Biol2250 – Final Exam questions Spring 2025 Dr Carr

For each of the following questions, write a **500 ~ 750 word essay** (front and back of one sheet of lined paper). The essays should show your **understanding** of the lecture material, and the relevant lab experience. They should demonstrate that you have thought about and prepared the answers ahead of time.

For the exam, I will select **Four** of the following questions. Answer any **THREE**.

[You may bring notes, on the front and back of half a sheet of 8.5" x 11" paper. Do *NOT* attempt to write complete answers in very small script. I will collect these notes after the exam].

1. **Distinguish the sciences of Genetics, Molecular Biology, and Biotechnology**. Illustrate the differences by citing one example of each, and how it conforms to that science, and not so much the others.

2. Molecular Biology has been described as "***Reverse Genetics***". What is the difference between this and 'Genetics' as usually understood. Since "*DNA makes RNA makes Protein*", why is that sequence not '"***Forward Genetics***"?

3. Describe the process of obtaining a **DNA** sequence of a particular gene, with emphasis on the biochemistry of **DNA extraction**, **PCR amplification**, and **automated "*Sanger*" DNA sequencing**.

4. Describe how ***Agrobacterium*** was used to introduce a **genetic pathway** into ordinary Rice to transform it to **Golden Rice**.

5. Describe the logic of the preparation of **a standard curve for qPCR**, and how it might be used to estimate the abundance of a **pathogenic organism** in commercial food products.

6. How does the **CRISPR-Cas biotechnology** provide a cure for **Sickle Cell Disease**? Distinguish *cure* from *treatment*.

7. We have used a number of laboratory techniques in this course. Historians and philosophers of science argue whether **scientists invent *new* technologies** to answer new questions, or instead **take advantage of *existing* technologies**. Cite one example of each in **biotechnology**. Which do you think is more common? Why.