-19.

PHYS-1022 will cover the rest



“Official” Text:

*Physics for Scientists and Engineers with
Modern Physics*

(2nd edition) by Randall D. Knight

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What we will learn

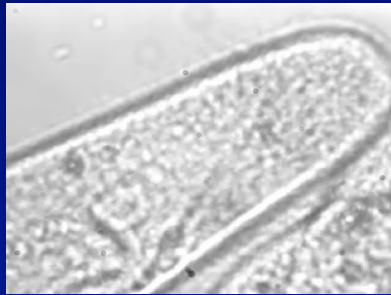
- ❖ Force
- ❖ Newton’s Laws: 1, 2 & 3
- ❖ Motion & circular motion
- ❖ Conservation of Energy
- ❖ Linear & angular momentum
- ❖ Fluids
- ❖ Elasticity
- ❖ Thermal physics



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Bio-connections

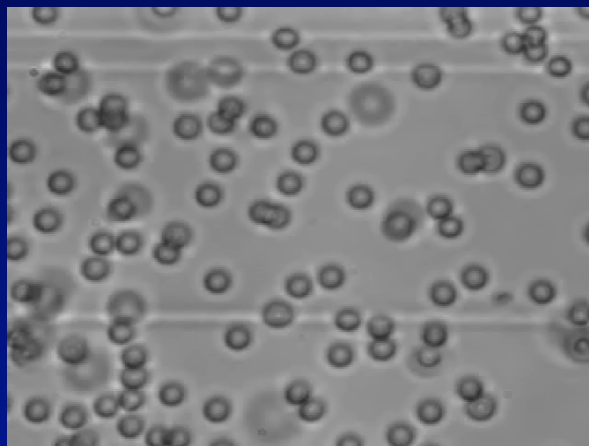
- ❖ Force, velocities and how cells move – molecular motors and viscosity



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Bio-connections

- ❖ Entropy and how heat moves things



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How do we learn “thinking physics”?

Teaching by telling doesn't work!!

The same way we learn to swim ...



... or play the piano ...



- by doing it!
- practice!
 - practice!!
 - ◆ practice!!!

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How do we proceed?

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How do we proceed?

- *What do we do in class?*
 - We practice *“Thinking Physics”*
 - Problem solving!
 - Hands-on experiments
 - Cooperative group problem solving
 - Brain storming – *don’t be afraid to be wrong*
 - Analyzing and discussing concepts
 - Working through examples
- *From where do I get the material?*
 - *Reading the book and other assigned selections before class!*

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This is not a sit back and enjoy the ride class

This class is a fast roller coaster

Get with the program

Use all the tools offered

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*"We're all in
this together."*

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The syllabus

Contains all important information:

- Class schedule
- Course overview
- Grading

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The grades

Absolute Grading Scale

Graded Items

- Warmups (Masteringphysics) 5%
- In class work 10+4+4=18%
- Homework (Masteringphysics) 11%
- Weekly quizzes 6%
- Exams 18+18+24%

Help and learn from each other!
.... And work like crazy

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The Exams (64%)

Midterm 1: Friday Feb. 18: outside of class

Midterm 2: Friday April 1: outside of class

Final: TBA

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What is MasteringPhysics?

MasteringPhysics is an online learning assignment and assessment solution that provides you with the tools and resources you will need to achieve success in this course and beyond.

- ❖ Improves your learning and retention through engaging media.
- ❖ You can access MasteringPhysics at anytime, anywhere
- ❖ Makes managing assignments easier so you can spend more time studying.
- ❖ Not yet another online homework system
 - Electronic book available, free with new text book
 - References, libraries
 - We compared many and picked this one to help you the most!

Using any web server, such as Internet Explorer, Chrome, Safari, Netscape, or Mozilla Firefox, go to:

<http://www.masteringphysics.com/>

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MasteringPHYSICS[®] Make Learning Part of the Grade[®]

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Incorrect Responses per Student

Category	prepared group	unprepared group
Linear	~2.5	~3.5
Energy	~2.0	~3.0
Angular	~1.5	~2.5
Gravitation	~2.0	~3.0
Torque	~1.5	~2.5
Rotational	~1.0	~2.0

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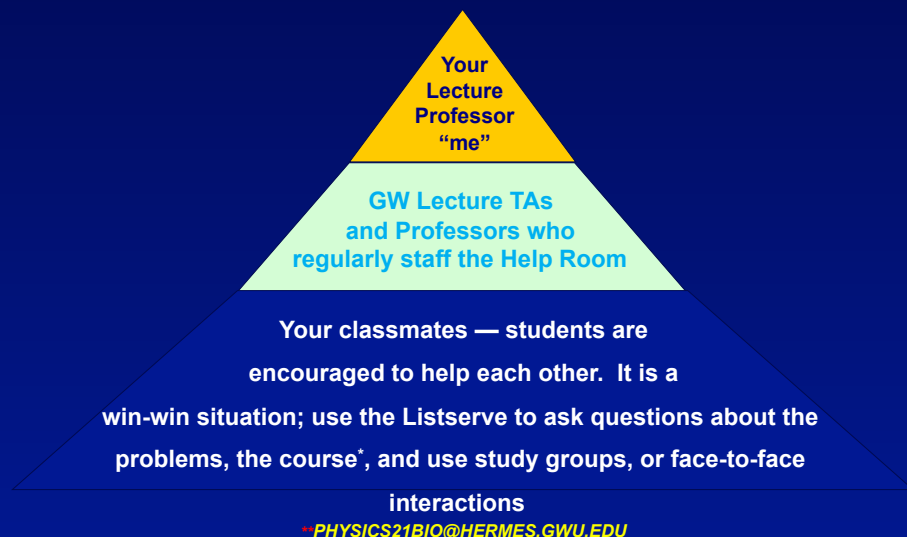
Mastering Assignments

Course grading elements administered:

1. Pre-class WarmUps (5%) – open at 6:00 AM on the day BEFORE the associated lecture; close at 2 pm on the day of the lecture. First warmup opens Tuesday morning.
2. Homework Sets (15%) – Usually open at by noon on Saturday; closing times are a week and 2 days later on Monday at 11:59PM. The First homework is open.

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MasteringPhysics Help pyramid



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Physics Help Room

Corcoran Hall 212B

- Staffed with TA's, instructors, physics majors
- Terminals for doing ConnectPlus assignments
- Ideal for working together on homework!
- Open many times each week (see posting on door)
- Go whenever you like

This is a major resource for you. Use it well!

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It is very important that you understand that completing the Mastering assignments during their period of availability is **YOUR** responsibility. If you wait until the last minute, you do so at your own peril. For example, if the computer system crashes or you cannot gain access to **Mastering for ANY** reason, it is your problem.

(There was one exception to the "No Exceptions" rule.)



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Math



- We will use calculus ... and you should also know ...
 - ♦ . . . high school algebra, trigonometry, and a little geometry. You should consult the Mathematics Review at the back of the course text and make sure that you are comfortable with the mathematics presented there.

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Math



You will need a small pocket calculator for this course.

It does not need to be a very fancy calculator.

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Blackboard

Announcements

Syllabus

Presented PPT Slides

Staff Information

Course Information

Some External Links



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Course website: www.gwu.edu/~phy21bio

Physics-21-Bio

Course homepage

[Home](#)
[Administrative](#)
[Resources](#)
[Schedule](#)
[FAQ](#)

Welcome to the course homepage for the bio-focused Physics-21. Click on the [schedule](#) to look at the day's assignments. Do you have a question about the course, the homeworks, how to solve a problem? Post it on the [LISTSERVE, PHYSICS21BIO@hermes.gwu.edu](mailto:LISTSERVE_PHYSICS21BIO@hermes.gwu.edu).

Announcements:

- Items to do before classes start
 - Read the [syllabus](#) carefully
 - Read The Biology of B-Movie Monsters paper by [LaBarbera](#)
 - Read the Feeling for Biological Numbers paper by [Phillips and Milo](#)
 - Optional: Read the "Life in Physical World" paper by [Vogel](#)
 - Get the book, Knight, Physics for Scientists and Engineers, 2nd edition. This book is bundled with a subscription to the electronic homework and tutoring system, masteringphysics.com. Here are a few options:
 1. Go to the bookstore and purchase the bundled package
 2. Go completely electronic – online to masteringphysics.com, and purchase a license there (\$50 without electronic text, \$92 including electronic text). Note that the license will expire in 1 year, after which, you will no longer be able to access the electronic text.
 3. Avoid the bookstore altogether by getting the text online, and, in parallel, purchasing the license from masteringphysics.com. If you do this, be sure to get the second edition, not the first edition. There are significant differences between the two. Also, if you purchase the multivolume edition (like the one in the bookstore) you will need vols 1 and 2 for Phys 21.
 - Purchase a bound (not spiral) notebook for the class.

Curriculum development for this course is being by the NSF DUE CCLI Phase 1 grant: A Bio-Focused Introductory Physics Course



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Let's start practicing!

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