**Non-Laboratory Thesis**

Evaluation of the thesis work and the written document (1 is highest, 5/6 is lowest) for all of the criteria listed below. Most students should get a 2 or 3 for each criterion.

**Evaluation of the Student’s contribution to the work (Adviser only)**

**Originality/Creativity:**
1 – Outstanding. The student took their project in directions far beyond what was originally envisioned and/or demonstrated exceptional creativity by taking additional approaches and directions based on their reading or data analysis.
2 – Excellent. The student provided new directions for their project based on reading or their data analysis that changed or improved the final project beyond what was originally envisioned.
3 – Average. The student carried out a project directed by their advisor/mentor, and may have provided some additional ideas or directions based on their reading or analysis, but stayed within the general bounds of the original project.
4 – Below Average. The student did only what was asked of them and did not contribute new ideas or directions.
5 – Poor. The student was unable to follow the project plan.

**Work Ethic:**
1 – Outstanding. The student worked consistently on their project. They spent an enormous amount of time finding and analyzing materials, were always prepared for discussions, and accomplished much more than I expected.
2 – Excellent. The student worked consistently on their project. They spent considerable time finding and analyzing materials, were well prepared for discussions, and accomplished more than I expected, but fell short of being outstanding in some measures.
3 – Above Average. The student worked on their project consistently, identified and analyzed materials independently, were prepared for discussions, and accomplished a bit more than I expected.
4 – Average. The student worked on their project consistently. They spent adequate amounts of time finding and analyzing materials. They were usually prepared for discussions. They accomplished what I expected.
5 – Below average. The student worked sporadically, and/or went long stretches without appearing. The student accomplished less than I expected.
6 – Poor. The student worked rarely or not at all, accomplishing much less than I expected.

**Independence:**
1 – Outstanding. The student attained a high level of independence and became self-sufficient in finding and analyzing source materials with nominal input from the advisor.
2 – Excellent. The student became largely independent in finding and analyzing source materials, but may have required assistance from the advisor with identification, comprehension, or analysis. This student worked independently but fell short of being outstanding.
3 – Average. This student needed regular (weekly or biweekly) guidance to stay on track. This student was able to find and analyze source materials but often required assistance from the advisor with identification, comprehension, or analysis.
4 – Below Average. The student continued to require frequent help from the advisor in identification, comprehension, and/or analysis of source material.
5 – Poor. The student never worked without direct involvement of the advisor.

**Perseverance/Resourcefulness:**
1 – Outstanding. The student was unusually brave/adept at finding or developing unusual sources (e.g. attended conferences or interviewed people) and/or identifying original material.
2 – Excellent. The student found great original materials in some unusual places that moved their project forward.
3 – Average. The student utilized standard sources.
4 – Below Average. The student missed some relevant sources.
5 – Poor. The student missed important, relevant, and obvious sources.
Research Design:
1 – Outstanding. Studies are incisive, rigorous and powerful. They allowed the student to test the hypothesis and distinguish among all reasonable models. Both positive and negative results are interpretable.
2 – Excellent. Studies are clearly superior in design and allowed the student to provide strong support for (or falsify) the hypothesis. Outcomes are readily interpretable but may not distinguish between all possible models.
3 – Above average. Studies as designed provide strong support for (or falsify) the hypothesis. Outcomes are often interpretable. Additional analyses or studies may be needed for this to be considered excellent.
3 – Average. Studies provide clear support for a hypothesis, but do not distinguish between all possible models. Several possible outcomes are not interpretable.
4 – Below average. Studies have little power to distinguish among multiple possible models. They provide some support for a hypothesis, but multiple models are consistent with outcomes.
5 – Poor. Studies do not test the hypothesis or have insufficient power to distinguish different models.

Evaluation of the senior thesis writing and presentation (Adviser and Readers)

Thesis Abstract
The Abstract should accurately summarize the contents of the thesis. Abstracts typically do not contain references. The key aspects of an excellent abstract include:
   a) a brief summary of the problem/question under investigation and its relevance
   b) a brief statement regarding the approach
   c) a concise summary of findings
   d) a summary of the interpretations and/or conclusions based on the findings

Evaluation:
1 – The Abstract contains all of the key aspects listed above. It is clear and concise, without extraneous information, and without scientific inaccuracies.
2 – The Abstract contains all of the key aspects listed above and is scientifically accurate. However, it is either not clear and concise or is qualitatively not an outstanding abstract.
3 – The Abstract contains all of the key aspects listed above but contains scientific inaccuracies. Abstracts with inaccuracies or errors should not score above a 3. Abstracts missing a key component should also not score above a 3.
4 – The Abstract is missing more than one of the key components listed above or contains many inaccuracies.
5 – The Abstract does not resemble a scientific abstract in that it is missing many of the key components listed above or contains numerous inaccuracies.

Introduction
The Introduction to the thesis should establish the context of the work being proposed. The key elements to an excellent introduction are
   a) sufficient background information for a scientist not familiar with your specific field to understand and evaluate the work you did. Concisely summarize pertinent literature to orient the reader.
   b) presentation of the nature and scope of the problem you have investigated. Why is the field important and what has already been done?
   c) clear articulation of the study rationale – why did you do what you did? What was the gap in knowledge or challenge that motivated your study?
   d) a brief summary of your approach and what you discovered, indicating why it is novel and or significant. What did you contribute towards filling that knowledge gap?

Evaluation:
1 – The Introduction includes all of the elements listed above and is scientifically accurate. It does not contain extraneous information or material better suited for the Results or Discussion.
2 – The Introduction includes all of the elements listed above, but has one or more of the following deficits: a) has
one or two scientific inaccuracies; b) contains extraneous information; c) contains information better suited to the Results or Discussion.

3 – The Introduction is missing one of the elements listed above and has one or more of the following deficits: a) has multiple scientific inaccuracies; b) contains extraneous information; c) contains information better suited to the Results or Discussion.

4 – The Introduction is missing more than one of the elements listed above and has one or more of the following deficits: a) has multiple scientific inaccuracies; b) contains extraneous information; c) contains information better suited to the Results or Discussion.

5 – The Introduction has numerous deficiencies and reads like a rushed draft.

Research Description: Students may choose to describe analyses in progress or planned but not could not be completed due to the termination of the on-campus semester. (Alternatively they may defer to the Discussion.)

1 – A exceptional exposition of the questions and hypotheses, showing deep insight into the problem. Very clear and logical development and resolution. Easily understandable by a typical molecular biologist.

2 – An excellent summary of the research question. Hypotheses are clearly described, logical and the approaches to their resolution are adequately explained. A knowledgeable reader can easily understand the research.

3 – A very good description of the research question/hypothesis. A knowledgeable reader can understand with some effort. The rationale is mostly clear and logically presented but there are a few instances where the student assumed knowledge on the part of the reader, or used jargon.

4 – A good summary of the research. Occasional sections are inappropriate, illogical or missing. The student used a lot of jargon without explanation.

5 – A poor description of the research. It is impossible for even a knowledgeable reader to understand the approach.

Thesis Results/Findings:

1 – All of the following should be true for this score: Results are presented in a logical, effective and creative manner. Data are presented accurately and clearly and could be easily understood by a typical molecular biologist. Controls and their significance are clearly and thoroughly described. Conclusions are valid, insightful and not over-interpreted. Figures are publication quality, appropriately labeled, with comprehensive legends.

2 – All of the following should be true for this score: The data are described accurately and clearly. Conclusions about data and controls are appropriate and not over-interpreted. Figures are high quality, appropriately labeled, with comprehensive legends.

3 – Data are presented in an effective manner. Figures are good quality, appropriate labeled, with comprehensive legends. One of more of the following may be true: conclusions about the data may lack insight. Jargon is utilized often. One or more figures are lacking in quality and/or labeling; legends are inadequate.

4 – The data are unorganized or not well presented. One or more of the following may be true: conclusions about the data and controls lack accuracy or insight. A typical molecular biologist might have minor difficulty following the conclusions. Some figures may be lacking in quality and/or labeling or have inadequate legends.

5 – The Results are a collection of data with little information to explain the relevance. One or more of the following may be true: Some portions are unclear or missing. Data are presented in a confusing or incomplete fashion. The student may have misunderstood some of the results, or failed to include or communicate them in an effective manner. Some conclusions may not fit the data or are absent (under-interpreted). Some figures are missing or low quality, poorly labeled, with minimal legends.

6 – Little attention is given beyond a quick statement of the results. The results are missing context and controls are not described. The student did not understand data or failed to draw conclusions. Figures are missing and/or of poor quality, lacking labels, and legends are minimal.

Discussion

A strong discussion will include a concise summary of your major results put into appropriate context with your research question. It is not a repetition of the Results, but should explain why your findings are important and how they help to fill the knowledge gap you provided in your introduction. Any limitations of the study should be analyzed. Future directions or new questions that stem from the work may be discussed.
Discussion (Analysis): Students may choose to include a discussion of possible outcomes and interpretations of analyses described in the Results that were in progress or planned but could not completed due to the termination of the on-campus semester.

1 – The student provided an in-depth analysis of the results and demonstrated exceptional insight into the broader implications.
2 – The student provided an excellent critical analysis of the data, including ideas that went significantly beyond the simplest interpretation.
3 – The student provided a very good discussion of the results but stayed mostly within the bounds of current thinking and/or primarily reiterated results with some analysis.
4 – The student provided a limited analysis of the data; however, the student mostly reiterated the results without further expansion.
5 – The student failed to provide a critique and simply reiterated the results.

Discussion (Future Research): Students may choose to discuss here, rather than in the Results, analyses in progress or planned but not completed due to the termination of the on-campus semester.

1 – The student provided future directions suggested by the current or anticipated results that were creative and insightful. If conducted, these would significantly move the field forward.
2 – The thesis contained several good ideas for future work. The ideas build upon the student’s findings, incorporate additional scholarship and are worthwhile suggestions for future research. If planned analyses are included, they are clearly summarized including rationales. Anticipated results are discussed and their impact clearly stated.
3 – The thesis provided one or two good ideas for future work. These should be relevant to the field but may not move the field forward significantly. If planned analyses are included, there may be some instances where the author assumed knowledge on the part of the reader, or used lab jargon. A knowledgeable reader could understand the rationale, although it may not always be clearly stated.
4 – The student made a very limited attempt to suggest future experiments or directions. Any planned analyses are mostly clear but the author used lab jargon without explanation or it was overall difficult to assess the value they would bring to the research.
5 – The student made an unsuccessful attempt or failed to suggest future directions.

Thesis Scholarship – This thesis:
1 – Is a model of impeccable scholarship. The background material has been thoroughly researched and properly referenced. It is an authoritative assessment of the relevant primary literature. The student has mastered the issues and integrated them to make an original and complete intellectual contribution independent of material mentors provided. The student has provided the reader with the relevant information to understand the significance of the problem at hand.
2 – Shows careful scholarship and frequently cited the primary literature. The student has mastered most the relevant material and has integrated it well to set up the thesis research.
3 – Shows average scholarship. The student accurately presented findings from the literature, but relied heavily on reviews rather than primary sources and/or relied only upon materials provided to them by the mentor.
4 – Shows below average scholarship. The student has mastered only a part of the relevant literature. Significant parts of the thesis are not supported by cited material. Important material has been neglected. Insufficient information is provided to understand the thesis research question.
5 – Shows poor scholarship. The student knows or understands little of the relevant literature or has made major errors in interpretation and/or citation.

Thesis Writing – This thesis:
1 – Is outstanding. It is a pleasure to read. It is clear and concise and represents excellence in student writing. It needs no additional editing.
2 – Is exceptionally well written. It is clear and careful and represents excellence in student writing. It however falls short of being outstanding in one or more respects (e.g., unnecessarily verbose).
3 – Is well written, but may require revisions and editing to be fully understandable. Usually clear, but some sections need to be re-read to capture the meaning.

4 – Is poorly written. Significant portions are sloppy or unclear. There are many grammatical errors and ambiguities.

5 – Is difficult to read. Most sections are unclear, ungrammatical and convoluted. Unquestionably a rushed draft that has not been proof-read.