Fundamentals of Biology I Lab Midterm Review Sheet
Dr. Susan Petro

Week 1 – Significant Figures, Metric Conversion, Scientific Notation
• Significant figures (review tutorial on website link)
• Metric conversion
• Scientific notation
• Accuracy and Precision

Microscopy
• Requirements for good microscopy - magnification, resolution, contrast
• How a dissecting microscope differs from a compound microscope
• How to determine the magnification of a microscope

Week 2 - Using a Spectrophotometer
• How does a spectrophotometer work?
• Why do we blank the machine and what do we use to blank it.
• Why do we use special cuvettes instead of ordinary test tubes
• Why do we use absorbance instead of transmittance (hint look at Lambert-Beer Law)

Week 3 - Excel - You may bring a 3x5 index card with as much Excel information on it as you can fit.
• Know how to do properly formatted single line and multi-line graphs
  1. Know how to decide what goes on the x axis and what goes on the y axis
  2. Be able to write a good title and properly label axes (with units)
  3. Know what the parts of the linear regression formula mean. In \( y = bx + a \)
     know that \( b \) is the slope (rate) and \( a \) is the y intercept (what does the y intercept tell you.)
  4. Know when to set the y intercept to zero and when not to.
  5. Know how to obtain the correlation coefficient.
  6. What does the correlation coefficient tell you
  7. Be able to find \( y \) when you know \( x \) and vice versa
• Be able to do a derivative graph from your linear regression graph.

Week 4 - Enzyme Activity
• Know the function of enzymes (to lower the activation energy) and how they are able to carry out their function (by approximating and orienting substrate molecules and then stressing old bonds.)
• Know the levels of protein structure and how the levels are held together and why this is important to enzymes
• Know the effect of temperature (both cold and hot) and pH on enzyme activity and WHY these factors affect activity.
• Be able to explain denaturation.
• Be able to explain competitive and noncompetitive inhibition of enzymes
• Understand dye-coupled reactions (in the turnip peroxidase lab guaiacol was the dye) and how we used this to determine the rate of peroxidase activity in this lab.

**Week 5 - Osmosis and Diffusion**
• Understand
  1. Diffusion
  2. Osmosis
  3. Passive transport
  4. Active transport
  5. Hypo-, iso- and hypertonic
• Know how to do the calculations described on the "Molarity and Avogadro's Number" handout
• Know how to determine the osmolarity of potato parenchyma as we did in the lab (Hint: know how to do % change in length and use it to make a linear regression graph)
• Review all the answers to the critical thinking questions from this lab. Many of you got these incorrect and they may show up again or questions very similar to them on the exam.

**Week 6 - Microscopy and Stages of Mitosis in Animal Cells**
• How to calibrate an ocular micrometer
• Be able to recognize the stages of the cell cycle in the whitefish blastula (There might be slides on the exam.)

**Week 7 – Mitosis in Plant Cells and Meiosis**
• Be able to recognize the stages in the cell cycle of the *Allium* root tip.
• Know the differences between plant and animal cells during cytokinesis
• Be able to explain what happens at each step of the cell cycle in both mitosis and meiosis and recognize drawings of these steps.
• Be able to explain the difference between mitosis and meiosis
• Understand what factors lead to diversity in the offspring (independent assortment, crossing over and random fertilization)
• Be able to determine the number of different gametes formed from meiosis both with and without crossing over.