

Chem 430 Objectives -Louka/Yan

- **Know** the method of least square and **construct** standard calibration curves.
- **Understand** fundamentals of electrochemistry.
- **Setup** galvanic cells, **calculate** E° and the equilibrium constant, **learn** how to **compute** E°_{cell} using Nernst Equation.
- **Recognize** various types of electrodes and their application in potentiometry, such as reference, ion-selective, glass, liquid electrodes and biosensors.
- **Understand** the principle and **know** applications of electro-analytical techniques: electrogravimetry analysis, coulometry, voltammetry, cyclic voltammetry, and amperometry.
- **Differentiate** between all previous electro-analytical techniques and when each technique would be **used**.
- **Apply** electro-analytical technique to **calculate** the solubility product constant (K_{sp}).
- **Understand** fundamentals of spectrophotometry, absorption of light and chromophores.
- **Tell** the difference between absorption, excitation and emission spectra, and difference between luminescence and chemiluminescence.
- **Understand** the difference between Molecular (absorption, fluorescence, and emission) spectroscopy vs. Atomic (absorption, fluorescence, and emission) spectroscopy.
- **Recognize** all components of the following instruments: UV-vis, Fluorescence, Infra-red, Raman, Atomic Absorption, and Inductively coupled plasma, and their applications.
- **Understand** principles of analytical separations.
- **Identify** Gas chromatography, **learn** about different types of detectors, columns and injectors.
- **Describe** how to choose the right conditions for the separation of certain type of molecules. **Know** the effect of temperature programming on separation.
- **Learn** about HPLC, **recognize** columns, detectors.
- **Describe** and **recognize** surface analysis (microscope: SEM, STM, AFM) and Vacuum
- **Interpret** data from Infra-red and Raman Spectrometry.
- **Understand** principles and fundamentals of Mass Spectrometry.
- **Relate** tandem (coupled) Instruments example GC-MS and LC-MS.
- **Assemble** major components in each instrument and explain their functions.
- **Know** the capability and disadvantages of various techniques, **be able to choose** the most suitable technique, and **optimize** the conditions for sample analysis.

- **Write** a scientific essay with ACS method of writing the references and **setup** a presentation and be able to **present** in public.
- **Perform** experiments and **analyze** data that will **benefit** student's career in fields such as pharmaceutical, environmental and forensic experiments.