

The final exam in Chem110L tests your understanding of methods that you have learned in the course. It also tests your knowledge about biological systems that were studied in the lab, and tests your ability to **carry out calculations** that biochemists routinely use. I assume that you know topics that were covered in Chem142A.

You can prepare for the exam by studying material in all the experiment handouts and reviewing quiz questions. The Boyer book might be helpful. Check out the sample test and attend a review session this Thursday and Friday. I am planning to ask questions in the following categories:

1. Physical principles behind each of the observation/study methods
 - a. Separation of macromolecules by gel electrophoresis
 - b. Separation of molecules by chromatography
 - c. Study of biological systems by microscopy
 - d. Analysis of protein expression patterns
 - e. Quantitative analysis; biosensors, coupled enzymatic assays
 - f. Characterization of molecules by UV-Vis absorption spectrometry
 - g. Characterization of molecules by NMR spectroscopy
2. Principles and applications of computational methods, such as
 - a. Visualization and analysis of macromolecular structures
 - b. Sequence analysis
3. Molecular-level understanding of each of the following processes
 - a. DNA denaturation and annealing
 - b. Enzymatic transformations of DNA
 - c. Function of enzymes topoisomerase, HIV protease, glucose oxidase, peroxidase
 - d. Conversion of light energy into ATP in plants
4. Main properties of the following classes of compounds
 - a. Nucleobases, RNA and DNA
 - b. Amino acids and Proteins
 - c. Mono- and disaccharides
 - d. Fatty acids and fats
5. Practical aspects of each of the experiments
 - a. Why such detection parameters (wavelengths, acquisition times etc)
 - b. Why such concentrations of solutes, buffers etc.
 - c. NMR: Why spinning, locking, shimming, and delay times matter
6. Data analysis with statistics
 - a. Understand the meaning of all the data observed
 - b. Understand main concepts in statistical data analysis
 - c. Understand methods of plotting and analyzing the data
 - d. Calculations of the mean, the variance, and the standard deviation of a dataset
 - e. Calculation of the slope in a linear regression model $y = ax$
7. Miscellaneous
 - a. How to design experiments; nature of errors in experimental science
 - b. How to apply techniques, such as UV-Vis, NMR, electrophoresis, chromatography) to other problems in biochemistry
 - c. Lab safety in general and safety aspects of each experiments
 - d. Broader relevance and educational value of experiments you have performed.

Good luck!