**Primary Topic:** Introduction to Graphing and Figures in Microsoft Excel

**Supporting Topics:** Units and Cell References

**Technical Objectives:**

* *Create* figured and graphs within Microsoft Excel
* *Utilize* cell referencing to perform calculations
* *Perform* unit calculations

**All graphs and charts must be legible to receive credit!**

1. **In an Ideal World…**

You are recreating Benoît Paul Émile Clapeyron’s (yes that’s a real name) discovery of the Ideal Gas Law (Equation 1) in 1834. You have gathered a number of experimental measurements of pressure *P*, volume *V*, amount *n* (in number of moles), and temperature *T* of nitrogen (N2) for various conditions. To determine the ideal gas constant (*n*), the first step is plotting the relationship between *P\*V* and *n\*T*. Additionally, since this is 2017 and you know what the general value of *n* should be, you have data from a model as well. Plot both the experiment and model on a single graph and make an assumption about the accuracy of your experiments.

(1)

1. **Higher Education**

You are now the dean of the College of Engineering at Wheatley University in 2077 (named after the primary benefactor, revolutionary biomechanicist, and first ever Space Rockstar Ben Wheatley). Your job is to convince the Provost that you need more faculty in the Department of Mechanical Engineering. The data provided are for both Wheatley University and similar competing institutions. Present the data graphically for both student to faculty ratio and course to faculty ratio such that the need for more faculty in the ME department is clear.

1. **Zombies - Everyone Stay Calm**

The zombie apocalypse is upon us. Unfortunately for zombies (and Hollywood), instead of society crumbling as we know it, people didn’t panic and the zombies eventually all died of starvation (imagine that). Data are presented with the number of infected people as measured throughout the outbreak. Plot the data with discrete points and connect the points with a line (not smoothed). Use the line to estimate the number of people infected at day 16? What about at day 92?

1. **Introduction to Stress and Strain**

The stress-strain curve is one of the most commonly used approaches to study mechanical behavior of material. Stress is calculated as force divided by area (Equation 2), while strain is displacement divided by initial length (Equation 3). Imagine you are stretching a rubber band the more force you apply (higher stress) will result in more stretching (higher strain). From the provided force-length experimental data, calculate stress and strain and plot on a graph. Make the graph three inches high, 4 inches wide, and ensure proper font size and axis labels. The graph must be readable!