BCEM443- Learning outcomes

General – BCEM 443 builds on the general learning outcomes of BCEM 393 (the prerequisite course). BCEM 433 has six 4-hour labs throughout the term, which reinforce learning outcomes presented during lecture time.

By the end of this course, successful students will be able to:

1. Predict hydrogen bonding and stacking interactions of native (or modified) nucleic acid bases based on their individual aromatic characteristics.
2. Understand how ribo and deoxyribo nucleic acids polymers can form different nucleic acid structures within the cell and their corresponding biological functions.
3. Purify genomic DNA, or total RNA and plasmid DNA, without the use of commercial kits and to subsequently analyze these nucleic acids on agarose (or denaturing agarose) gels before or after treatment with nucleases and restriction endonucleases.
4. Predict how changes in temperature, pH and ionic affect the structure of purified nucleic acids, enabling students to understand hybridization technology behind many modern molecular biology experiments.
5. Predict how hormones insulin and glucagon coordinately regulate glycogen metabolism and glycolysis in liver and muscle cells.
6. Purify and statistically analyze blood glucose and liver glycogen in from samples obtained from a rat in either the fed or fasted state and then compared to a population of rats.
7. Predict how hormones insulin and glucagon coordinately regulate fatty acid biosynthesis in liver as well as fatty acid degradation in heart and muscle cells.
8. Isolate and analyze the lipid content of brain tissue in a laboratory setting, where each unique lipid class plays a different role within this organ.
9. Describe how transaminases are the linking enzymes between amino acid biosynthesis and degradation routes, how excess nitrogen is disposed of as urea in the liver, and how non-lethal defects in amino acid degradation enzymes can give rise to a variety of human diseases using the metabolic KEGG database.
10. Anaylze and unknown metabolic pathway in terms of enzyme mechanism, redox loops and energetics.
11. Interpret and communicate the results of biochemical experiments in written reports with clarity and conciseness.