Welcome to PHYS 157

Introductory Physics for Engineers !

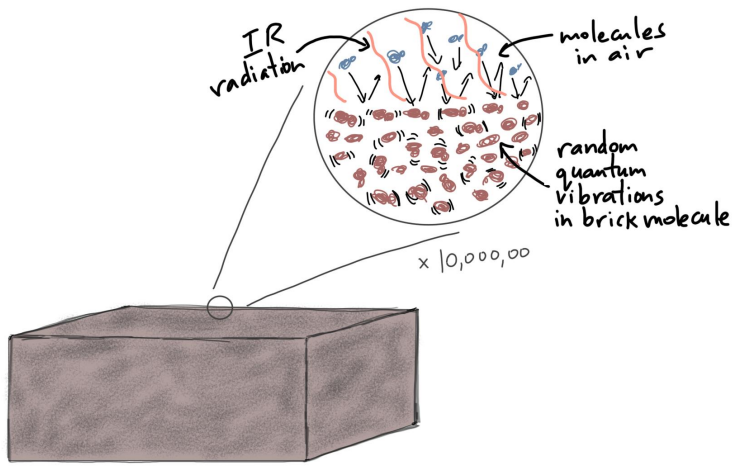
Section 102

MWF 13:00-13:50

Dr. Marina Litinskaya

Lecture 1.

Introduction.
What this course is about?



Instructor: Dr. Marina Litinskaya (left in this picture)

Office: Henn 334

Email: milt@phas.ubc.ca

Research interests: Optics and spectroscopy of atoms, molecules and nanostructures (theory)

- Same said in a simple way: I use light to learn about what's going on inside gases and solids, and to manipulate various processes in atoms and molecules.

Teaching: PHYS 100, 131, 118, 157 (first time), 158, 159, 170, 333

Course coordinator: Megan Bingham

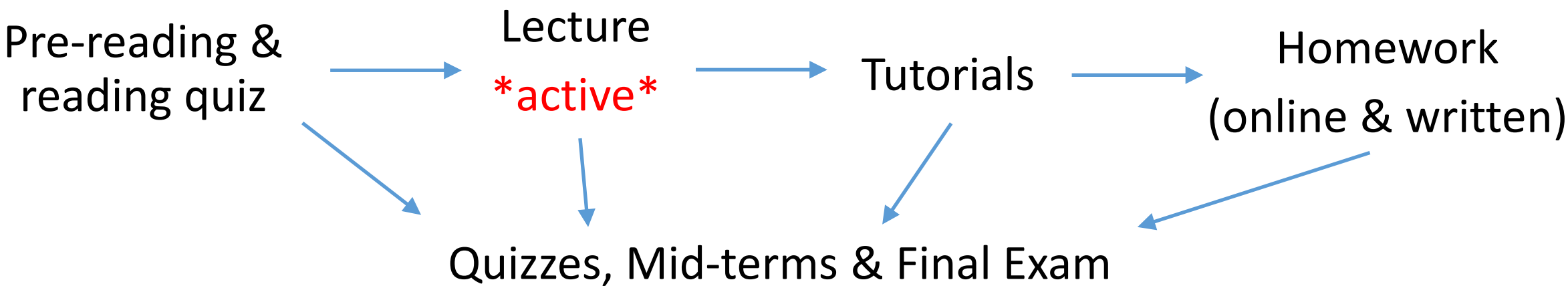
- Email: coursecoord@phas.ubc.ca
- Contact Megan for all administrative questions (example: academic concession requests) with your name, student number, course number, and lecture and tutorial sections

More about me

- My role is mainly to tell you interesting things about physics, and to help you learn.
- I like questions. Please ask them. Suitable occasions:
  - Office hours (Zoom). Time TBA.
  - After each lecture (with rare exceptions).
  - Email me for an appointment (milt@phas.ubc.ca).
- I am convinced that there are no stupid questions. At least, I have never heard one.
- I don't know any single person who understands everything immediately.
- Many people say that I am not scary. Feel free to contact me if need be.

…and now about the course.

How the course works

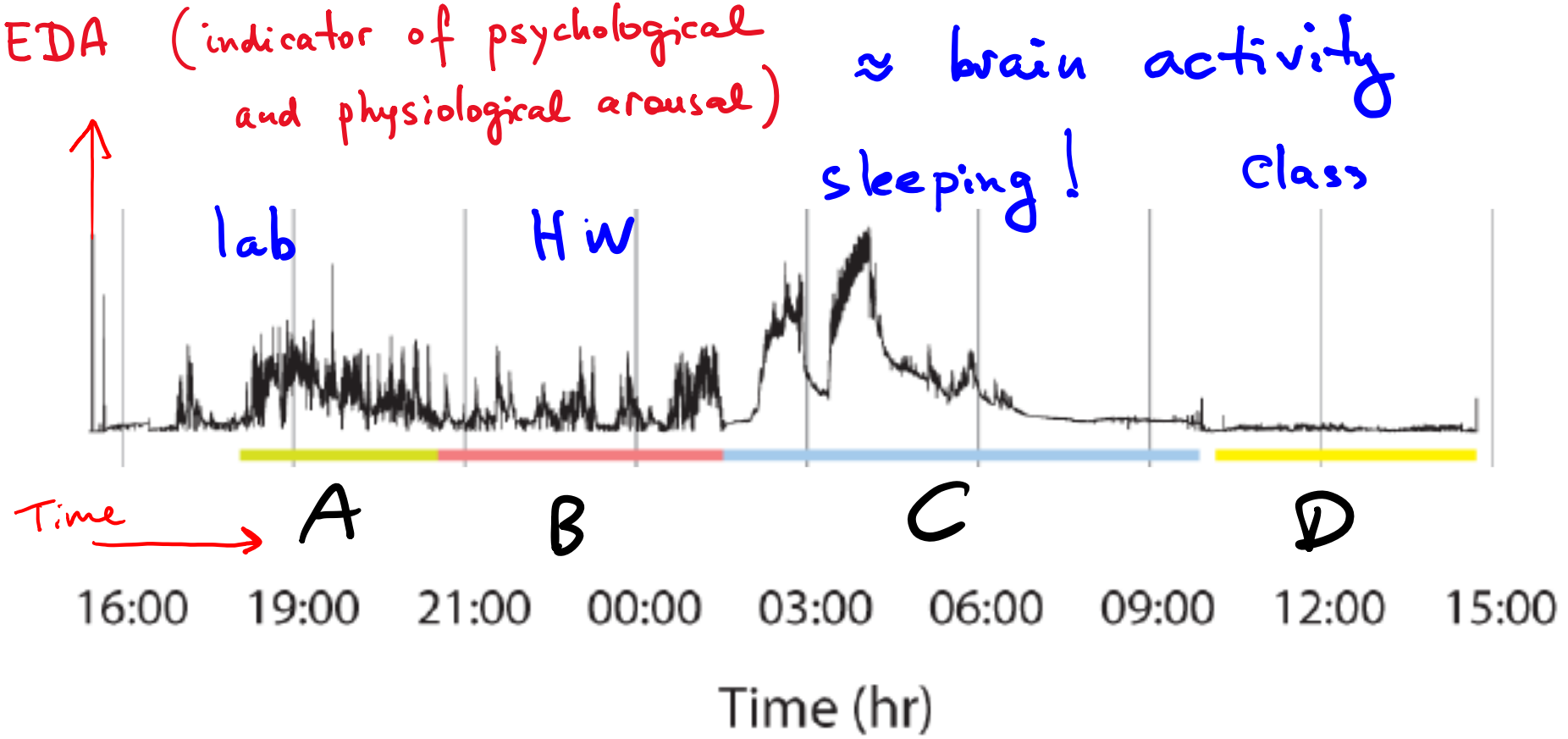


- Quizzes, Midterms & exams will have multiple choice and numerical answer questions (similar to clicker questions in lecture) and written questions (similar to tutorial and homework questions)

Grading Scheme

Reading Quizzes	3%
Tutorials (marked based on participation credit)	6%
Mastering Physics Homework	6%
Written Homework	9%
Quizzes	18%
First midterm	13%
Second midterm	13%
Final exam	32%

active lectures



Q: Which segment shows EDA during class time?

Poh, M.Z., Swenson, N.C., Picard, R.W., IEEE Transactions on Biomedical Engineering, vol.57, no.5, pp.1243-1252, May 2010

How to get started

- Sign in to Canvas with your Campus Wide Login (CWL)
- The PHYS 157 course Canvas site contains EVERYTHING you need:
  - General information, course goals, schedules, assignments, grades, etc.
  - Read Syllabus very carefully!
- Complete the steps in "What you need to do in the first week" (posted on Canvas)
- Visit the bookstore (online or in person) to get textbook and Mastering Physics code.
  - There are various options for this, explained in the syllabus (on Canvas)
- Sign up for Piazza: https://piazza.com/ubc.ca/winterterm12023/phys157allsections2023w1
- Sign up for an iClicker Cloud account and link to this course (join code: https://join.iclicker.com/UEEV)

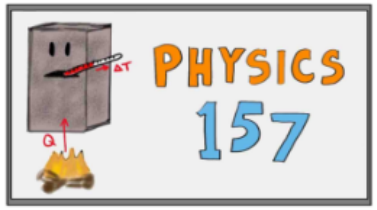
Canvas navigation

2023W1

- Home
- Assignments
- Grades
- Piazza
- Modules
- Announcements
- Zoom
- Course Evaluation
- iClicker Cloud

PHYS 157 ALL SECTIONS 2023W1 Introductory Physics for Engineers I

Edit



Local Time
(Vancouver, Canada)
Tue, 5. Sept 2023
05:03 p.m.

[What You Need To Do In The First Week]

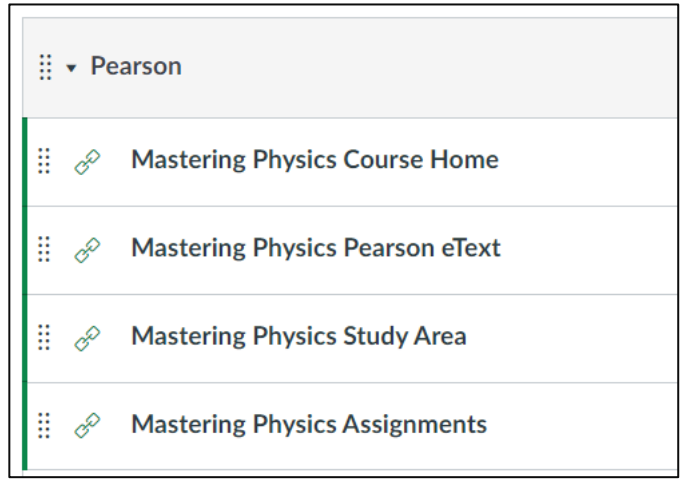
Section 101	Section 102	Section 103
Professor: Amali Jambuge amali.jambuge@ubc.ca Lecture time: 9am-10am MWF Office hours: Wednesday 10.15-11.15 am Office Hours Zoom Link	Professor: Marina Litinskaya mlit@phas.ubc.ca Lecture time: 1pm-2pm MWF Office hours: TBD Office Hours Zoom Link	Professor: Steve Dierker steve.dierker@ubc.ca Lecture time: 2pm-3:30pm T/Th Office hours: Tuesday 4-5 pm Office Hours Zoom Link

Basic Information:

Syllabus	Learning Goals	Topics & Reading Assignments
Tutorials	Homework	Health Safety
Contacts	Academic Integrity	Academic Concession

Weekly summaries of course content:

Week 1	Sep 6-8



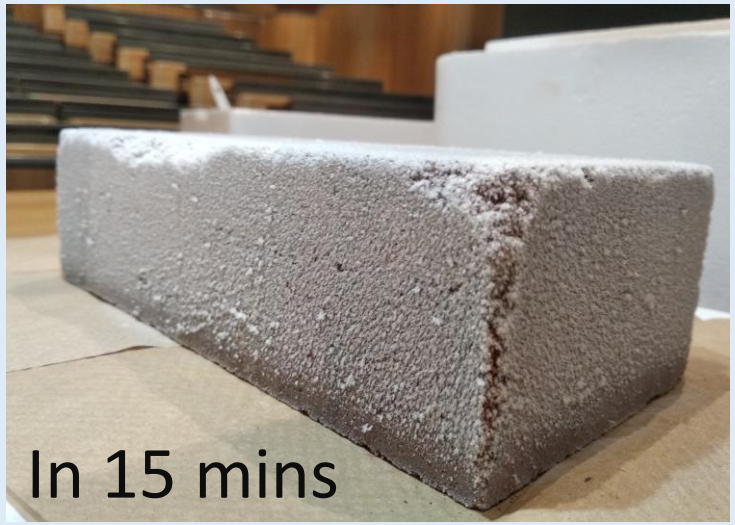
- Online homework & eText

Section 102
Sep 6: pre/post Lecture Slides
Sep 8: pre/post Lecture Slides

- All relevant information

A story of a brick, or What we can see if we pay attention

Where do these icicles come from?



In 1 hr

Why does this melting occur?

A story of a brick, or What we can see if we pay attention

What is happening / changing here that is not immediately apparent?

cold brick

warming up

grabs water molecules from air and freezes them

molecules vibrating in brick (energy transfer)

touching warm table

geometry matters for melting

air convection

} temperature, phase transitions, heat transfer

A story of a brick, or What we can see if we pay attention

I. Thermodynamics

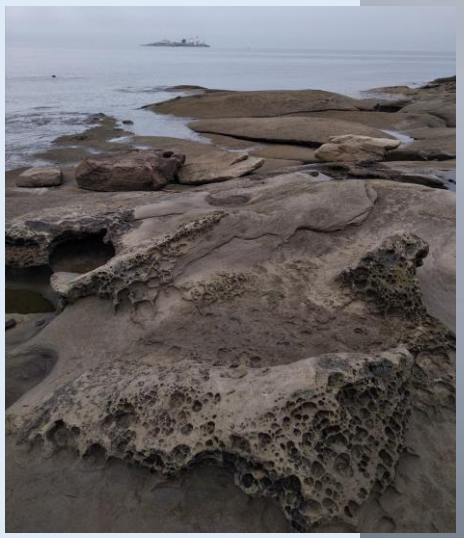
- The brick initially was very cold – it assumed the temperature of dry ice (heat exchange between objects in contact?)
- Then it started to warm up – how?
  - Getting heat from air molecules? From their kinetic energy?
  - Getting heat from the desk? How exactly?
  - Getting heat from other objects in the room (thermal radiation)?
- Icicles: molecules of water in the air? How does the brick catch them?
- When the water molecules are caught: they freeze to ice (phase transition)
- Then the ice starts to melt into water (another phase transitions)
  - As a matter of fact, we have three states of H2O here: gas, liquid, solid!
- What does it mean that the brick gets heat? What exactly changes in it? What, in fact, temperature is?

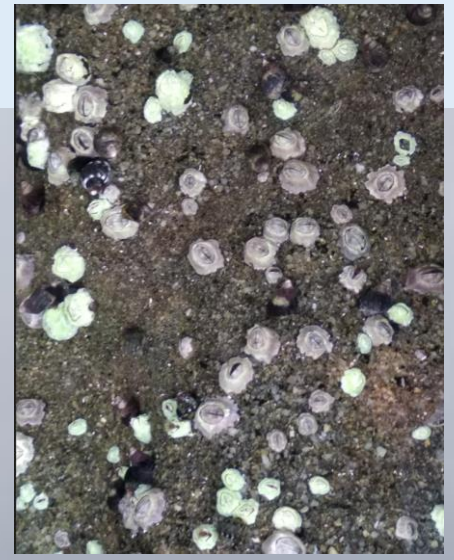
II. Waves

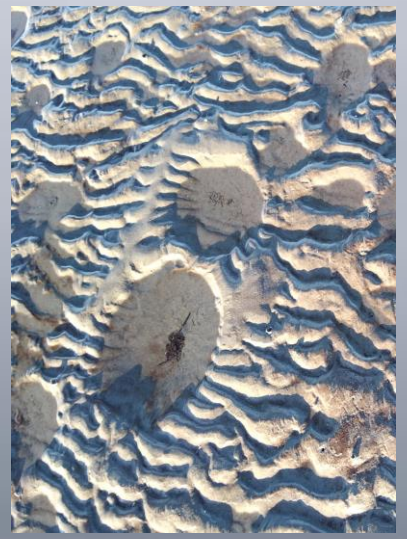
- How we can see all this? (Light = electromagnetic wave)
- How we can discuss all this? (Sound = mechanical wave)
- ……

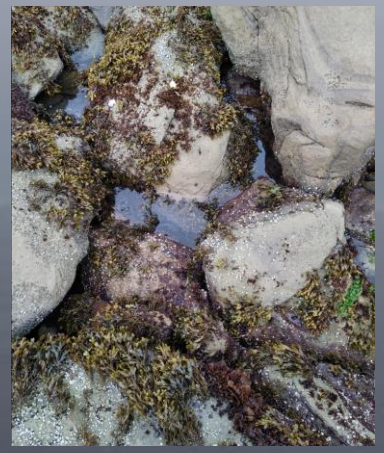
What is ocean?

- H_20 + NaCl…





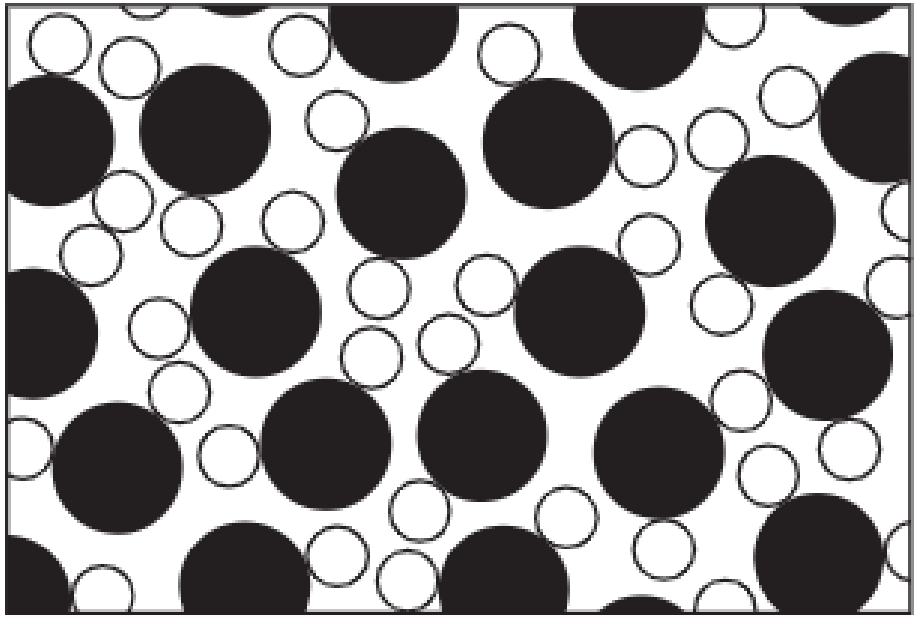




If, in some cataclysm, all of scientific knowledge were to be destroyed, and only one sentence passed on to the next generations of creatures, what statement would contain the most information in the fewest words?

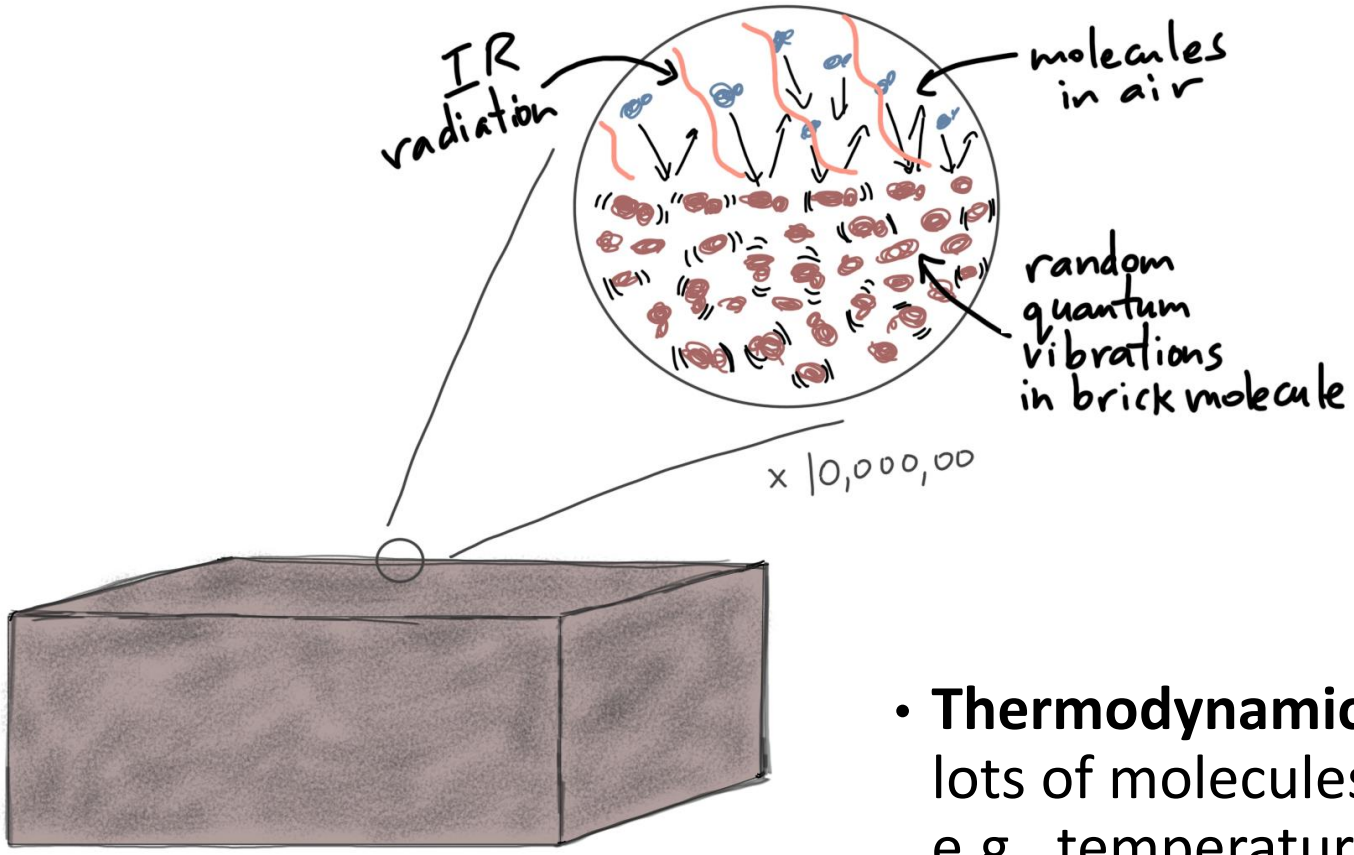
I believe it is the ***atomic hypothesis*** (or the atomic *fact*, or whatever you wish to call it) that *all things are made of atoms—little particles that move around in perpetual motion, attracting each other when they are a little distance apart, but repelling upon being squeezed into one another*. In that one sentence, you will see, there is an *enormous* amount of information about the world, if just a little imagination and thinking are applied.

Richard Feynman
https://www.feynmanlectures.caltech.edu/I_01.html


WATER MAGNIFIED ONE BILLION TIMES

1. Thermodynamics: how to summarize physics of 10^{23} microscopic things?

About this course

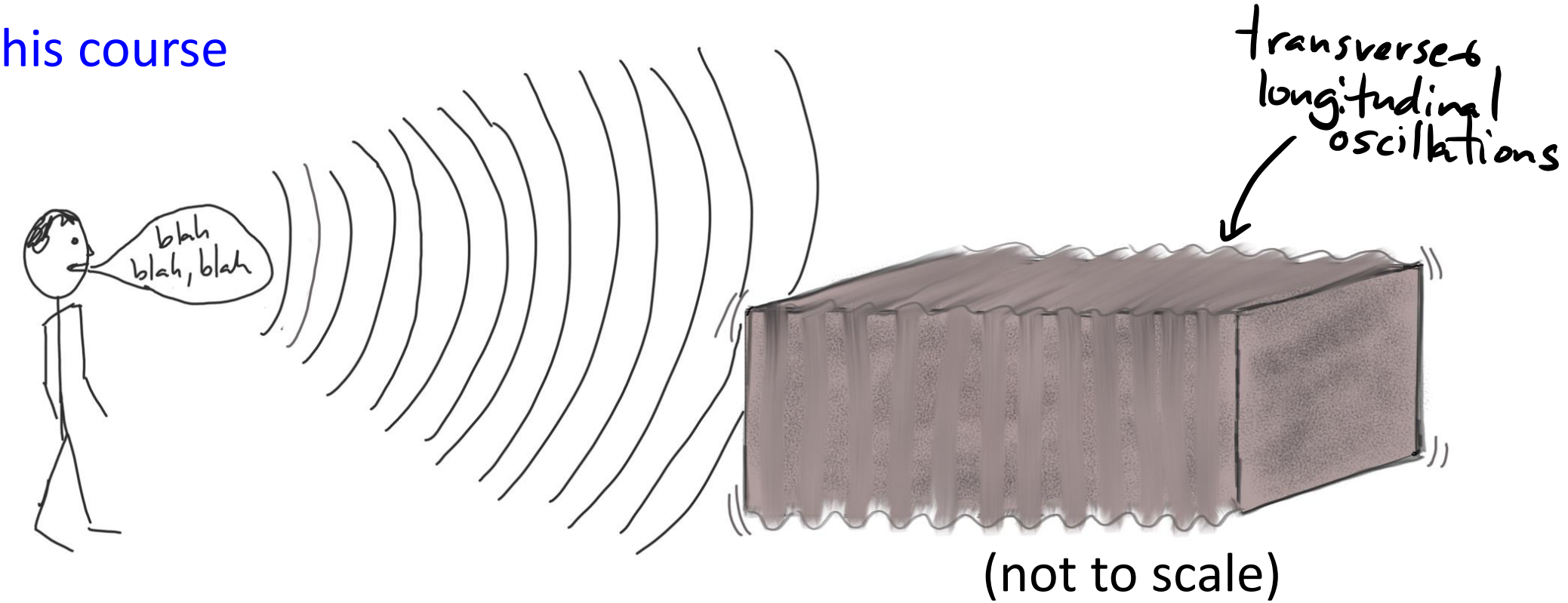


- Macroscopic vs microscopic viewpoints
  - Macro: Overall behavior of a system (such as temperature).
  - Micro: Behavior of the particles making up a system (such as kinetic energies of molecules).

- **Thermodynamics**: summarizes the average properties of lots of molecules by defining "macroscopic variables", e.g., temperature, pressure

2. Oscillations & waves: collective motions of macroscopic collections of molecules (e.g., sound waves, guitar string, ocean waves,…)

About this course



(not to scale)

Also: more fundamental waves: e.g., light, gravitational waves

Next Time:

Make sure to register your clickers, since we will start with choosing the best time slot for office hours (Monday afternoon)