**Pre-Lab Questions**

* **Understand the details of how every instrument you use operates.** You should be able to find and learn most or all of this information from the instrument manual, manufacturer’s website, literature, textbooks, or sometimes Wikipedia for very basic information.

1. What is the overall purpose of the measurement or instrument procedure? (Not all below items will apply to every instrument!)
   1. Quantify a compound? If so, what exactly does it quantify? Concentration? Total mass?
   2. Identify a compound? How? (e.g., by elution time, spectral features, etc.)
   3. Characterize a compound (e.g., aromaticity, % of different functional groups)? How?
   4. Separate compounds? How (what is the theoretical principle)?
2. What are the basic parts of the instrument hardware? What is the purpose of each part?
3. What exactly is the instrument doing or measuring? (e.g., measuring the light intensity transmitted through the sample?)
4. Are there detectors? If so, what does the detector do? If there are multiple detectors on the same instrument, what are the advantages and disadvantages of each detector?
5. If the instrument comes with different options, what are the advantages and disadvantages of the different options? (For example, types of crystals for ATR-FTIR spectroscopy, cuvette materials for UV-vis spectrophotometry, molecular weight cutoff (MWCO) for ultrafiltration membranes, etc.)
6. **How do you check that the instrument is working properly and sufficiently clean to run samples (before and during your sample measurements)?**
7. If you have never taken a measurement of your particular compound before, how do you figure out what to do? How can you check that the data are reasonable?
8. If you are running an assay before taking the measurement, how does the assay work? What is the purpose of performing the assay instead of putting the sample directly into the instrument?

* **Understand how to analyze the data collected by the instrument and any limitations.**
  1. Does the instrument or software process the raw data before it reports information to you? What equation or theory is it using to do this analysis? Is this theory OK to apply for your sample?
  2. What is the correct term for the data you are collecting? E.g., “spectrum,” “chromatogram,” “absorbance”?
  3. If you have different peaks in your spectrum or chromatogram, what does each peak represent?
  4. What is the limit of detection of the method for your analyte of interest?
  5. Do you need to measure calibration standards? Why or why not – what is the purpose of the calibration? How often do you need to calibrate?