

## **Molecular Methods Problem Set**

Due November 8, 2018

1. Identify five problems associated with using molecular methods for microbial diversity studies of environmental samples. (20 points)
2. Why are deoxynucleotides included in the PCR mix? Why is BSA added? Describe what happens at each temperature of the PCR program. (15 points)
3. Include a print of your agarose gel showing the presence or absence of bands using different primer sets. Label each lane according to the microbial group or function you were trying to amplify. Note the Winogradsky column and depth from which your DNA came, the conditions of that column (what was the column amended with, fresh or salt water, light or dark?). Describe what the molecular results tell you about the ecology of your column. Even if nothing worked, what did you expect based on your column treatment and GC results? This should not be a two-sentence answer. (25 points)
4. What are ribosomes? Why is ribosomal RNA used to understand microbial diversity? What is the difference between rRNA and mRNA? Describe the relevance of both rRNA and mRNA to the biology of a cell. (15 points)
5. Design an ecological experiment using tools from molecular biology. Clearly state your hypotheses and what tools you would use to test your hypotheses. Why are the tools that you chose appropriate to answer the questions that you posed? This should not be a two-sentence answer. (25 points)