Guidelines for Presenting Physics 1204 / Music 1466 Homework Assignments

This course is a Writing in the Majors course. We aim to teach you how to write well about the physics of musical sound, as well as to understand the physics and solve physics problems.

I am very proud that for each of the five years I have taught this course, one of my students has won the Knight Prize for best term paper in a Writing in the Majors course. How do we keep up this excellent standard? By encouraging, pestering and nagging you all to write well on every assignment you hand in!

1. Presenting a solution that requires equations

You need enough words to explain what you are doing, but you don't need a lot of words!

Each equation is usually introduced by some text. The equation goes on a separate line, indented and italicized. The equation is usually part of a complete sentence and needs a punctuation mark after it.

Equations must be properly typeset, or written in by hand.

Example: Question 2(a) from HW 3, 2008 - An Intense Neighbor

> Your annoying neighbor is playing his boom box again. During one 3 minute long heavy metal song, 150 J of sound energy passes through your study window. Your window has dimensions 0.80 m by 1.20 m.
> (a) What is the intensity of the sound passing through the window?
>
> **SOLUTION:**
>
> **2(a)** The intensity *I* of the sound arriving at the window is given by
>
> $$I = \frac{power}{area} = \frac{energy}{(time)(area)}.$$
>
> Substituting in the given numerical values gives
>
> $$I = \frac{150\ J}{(3\ mins)\left(\frac{60\ sec}{1\ min}\right)(0.80\ m)(1.20\ m)}$$
>
> $$= \boxed{0.87\ W/m^2}.$$

We are asking you to do this because it is the required style for all professional scientific journals. We will provide detailed homework solutions that you can use as a model for future assignments.

2. How many significant figures should I use?

For this course, three significant figures will usually be fine. Please don't give us 7, 8, 9… significant figures, just because that's what you see on your calculator screen.

3. Where do I write in units?

Look at the example above for guidance. You must write in the appropriate unit next to <u>every</u> number your write in your equations, and of course next to your final answer. This is "correct" grammar" for writing equations. Including units helps you avoid errors such as writing equations upside-down.

4. Please put your final answers in boxes

This helps us to grade your work more efficiently.

5. How much should I write for questions which require a verbal answer?

You should write enough to explain your answer clearly. Your writing should be clear and concise. Don't include extra facts "just in case"! That decreases the clarity of your writing, because you are distracting the reader's attention away from the point you are trying to make.

Example: Question 4 from Homework 3, 2008 - Logarithms and Musical Sound

> Explain why logarithms are so important in musical sound. Start by explaining the connection between logarithms and sensation, and go on from there. (*You'll probably need a few paragraphs.)*
>
> **SOLUTION**
>
> **3.** Logarithms are important in musical sound because they are tied closely to our perception of both pitch and loudness. The sensation of pitch follows Fechtner's law: "As a stimulus is increased multiplicatively, sensation is increased additively." However, we also know that when a number is increased multiplicatively, its logarithm increases additively. Thus Fechtner's law asserts that our sensory processing system "takes the logarithm" of the stimulus and perceives that logarithmic value as the sensation.
>
> A thought experiment involving octaves provides a good illustration of the logarithmic relationship between frequency and pitch. Consider a series of notes, each one an octave higher than the previous note. Each time you go up an octave the frequency of the note is increased by a factor of 2, so the frequency differences between successive notes increase. However, differences between the *logarithms* of the frequencies of successive notes are constant (equal to log 2) and fit with our perception of equal pitch intervals (octaves) between notes.
>
> Our perception of loudness approximately follows Fechtner's law. Repeated multiplication of sound intensity by the same constant factor produces increasing intensity differences between successive sound levels. However, we perceive approximately same-sized increases in the loudness of the sound.

In the above example, every sentence either makes a scientific point, or connects you to the next idea. Although the writing is concise, it still has flow.

After I wrote this piece, I re-read and edited it about FIVE times. Each time I re-read it, I tried to imagine being my intended reader (you!), reading it for the first time.

As you re-read your work, ask yourself: does every sentence work towards making the point I am trying to make? Is there anything in my piece that is unnecessary and could be cut? Do I have enough "connective tissue" to hold the piece together and generate flow from one sentence to the next?

6. Study the homework solutions carefully

They are your model for how to present your work well.

7. DON'T WORRY!

We DON'T expect Assignment 1 to be perfect! This standard is what we're working TOWARDS during the semester.

Best wishes, Dr Selby