Saylor's Chart of Thermodynamics

Step #1: What is the thing being analyzed?

- Is it a closed system or a control volume? Answering this question will enable you to determine which of the columns you live in. You can only live in one. You must also decide if you have a transient problem or not.

Step #2: Is the problem a transient problem, or a steady-state problem?

Step #3: Will I need to use Conservation of Energy, an Entropy Balance, or both?

- The answer to this question will determine whether you live in the first row, the second row, or both rows.

	Closed System	Control Volume
Conservation of Energy	$\Delta E = Q - W$ $\frac{dE}{dt} = \dot{Q} - \dot{W}$	$\frac{dE_{C.V.}}{dt} = \dot{Q}_{C.V.} - \dot{W}_{C.V.} +$ $\sum_i \dot{m}_i(h_i + \frac{V_i^2}{2} + gz_i) - \sum_e \dot{m}_e(h_e + \frac{V_e^2}{2} + gz_e)$
Entropy Balance	$\Delta S = \int_1^2 \left(\frac{\delta Q}{T}\right)_b + \sigma$ $\Delta S = \sum_j \frac{Q_j}{T_j} + \sigma$ $\frac{dS}{dt} = \sum_j \frac{\dot{Q}_j}{T_j} + \dot{\sigma}$	$\frac{dS_{C.V.}}{dt} = \sum_j \frac{\dot{Q}_j}{T_j} + \sum_i \dot{m}_i s_i - \sum_e \dot{m}_e s_e + \dot{\sigma}_{C.V.}$

Step #4: Now that I've decided what equation(s) to use, I need a way to get properties such as u, h, s, and others. What is my property model?

- There are many ways to get properties. Examples include tables, plots, equations, and charts. Note that your choice may be dictated by availability of resources. In this course, the rule of thumb is to use the most accurate resource at hand. Equations of state help you relate (p, v, T). Note that the ideal gas equation of state is only one example of an equation of state.

A surprisingly common error is to use the ideal gas equation of state for liquid water, or other liquids, or blocks of solid lead... do not do this.