Grading rubric for spring semester Junior Paper

**Total length 10-12 pages:**
- Abstract (200 word limit)
- Background & Significance (3-5 pages)
- Specific Aims (1/2-1 page)
- Preliminary Results (1-2 pages)
- Research Plan (4-5 pages)
- Bibliography (not included in page length, at least 10 primary sources)

Format: Arial 11 or Times New Roman 12 point font, double-spaced (except for bibliography), 1 inch margins. There is no limit on figures and tables.

Faculty advisers will read and comment on no more than one draft of the JP.

**Abstract (200 words):**
The abstract should accurately summarize the contents of the JP. 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 preliminary findings
- d) a summary of the interpretations and/or conclusions

**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 – This does not resemble a scientific abstract in that it is missing many of the key components listed above or contains numerous inaccuracies.
**Background & Significance (3-5 pages)**

The Background & Significance section should establish the context of the work being proposed. This section must answer the questions, "What do I plan to study? Why is it an important problem/question? How does work published by other investigators motivate the proposed research – what has been done, what gaps remain in our understanding? How will my study, if successful, advance our knowledge about the specific problem and the field more generally?"

The key elements to an excellent Background & Significance section are:

- a) a concise summary of the relevant primary literature that frames the proposed question or study
- b) the purpose of the work in the form of a hypothesis or question
- c) the rationale for the approach to testing the hypothesis or answering the question
- d) a brief statement as to how the field would be advanced by successfully testing the hypothesis

**Evaluation**

1 – The Background & Significance includes all four elements listed above and is scientifically accurate. It does not contain extraneous information or material better suited for the Preliminary Results or Research Plan.

2 – The Background & Significance includes all four elements listed above, but has one or more of the following deficits: a) has one or two scientific inaccuracies; c) contains extraneous information; d) contains information better suited to the Preliminary Results or Research Plan.

3 – The Background & Significance is missing one of the four elements listed above and has one or more of the following deficits: a) has multiple scientific inaccuracies; c) contains extraneous information; d) contains information better suited to the Preliminary Results or Research Plan.

4 – The Background & Significance is missing more than one of the four elements listed above and has one or more of the following deficits: a) has multiple scientific inaccuracies; c) contains extraneous information; d) contains information better suited to the Preliminary Results or Research Plan.

5 – The Background & Significance has numerous deficiencies and reads like a rushed draft.

**Specific Aims (1/2 to 1 page)**

The Specific Aims section is the "master plan" for your proposal. If the Background & Significance section has set up the question well, the Specific Aims section should easily transition into what you will do for your thesis work. You do not need to restate the background information in this section but it should state the problem you are studying, the central hypothesis you are testing, and the "to do" list of objectives - the Aims - for addressing the hypothesis. A senior thesis proposal should have at least two specific aims, but these should be reasonable for the time you have to complete the work. List each aim as a bold header. Under the header state the experimental approaches you will take and, briefly, how the aim will help prove your hypothesis. Each aim can have its own hypothesis if warranted.
Evaluation
1 – The specific aims are clear and concise. They are reasonable and designed to test the stated hypothesis. The rationale and approach to the Aims are clear.

2 – The specific aims are reasonable and designed to test the stated hypothesis. However, the section is lacking in clarity, or lacks suitable details of the rationale or approach.

3 – The specific aims are reasonable but are not clear in how they test the hypothesis, or the section is unclear and lacking in details of the rationale and approach.

4 – The specific aims do not test the hypothesis or are completely unclear.

5 – The specific aims are not clear, do not test the hypothesis, and lack needed details.

Preliminary Results (1-2 pages)
This section reports unpublished work only and may include data from others in the laboratory or your own results. Only unpublished work relevant to your hypothesis and specific aims should be included. You must indicate clearly whether you or another lab member obtained the results you present. Concisely explain the experiments and/or analysis that was done and why, and how the results inform your hypothesis.

If the student is initiating a completely new project, there may be no preliminary results to report. In this case, please state that there are currently no preliminary results for the project. In the current circumstances it is likely that most students, especially those who started in the spring, will not have preliminary data of their own to present. Unpublished data generated by another lab member that directly supports the proposal may be included, but must be properly cited. Alternatively, if a student has been in the laboratory in previous semesters they may have data to include. Regardless, any data that is presented is evaluated on how it is presented and relevance to the proposal, not on what was accomplished.

Evaluation
1 – Preliminary results are professionally presented and establish the feasibility or support the rationale for the hypothesis and proposal. This section is clear, even to readers unfamiliar with the experimental system.

2 – Preliminary results are well presented and understandable. The relation of the preliminary results to the proposal is clear.

3 – Preliminary results are well presented but the relation to the proposal or rationale and hypothesis is difficult to determine.
4 – Preliminary results are difficult to understand for a reader who is unfamiliar with the system, or the relationship to the proposal is unclear.

5 – Preliminary results are presented but they are difficult to understand, or do not provide support for the rationale or hypothesis, or contain numerous scientific inaccuracies.

N/A – there are no preliminary results for this proposal.

Research Plan (4-5 pages)
This section should provide a detailed work plan for your thesis. This section should be organized by specific aim. Each experiment or study proposed in this section should include:
   a) A concise outline or description of the experiment or study, including controls
   b) Potential results and how these would relate to the hypothesis being tested
   c) Potential problems or pitfalls that may occur and how these would be addressed.

Evaluation
1 – The Research Plan is clearly and concisely presented. The experimental approach is understandable to an audience not familiar with the system. All three elements above are included for each experiment or study and each is expertly addressed.

2 – The Research Plan is clear and concise. The approach is reasonably understandable and logical, and all three elements are included for each experiment.

3 – The Research Plan is clear and the approach is understandable. However, one or more elements are missing or not well explained or presented.

4 – The Research Plan is clear but the approach is not understandable, or is not always logical, or lacks multiple elements.

5 – The approach is not logical or clear and the section lacks multiple elements.

Evaluation of Writing
1 – The JP is a pleasure to read. It is clear and concise. Needs little or no editing and reads as though it was written by an expert.

2 – The JP is easy to read, needs only minor editing. Represents excellence in student writing and appears to be the end product of multiple drafts.

3 – The JP is well written, but requires revisions and editing. Usually clear, but some sections need to be re-read to get at the meaning. Reads like a good, proof-read draft.

4 – The JP is poorly written. Significant portions are sloppy or unclear. There are many grammatical
errors, typos, and ambiguities. Reads like a rough draft.

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

The following two sections are scored by the adviser only.

**Bibliography:**
This is a comprehensive list of the sources used in developing your proposal. Please include full references, with titles, in your bibliography. Format citations with last name of the first author and date, for example (Gavis et al., 2015).

**Evaluation**
1 – Each factual statement is referenced to the appropriate primary source. The student identified and correctly cited relevant papers they found through their own reading of the literature that were not suggested by the advisor. The citations are completely accurate and properly formatted for a published journal. All articles cited in the text - and only those articles cited in the text – are listed completely in the bibliography.

2 – Each factual statement was referenced to the appropriate primary source. The citations are completely accurate and properly formatted for a published journal. All articles cited in the text - and only those articles cited in the text – are listed completely in the bibliography. However, the sources were mainly those suggested by the advisor.

3 – Most citations are accurate; however, one of the following was true: a) a few key facts are not properly referenced; b) the student relied almost exclusively on non-peer reviewed Internet sources; c) references are missing from the Bibliography; d) references are listed in the bibliography but not cited in the text; e) the references are not listed in an accepted scientific format.

4 – The citations and references are acceptable; however, two of the following are true: a) a few key facts are not properly referenced; b) the student relied almost exclusively on non-peer reviewed Internet sources; c) references are missing from the bibliography; d) references are listed in the bibliography but not cited in the text; e) the references are not listed in an accepted scientific format.

5 – The citations are not acceptable; three of the following are true: a) a few key facts are not properly referenced; b) the student relied almost exclusively on non-peer reviewed Internet sources; c) references are missing from the Bibliography; d) references are listed in the bibliography but not cited in the text; e) the references are not listed in an accepted scientific format.

**Work Ethic and Independence**
The student should speak with the adviser about expectations concerning commitment and what should be accomplished for the JP. Advisors will take the current circumstances into consideration when
evaluating student work and independence. If your student has primarily interacted with a mentor in your laboratory, you should ask them for their input on this criterion.

**Evaluation:**
1 – The student worked consistently and made exceptional progress. The student clearly put in the time and effort required to understand the background for the proposed project. To meet this score the student should have demonstrated the ability to find and read relevant literature on their own. They should have made original suggestions and contributions to the development of the Aims and Experimental Plan. They should have properly incorporated feedback on their project and writing.

2 - The student worked consistently and made excellent progress. The student clearly put in the time and effort required to understand the background for the proposed project. To meet this score the student should have demonstrated that they read and understood literature assigned to them by their mentor/adviser. They should demonstrate understanding of their proposed project. They should have properly incorporated feedback on their project and writing. This is the score we expect most of our juniors to meet.

3 - The student worked consistently and made minimal progress. The student accomplished less than expected in terms of understanding the literature and/or the project. This may be evident from their writing, participation in discussions, and/or in a failure to properly incorporate feedback into their paper. To meet this score the student should have made some gains in understanding the background or their project, even if less than expected.

4 – The student worked intermittently and made some progress. The student accomplished less than I expected in terms of understanding the literature and/or the project. This may be evident from their writing, participation in discussions, and/or in a failure to properly incorporate feedback into their paper. This score would be given to students who show little to no gains in understanding of the background or their project.

5 – The student put minimal effort into the JP, or waited until the very end of the semester to get started. The student accomplished much less than I expected in terms of understanding the literature and/or the project. This score would be given to students who show little to no initiative in working on their JP and put in a minimum of effort towards understanding and writing.