Physics 114 Culminating exercise 2021

Timing: There is Part 1 (test) and Part 2 (presentation). They don't have to be done at the same time. Both must be completed by the last day of finals, May 20.

Part 1:

An open book test that asks you to do short questions (some short answers, some short calculations) on material that should be familiar from our 12 weeks together.

The short calculations will be much closer to "warmups" than to the "hand-in" questions. I'll focus on important ideas that permeated our work, and ask for skills that we've built up over time.

I'll post a **Practice Test** by the beginning of Reading Period, to help you gauge the length, depth, types of questions that might be asked. Hopefully, after you study, it will also be helpful to you as ... well ... practice for the real test :-)

More info about the test:

1) It is open book/notes/our Moodle site/our Google Drive with solutions.
2) Please study for it. Incentivizing studying is the only good reason I can think of for giving a test!
3) You can schedule taking it in any 3 1/2 hour block of time that is convenient for you during the exam period from May 13 - May 20.
4) A Google Doc will be available later in this last week of classes, for you to specify the time you want to take the test. Thank you for, before May 13, committing to a time that works for you.
5) I'll email the test to you at your start time. You have 3 1/2 hours to email answers back to me. I'll do my best to write a test that, if one has studied, takes comfortably less than 3 hours to do. I'm adding an extra half hour for you to check work, scan, and be sure the scans you email back are legible.
6) If you have an extra time accommodation, that extra time will be added on.

Part 2:

• A **short presentation in either written form** (2-4 pages) or **video form** (5-7 minutes) ... your choice.

• **The source of info:** One of the B&B sections which we have not directly covered.

• **Grading Rubric:** Did you

i) **Motivate** why this topic is interesting?

ii) Demonstrate how the **background ideas are rooted in our seminar?**

iii) **Make it your own** as you unpack ideas, derive equations, and discuss theoretical or real-world impacts?

iv) **Solve, in good pedagogical style, at least one short problem** - either one you choose from the chapter-end problems in B&B or else one which you invent ... perhaps an elaboration on an example in B&B? **A short computer-aided calculation or simulation would be a fine substitute for this problem.**

• **In a nutshell:** Show that our seminar has prepared you to explain a novel system, application or extension of our seminar. Create the kind of short presentation we might have given in a seminar, had we been in the real world, and had more than 12 weeks of 90 minutes meetings :-}

• **Chapters from B&B** on which you could base your presentation are listed below. You do not have to cover a whole chapter. In fact, **please do not!** One long B&B section or a couple of short ones is a perfect basis for this exercise. Please feel free to vet your choice with me before you start to write.

*If you wish to use an additional reference besides your section(s) of B&B it's OK, but do cite it.

Ch. 10 The diffusion equation
Ch. 15 Entropy and Data compression
Ch. 15 Entropy and Quantum information
Ch. 17.2 and 28.4 Bubbles and droplets
Ch. 17.1 Wires and rubber bands
Ch. 25 Relativistic gasses
Ch. 31 Sound waves
Ch. 32 Shock waves
Ch. 33 Brownian motion
Ch. 34 Non-equilibrium thermo (This chapter includes the arrow of time :-)
Ch. 35 Stat mech and thermo of stars
Ch. 36 Compact stellar objects
Ch. 37 Earth's atmosphere (This chapter works up to global climate change :-o)