

Grading Rubric for Thesis (GENE 4990R)

This rubric is used for the assessment of the Genetics Student Learning Outcome #2: "Apply the process of science to research questions in genetics." Use this rubric to provide the basis for the grading of the undergraduate thesis (check the boxes to assign the appropriate level of the rubric). The Thesis Reader should complete this rubric and submit the completed form to the Student, Research Mentor and the Office of the Undergraduate Coordinator (Brian Norman, blnorman@uga.edu) by the agreed upon date.

Student Name:

Thesis Reader:

Overall Score:

Research Mentor:

Thesis Title:

Rubric adapted from: Timmerman, B.E.C., Strickland, D., Johnson, R.L. and J. R. Payne 2011. Development of a 'universal' rubric for assessing undergraduates' scientific reasoning skills using scientific writing. Assessment and Evaluation in Higher Education 36: 509-547.

	1	2	3	4	Score
INTRODUCTION Context: Demonstrates an understanding of the "big picture." Why is this question important/ interesting to genetics? What do we already know? What problem/ question is this addressing?	The importance of the question or broader context for genetics is not addressed.	The writer provides a generic or vague rationale for importance of the question or broader context for genetics.	The writer provides some relevant context for importance of the question or broader context for genetics.	The writer provides a clear sense of why this knowledge may be of interest/important to genetics, describes the current gaps in our understanding of this field and explains how this research might help fill those gaps.	
INTRODUCTION Accuracy and Relevance: Content knowledge is accurate, relevant and provides appropriate background for reader.	Background information is missing or contains major inaccuracies. Background information is accurate, but irrelevant or too disjointed to make relevance clear.	Background omits information or contains inaccuracies which detract from the major point of the paper. Background information is overly narrow or overly general.	Background information contains minor omissions or inaccuracies that do not detract from the major point of the paper. Background information has the appropriate level of specificity to provide relevant context.	Background information is completely accurate. Background information has the appropriate level of specificity to provide concise and useful context to aid the reader's understanding.	
INTRODUCTION Testable and Alternate Hypotheses: Hypotheses are clearly stated; testable and plausible alternative explanations are considered.	No hypothesis is indicated. The hypothesis is stated but too vague or confused for its value to be determined. A clearly stated, but not testable, hypothesis is provided. A clearly stated and testable, but trivial hypothesis is provided.	A single, relevant, testable hypothesis is clearly stated. The hypothesis may be compared with a 'null' alternative which is usually just the absence of the expected result.	Multiple relevant, testable hypotheses are clearly stated. Hypotheses address more than one major potential mechanism, explanation or factors for the topic.	A comprehensive set of testable hypotheses are clearly stated which, when tested, will distinguish among multiple major factors or potential explanations for the phenomena at hand.	
METHODS Controls and Replication: Appropriate controls (including appropriate replication) are present and explained.	Student fails to mention controls and/or replication, or mentions them, but the description or explanation is incomprehensible.	Student explanations of controls and/or replication are vague, inaccurate or indicate only a rudimentary sense of the need for controls and or replication.	Student describes a reasonable sense of why controls/replication matter. Explanations are mostly accurate.	Explanations of why these controls matter, are thorough, clear and tied into sections on assumptions and limitations.	
METHODS Experimental Approach: Are the techniques described likely to produce salient results (tests the hypotheses posed.)	Experimental approach is poorly explained.	Student explanations of experimental approach are vague, inaccurate or indicate only a rudimentary understanding.	Student describes a reasonable understanding of the experimental approach. Descriptions are mostly accurate.	Understanding of experimental approach is thorough and clear.	
RESULTS Data Selection: Data are comprehensive, accurate and relevant	Data are too incomplete or haphazard to provide a reasonable basis for testing the hypothesis.	At least one relevant dataset per hypothesis is provided but some necessary data are missing or inaccurate. Reader can satisfactorily evaluate some but not all of writer's conclusions.	Data are relevant, accurate and complete with any gaps being minor. Reader can fully evaluate whether the hypotheses were supported or rejected with the data provided.	Data are relevant, accurate and comprehensive. Reader can fully evaluate validity of writer's conclusions and assumptions. Data may be synthesized or manipulated in a novel way to provide additional insight.	
RESULTS Data Presentation: Data are summarized in a logical format. Table or graph types are appropriate. Data are properly labeled including units. Graph axes are appropriately labeled and scaled and captions are informative and complete.	Labels or units are missing, preventing reader from being able to derive useful information from graphs. Presentation of data is in an inappropriate format. Captions are confusing.	Contains some errors in or omissions of labels, scales, or units, but the reader is able to derive some relevant meaning from each figure. Is technically correct but inappropriate format prevents the reader from deriving meaning or using it. Captions are missing or inadequate.	Contains only minor mistakes that do not interfere with the reader's understanding and the figure's meaning is clear without the reader referring to the text. Graph types or table formats are appropriate for data type. Includes captions that are at least somewhat useful.	Contains no mistakes. Uses a format or graph type which highlights relationships between the data points or other relevant aspects of the data. May be elegant, novel, or otherwise allow unusual insight into data. Has informative, concise and complete captions.	
RESULTS Statistical Analysis: Analyses are appropriate for hypotheses tested and are correctly performed and interpreted with relevant values reported and explained.	No statistical analysis is performed. Statistics are provided but are inappropriate, inaccurate or incorrectly performed or interpreted so as to provide no value to the reader.	Appropriate, accurate descriptive statistics only are provided. Inferential statistics are provided but either incorrectly performed or interpreted or an inappropriate test was used. Correct inferential statistics are provided, but lack sufficient explanation.	Appropriate inferential statistical analysis is properly performed and reasonably well explained. Explanation of significant value may be limited or rote.	Statistical analysis is appropriate, correct and clearly explained.	

	1	2	3	4	Score
<p>DISCUSSION Conclusions: Conclusion is clearly and logically drawn from data provided. A logical chain of reasoning from hypothesis to data to conclusions is clearly and persuasively explained. Conflicting data, if present, are adequately addressed.</p>	<p>Conclusions have little or no basis in data provided. Connections between hypothesis, data and conclusion are non-existent, limited, vague or otherwise insufficient to allow reasonable evaluation of their merit. Conflicting data are not addressed.</p>	<p>Conclusions have some direct basis in the data, but may contain some gaps in logic or data or are overly broad. Connections between hypothesis, data and conclusions are present but weak. Conflicting or missing data are poorly addressed.</p>	<p>Conclusions are clearly and logically drawn from and bounded by the data provided with no gaps in logic. A reasonable and clear chain of logic from hypothesis to data to conclusions is made. Conclusions attempt to discuss or explain conflicting or missing data.</p>	<p>Conclusions are completely justified by data. Connections between hypothesis, data, and conclusions are comprehensive and persuasive. Conclusions address and logically refute or explain conflicting data. Synthesis of data in conclusion may generate new insights.</p>	
<p>DISCUSSION Alternative explanations: Alternative explanations are considered and clearly eliminated by data in a persuasive discussion.</p>	<p>Alternative explanations are not provided; are trivial or irrelevant; or are mentioned but not discussed or eliminated</p>	<p>Alternative explanations are provided in the discussion only; may include some trivial or irrelevant alternatives; or discussion addresses some but not all of the alternatives in a reasonable way.</p>	<p>Some alternative explanations are tested as hypotheses; those not tested are reasonably evaluated in the discussion. Discussion of alternatives is reasonably complete, uses data where possible and results in at least some alternatives being persuasively dismissed.</p>	<p>Alternative explanations have become a suite of interrelated hypotheses that are explicitly tested with data. Discussion and analysis of alternatives is based on data, complete and persuasive with a single clearly supported explanation remaining by the end of the discussion.</p>	
<p>DISCUSSION Limitations of design: Limitations of the data and/or experimental design and corresponding implications discussed.</p>	<p>Limitations of design are not discussed.</p>	<p>Limitations of design are discussed in a trivial way (e.g. 'human error' is the major limitation invoked).</p>	<p>Limitations of design are relevant, but not addressed in a comprehensive way. Conclusions fail to address or overstep the bounds indicated by the limitations.</p>	<p>Limitations of design are presented as factors modifying the author's conclusions. Conclusions take these limitations into account.</p>	
<p>DISCUSSION Significance of research Paper gives a clear indication of the significance of the research and its future directions.</p>	<p>Future directions are not addressed. Significance of the project is not addressed.</p>	<p>Future directions are vague, implausible, trivial or off topic. Mentions of significance are vague or inappropriate.</p>	<p>Future directions are useful, but indicate incomplete knowledge of the field (suggest research that has already been done or is improbable with current methodologies). Significance demonstrates only partial knowledge of field.</p>	<p>Future directions are salient, plausible and insightful. Writer clearly explains how this work fills our knowledge gaps and new questions or opportunities that are opened as a result of this work.</p>	
<p>PRIMARY LITERATURE Does the paper draw appropriately on the primary scientific literature?</p>	<p>Primary literature references are absent or irrelevant.</p>	<p>Primary literature references, if present, are inadequately explained. Citations are at least partially correctly formatted.</p>	<p>Primary literature references are relevant and adequately explained but few. Primary literature references are generally correctly formatted.</p>	<p>Primary literature references are relevant, adequately explained, and indicate a reasonable literature search. Primary literature references are properly and accurately cited.</p>	
<p>WRITING QUALITY Grammar, word usage and organization facilitate the reader's understanding of the paper.</p>	<p>Grammar and spelling errors detract from the meaning of the paper. Word usage is frequently confused or incorrect. Information is presented in a haphazard way.</p>	<p>Grammar and spelling mistakes do not hinder the meaning of the paper. General word usage is appropriate, although use of technical language may have occasional mistakes. There is some evidence of an organizational strategy though it may have gaps or repetition.</p>	<p>Grammar and spelling have few mistakes. Word usage is accurate and aids the reader's understanding. A clear organizational strategy is present with a logical progression of ideas.</p>	<p>Correct grammar and spelling. Word usage facilitates reader's understanding. A clear organizational strategy is present with a logical progression of ideas.</p>	