Biochemistry 3723: Student Learning Outcomes 8/5/09

Lab Competency: General Laboratory Procedures

At the end of this course the student will be able to:

1. demonstrate the safe and accurate use of basic laboratory equipment to produce high quality data.

2. use data collected by students to calculate experimental results and express results with appropriate units, significant figures, precision and accuracy

3. demonstrate the ability to follow laboratory protocol to answer specific biochemical questions.

5 interpret and report experimental results and conclusions resulting in clear, grammatical, written language, using appropriate calculations, diagrams and graphs (all appropriately labeled).

Specific Biochemical Competency

At the end of this course, the student will be able to recall and explain in writing basic scientific concepts relating to the study in the laboratory of the following areas of biochemistry and molecular biology: preparation of solutions; structure and isolation of proteins; structure, isolation, and manipulation of nucleic acids; experimental approaches to understanding metabolism; experimental techniques used in molecular biology; use of databases to evaluate protein and nucleic acid sequence.

More specifically, at the end of this course the student will be able to:

1. demonstrate the proper preparation and measurement of general solutions (Exp 1-3), including:
   a. buffers, using Henderson-Hasselbalch equation to calculate how to prepare a buffer
   b. colorimetric assays used to determine the concentration of a chromophore in solution
   c. absorption spectrum to identify and quantify chromophores

2. execute the purification of a protein, using enzyme assays and colorimetric assays to evaluate the protocol (Exp 4-7). Student will be able to recall and explain in writing the principles and execution of the following techniques:
   a. bulk purification steps
   b. chromatographic purification procedures (size exclusion, ion-exchange, affinity)
   c. SDS-PAGE for separation of biomolecules
   d. MALDI analysis of protein
   e. evaluation of purification using standard techniques of enzyme assay and protein concentration assay to calculate product yield and purification
   f. evaluation of results of purification by comparison with information collated in web-based databases.
3. experimentally determine kinetic constants and mechanism of inhibition of enzymes (Exp 8)

4. formulate and present a written, unified explanation of results from student gathered experimental data and relate results to currently accepted knowledge of carbon metabolism in bacteria (Exp 9)

5. isolate, manipulate and analyze DNA (Exp10-12)
   a. compare and interpret results of manipulation of various DNA samples
   b. use databases to analyze sequencing results

6. interpret relationships between biological samples from experimental results. (Exp 13-14)
   a. construct plasmid map from restriction analysis
   b. recall and explain in writing the principles behind Southern blotting and perform a Southern blot
   c. recall and explain in writing the principles behind standard and quantitative PCR and analyze biological samples using PCR