Lecture topics in Bio 410:510 Cell metabolism and disease.

My workload involves presenting the following topics

Protein structure and post-translational modifications.

Metabolism: pathways, their integration and control.

Cell energy metabolism: mitochondria, structure and overview of functions.

Oxidative phosphorylation, ROS production and consequences.

Synthesis of ATP by a spinning top.

Apoptosis and role of mitochondria.

Altered energy metabolism in cancer: the Warburg effect.

Exercise, energy metabolism and aging.

Metabolic changes and diabetes.

Inherited mitochondrial disease: the overview.

The new paradigm in diagnosing mitochondrial diseases: whole exome sequencing and RNA seq..

How do you treat a disease of energy metabolism? the progress so far, and relevance to treating Parkinsons and Alzheimers.

Drug discovery: the process.

101 things to do with a degree in biology.

Your workload

In the first weeks of the course, students will be placed in groups of 5, and given a DNA sequence for a disease-related protein that will have a mutation, which may or may not be pathogenic. The group will have to find the mutation, then locate the changed amino acid in the 3D structure, and decide whether they think it will cause functional changes. The group will present their findings to the class in a 10 minutes presentation in week 5.

In the second half of the class students will be placed in different groups of 5. Each group will be given a data set of the changes in levels of 60 proteins of metabolism

caused by a specific drug treatment, (data collected by my company Metabolic Profiling). The project involves putting these various proteins into their respective pathways, and deciding the overall effect of the drug on metabolism. For this project I will meet with the groups regularly. Once progress has been made I will reveal the tissue on which the experiments were done and the disease involved and you will decide whether the compound had positive or negative effects. Each group will present their findings in a 15 min presentation to the class.