

August 29, 2016

Physics 131

Prof. E. F. Redish

■ Theme Music: The Rolling Stones

Start me up

■ Cartoon: Lynn Johnston

For Better or for Worse



NEXUS/Physics

- The goal of this course is to help you understand the physics you need for advanced bio, chem, and professional school classes.
- This course is part of a new national model created here and supported by the Howard Hughes Medical Institute and the National Science Foundation.
- It is particularly designed to match the new MCAT exam.
- We are continuing to work on understanding how to make this class more effective for you.

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This week

- Go to our homepage and read it all carefully!
 - <http://www.physics.umd.edu/courses/Phys131/fall2016/>
- There is a recitation this week! (None next week.)
- Please go to lab (with your laptop and a flashdrive) to install the lab software and complete the online surveys. (5 pts each)
- Sign up for WebAssign.
- Register your clickers.
- Do the readings for each class –
WA questions begin next class.

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Overarching themes

- | | |
|---|---|
| <ul style="list-style-type: none"> ■ Thinking physically <ul style="list-style-type: none"> – Mechanism – Coherence – Multiple representations ■ Models <ul style="list-style-type: none"> – Identifying key elements – System schema ■ Connecting to what you learn in biology and chemistry classes! | <ul style="list-style-type: none"> ■ Math <ul style="list-style-type: none"> – Quantifying your experience – Thinking with equations ■ Thinking about your thinking <ul style="list-style-type: none"> – Debugging – Checking – Strategizing |
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Motivational Reading (in Files on ELMS)

- For biology majors
 - Joel Cohen,
“Mathematics is biology’s next microscope”

- For pre-meds
 - Jerome Groopman,
“How Doctors Think” (Chapter 1)

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How we do it

- Reading first / Flipped class
- Working in groups
- Problem solving
(serious homework!)
- Thinking on tests
(really!)
- Scientific community
(non-protocol) labs

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Reading First

- There are readings to do before every lecture.
- For some of these readings you have to ask a question or answer some on WebAssign (due at 9PM the night before). (1 pt each)
 - These questions will affect what happens in class.
- Part of the goal is to help you learn to read scientific text more professionally.
 - Working out difficult issues.
 - Connecting what you are reading with other things you know.
 - Thinking about the next step.

If you have questions on the other readings, post it on the discussion group for readings in ELMS

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Web links for readings

- **Homepage**
 - <http://www.physics.umd.edu/courses/Phys131/fall2016/>
- **Schedule with links to reading**
 - <http://www.physics.umd.edu/courses/Phys131/fall2016/ScheduleR.html>
- **WebAssign assignments (Class key umd 8810 2823)**
 - <http://www.webassign.com/>
- **Full text**
 - [http://umdberg.pbworks.com/w/page/90716129/Working%20content%20I%20\(2015\)](http://umdberg.pbworks.com/w/page/90716129/Working%20content%20I%20(2015))

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Problem Solving

- Physics is very much about learning to apply general principles to new situations. (Like medical diagnosis)
- These applications are often NOT amenable to automated thinking (algorithms).
- Problems in this class will NEVER be “plug and chug” or just using a memorized equation to calculate something.
 - Essays
 - Modeling (creating equations)
 - Sense-making
 - Estimation (NOT guessing)
 - Representation translation & coherence building.
- Some problems will be difficult to do alone. They are designed to be done in groups!

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Working in groups

- Science is not just a collection of facts or even of methods: it’s a conversation.
- One of the things you have to do in learning to solve hard problems is to ask yourselves questions that let you bring up what you know. It’s often best to learn to do that by asking others.
- Good communication skills and the ability to work in teams are highly valued in modern workplace environments (including in health care).

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Group activities

- In-lecture clicker questions.
 - You get a point each time you share an answer with the full group.
- Group problem solving in recitation.
- Working in groups in lab.
- Find a group to work with on HW!
 - Our homework is designed for working together.
 - Course Center highly recommended.
 - How to do this without copying?!

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Read the class Homepage, Mechanics page, and Grading Details carefully!

- There are ~1300 points in this class!
 - Two hour exams @ 100 pts each
 - One final exam @ 200 pts
 - Labs @ 165 pts
 - HW @ 300 pts
 - Eleven Quizzes @ 10 pts each (lowest dropped)
 - Reading questions, clickers, lab & recitation interactions, & surveys (participation) 335 pts
- You need about 80-85% (~1100 pts) for an A!

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