Biology 211
Lab Notebook Section 1: Introduction to Genomics Research (40 points available)

Part 1: Introduction section of a scientific journal article (20 points available)
The introduction should include

- The research organization, researchers and their funding
- The research problem
- Elements of the research: there are three "key players" in this research project: a kind of wheat, a fungus and a bacterium. What are their scientific names? What is significant about each?
- The solution/biological process being investigated in the whole research project
- For the portion of that project that you will be doing in this class, its major goals and if appropriate, a hypothesis.
- Other related details presented.

Instructor completes this portion

Part 1 Scoring Criteria	**Detailed**	**Less Detailed**	**Not detailed**
The research organization, researchers and their funding	5	3	2
Research problem	5	3	2
Solution being investigated	5	3	2
Scientific vocabulary (terms defined, used correctly)	5	3	2
Total Points Awarded			

Part 2: Research Reflection
(20 points for taking the task seriously; fewer if you don't)

This is an informal (but not necessarily short) piece of writing that follows Part 1 in your lab notebook. Answer these questions:

- Has your understanding of scientists and scientific research changed based on Dr. Bangera's presentation? If so or if not, explain and provide details from the presentation to support what you're saying.
- What is your role in this project?
- What are your goals and desired outcomes for this project?

Points awarded_____
Explanation if fewer than 20 points awarded:

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Bio 211
Lab Notebook Section 2: Protocols

This section will include write-ups of the following protocols:

- Making a gel
- Inoculation and cell culture
- Plasmid extraction
- Plasmid check
- Sequencing reaction
- Sequencing reaction cleanup

This section should include
____ Table of contents for the protocol section

For each protocol
____ Purpose of protocol (what did you do and why)
____ Background for protocol (what does the procedure/method do and how does it do it)
____ Full names of all buffers/organisms used in the protocol (materials section)
____ Numbered steps in the protocol
____ Complete name of your clone
____ Error analysis (what might have gone wrong, how will you know)

For each step
____ Purpose of the step
____ Reagent used and the quantity used
____ Reagent ingredients
____ Purpose of each reagent ingredient—what that ingredient does

Results section needed for cell culture and plasmid check labs

<u>Cell Culture</u>

____ Describe what your culture looks like before and after incubation. What does this tell you?

<u>Plasmid Check</u>

____ Pictures of your gel with ladder and plasmid band (or lack of band)
____ Table with your ladder measurements
____ Standard curve graph that includes the equation for a best-fit line
____ Size of plasmid calculated from standard curve equation
____ Size of insert

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Lab Notebook Section 2: Protocol Self-Assessment (40 points available)
Requires three different colored highlighter pens

You will be self-assessing your write-up of these protocols:

- Making a gel
- Inoculation and cell culture
- Plasmid extraction
- Plasmid check
- Sequencing reaction
- Sequencing reaction cleanup

For Section 2 of the Lab Notebook answer the following questions

- On what page of the lab notebook is the table of contents for the protocol section?
- Are steps in each protocol numbered?
    a. If you answered yes, put a checkmark by the first number in each procedure.

For each protocol complete the following labeling

- Circle the reagent contents.
- Highlight (color 1) the material used in each step.
- Highlight (color 2) the quantity used in each step.
- Highlight (color 3) the reagent substance purposes (what is in each reagent?).
- Write "what" once beside each reagent name and quantity.
- Bracket and label "why" beside each description of what the reagent does.
- Bracket and clearly label #1 where you explained the <u>purpose</u> of this protocol.
- Bracket and clearly label #2 where you explained the <u>background</u> for this protocol.
- Bracket and clearly label the purpose of each step and of each reagent used in the protocol (purp step 1, purp step 2, etc; purp reagent 1, purp reagent 2, etc).
- Underline the full names of all buffers/organisms used in this procedure.
- Wavy underline the complete name of your clone.

For your results clearly label each item as follows

- #1—pictures or descriptions of your inoculation tube before and after incubation
- #2--pictures of your gel and the ladder
- #3--a table with your measurements
- #4--the standard curve graph
- #5—your plasmid plugged into the graph or the equation from the standard curve

For each protocol answer the following self-assessment questions

- The number of highlights in color 1 above should be the same as the number of highlights in color 2.
    - How many highlights are there for color 1?_____
    - How many highlights are there for color 2?_____
    - If the numbers don't agree, what is missing?

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- Explaining the purpose of each reagent in detail means explaining what you're doing (re-agent and quantity) and why you're doing it (what each component of the reagent does). So the number of "what's" should be the same as the number of "why's"
    - How many "what's" have you written?_____
    - How many "why's" have you written?_____
    - If the numbers don't agree, what is missing?

- The naming convention for buffers and organisms is to provide the full name the first time you refer to it and italicize the name, then use its initials thereafter.
    - Explain why this is done:
    - Did you italicize the full name?
    - Did you use the full name of any organism more than once? If so, which organism?
    - For which of the buffers/organisms did you use its initials before you provided the full name?

Additional questions

- Did you have to re-do any of the protocols?

- If so, did you follow the steps you'd written up?

- If you did follow those steps, what did doing so tell you about how accurately you described the steps? Or if you didn't have to re-do any of the protocols, did the highlighting tell you about how accurately you described the steps? (The test of quality is whether doing only those steps would produce a successful procedure.) Is there room for improvement?

Final Self-Assessment Questions

- Did labeling the various parts of the protocol section and then answering self-assessment questions reveal any problems with this section? Explain.

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Lab Notebook Section 3: Results and Discussion

Results should contain
____ Assessment of your sequence data for each primer
____ Results from each of the four BLASTs (2 BLASTs per sequence), include all necessary figures
____ Significant organisms and proteins that you found in each BLAST
____ Discussion of what makes these results significant
____ Brief description of each protein
____ Results from repeated runs with descriptions of what may have gone wrong

Discussion should contain
____ Detailed description of what each protein does
____ Explanation of the protein's significance
____ Discussion of matching organisms and their colonizing ability
____ Answers that address the major goals of this experiment
____ Final assessment of the protein for L5 1-96 colonizing ability
____ Additional experiments you could include to further validate and/or explore your results

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Lab Notebook Section 3: Results and Discussion Self-Assessments
Requires FOUR different colored highlighter pens
Completing this self-assessment and taking it seriously will earn you 20 points. Not taking it seriously will earn you fewer points.

Results: Complete the following labeling
_____ Bracket and clearly label ("assessment") the assessment of your sequence data for each primer.
_____ Highlight—just in the left margin and with a different color for each—the results from each of the four BLASTs.
_____ Circle the names of the organisms and proteins that you found in each BLAST.
_____ Highlight—just in the left margin and with a different color for each protein--your description of the protein.
_____ When/if your sequence had no data or poor data, draw a box around where you stated that.
_____ Bracket and clearly label (ORF Finder) the ORF activity completed from the lab sheet. Circle the reading frame that matches your BLASTx results for each primer sequence.

Discussion: Complete the following labeling
_____ Bracket and clearly label (G1, G2, etc.) where you have answered the major goals of this experiment.
_____ Bracket and clearly label (Disc1) your description of what each protein does.
_____ Bracket and clearly label (Disc2) the explanation of the protein's significance.
_____ Bracket and clearly label (Disc3) the matching organisms and their colonizing ability.
_____ Bracket and clearly label (Disc4) the final assessment of the proteins for L5 1-96 colonizing ability.
_____ If appropriate, bracket and clearly label (alt cont) additional experiments that could further validate and/or be used to explore your results

Answer these Self-Assessment Questions
A. Why did you include the images, graphs, or tables that you did?
B. Do these images address all of the major goals identified in Section 1 of the Lab Notebook?
C. Did you leave out data? Why or why not?
D. If you did leave out any piece of data, how could leaving it out affect your conclusions down the road? If, for example, you didn't have a chromatogram quality analysis, could you trust the quality of the BLAST data?
E. Is there such a thing as superfluous data? Do you have any figures that might be considered superfluous? Why?
F. Are these sections of your lab notebook reflective of professional scientific writing like what you see in your journal club readings? Explain
G. Is the quality of analysis and language similar to what a primary scientific article contains? Explain.

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Lab Notebook Section 4: Final genomics research and Journal Club reflection (20 points available)
Completing this self-assessment and taking it seriously will earn you 20 points. Not taking it seriously will earn you fewer points.

Take one final trip through all your lab notebook entries as if they were written by someone else.

Answer these questions about the lab notebook

1. Is your lab notebook reflective of professional scientific writing like what you see in your journal clubs?
2. Is this quality of analysis and language similar to what a primary scientific article contains?
3. Can you do better than what you currently have, and how?
4. Did the lab notebook provide the answers you needed for the Comgen exam? If not, specify what you needed to change in order for it to do so.

Answer these questions about the genomics project and journal club

5. Has doing the genomics research and journal club changed your perception of how science is conducted? Explain.
6. Did the genomics research and journal club change your perception of yourself as a scientific researcher? Explain.
7. Did the genomics research and journal club make you more or less inclined to continue in your science path? Explain.

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