

Lab Report Rubric

Task

This performance assessment is intended to evaluate a formal lab report written following a semester-long genetics project, conducted during the lab component of the undergraduate genetics course (Biology 274) at Suffolk University¹. The student's evaluation on this performance assessment will be based on students' ability to give rationale for, to interpret, and to discuss the data that they generate during the semester-long project.

Below is a summary of the process in which students will participate:

- 1 Students will be introduced to fly phenotypes: differences between normal (wild type) and mutant flies and differences between female and male flies.
- 2 Students will be given wild type and mutant flies with visually apparent but uncharacterized (from the students' points of view) mutant traits.
- 3 Throughout the semester, students will work in pairs conducting a set of experiments to investigate the mode of inheritance of their specific genetic trait.
- 4 Students will be asked to observe, count, and record the phenotypes for each experiment conducted.
- 5 Each student will report findings in a formal lab report in which rationale for the project will be explained, collected data will be summarized, hypothesis regarding the mode of inheritance of the trait under study will be presented and the results of statistical analysis will be interpreted.
- 6 The formal lab report will be handed in near the end of the semester for evaluation by the instructor.

Objectives

After completion of the semester-long genetics project and lab report, students should be able to demonstrate the following:

#1	Understand and explain the rationale of a genetics questions and experiments
#2	Accurately interpret genetic data
#3	Interpret statistical analysis of genetic data
#4	Design genetic experiments for further hypothesis testing
#5	Overall mastery of genetics concepts

Criteria

All of the following criteria will be applied to each formal lab report. The scale used for assessing the criteria will be as follows:

3	Advanced
2	Intermediate
1	Novice
0	Not addressed/Below novice

¹ When generating this rubric, we referred to the "Universal Rubric for Lab Reports" designed by the Department of Biological Sciences at the University of South Carolina: <http://www.biol.sc.edu/~timmerman/Universal%20Lab%20Rubric.pdf>

1 Demonstrates a clear understanding of the rationale for experiments conducted: how does this lab project address the genetic problem being studied?

- 3** The writer provides a clear sense of how the experimental design can distinguish between different modes of genetic inheritance.
- 2** The writer provides some relevant context for the experimental design.
- 1** The writer provides vague or generic context for the experimental design.
- 0** This is not addressed or missing.

2 Considers plausible alternative modes of genetic inheritance.

- 3** Describes the four possible alternative (autosomal recessive, autosomal dominant, X-linked recessive and X-linked dominant) modes of inheritance and considers how to distinguish among these.
- 2** Describes more than one of the four plausible alternative modes of inheritance and considers how to distinguish among these.
- 1** Describes more than one of the four plausible alternative modes of inheritance.
- 0** Does not consider more than one plausible mode of inheritance.

3 Provides informed explanation for the observed results that is clearly and logically drawn.

- 3** Connections between data and explanations are complete and justified.
- 2** Connections between data and explanations are justified but incomplete .
- 1** Connections between data and explanations are justified but reveal gaps in understanding.
- 0** Connections between data and explanations are not justified or missing.

4 Addresses conflicting or missing data, if relevant.

- 3** Conclusions address and logically explain conflicting or missing data, considering plausible alternative explanations.
- 2** Conclusions attempt to explain conflicting or missing data.
- 1** Conflicting or missing data are poorly addressed.
- 0** Conflicting or missing data are not addressed.

5 States a testable hypothesis about mode of inheritance based on the experiment and relevant genetic principles.

- 3** Provides a clearly stated plausible hypothesis that logically follows from the experimental findings.
- 2** Provides a plausible hypothesis but reveals gaps in logic or understanding.
- 1** Provides an implausible hypothesis.
- 0** Fails to provide any hypothesis

6 Provides interpretation of statistical analysis based on hypothesis, including explanation of relevant values.

- 3** Statistical analysis is clearly interpreted and conclusions are properly explained.
- 2** Interpretation of statistical analysis and conclusions reveal gaps in understanding
- 1** Interpretation of statistical analysis and conclusions are invalid.
- 0** Interpretation of statistical analysis and conclusions are incomplete or missing.

7 Suggests appropriate further experiments to test conclusions.

- 3** Suggests and fully explains comprehensive logical experiment(s) that address relevant question(s) that remain to be answered.
- 2** Suggests a logical experiment(s) that address relevant question(s) that remain to be answered but justification for the experiment is incomplete or missing.
- 1** Suggests a trivial experiment(s) that does not address relevant question(s) that remain to be answered.
- 0** No further experiments are suggested.

8 Integrates data, conclusions, and hypotheses in the report.

- 3** Integrates data, conclusions and hypotheses in a consistent and thorough way throughout the report demonstrating a command or mastery of genetic concepts.
- 2** Integrates data, conclusions and hypotheses in a consistent but incomplete way.
- 1** Integration of data, conclusions and hypothesis shows inconsistencies and limited understanding of genetic concepts.
- 0** Integration of data, conclusions and hypothesis is inconsistent and shows poor understanding of genetic concepts.

			Criteria	
Objectives	#1	Understand and explain the rationale of a genetics questions and experiments	1-2	_____ /6
	#2	Accurately interpret genetic data	3-5	_____ /9
	#3	Interpret statistical analysis of genetic data	6	_____ /3
	#4	Design genetic experiments for further hypothesis testing	7	_____ /3
	#5	Overall mastery of genetics concepts	8	_____ /3
			Total	_____ /24

Scoring

19-24	Advanced
13-18	Intermediate
7-12	Novice
0-6	Below novice