博士生“高级科学写作”课程考核方式

1、每周课堂出勤率（10%）

2、实验记录规范程度（10%）（请参加小组汇报和讨论时携带实验记录本，并由负责老师根据实验记录的真实、完整、规范性打分，最高 10 分）

3、期末考试（40%）：撰写科研项目计划（要求见下）。**请提前准备。递交时间本学期末，具体时间见后续通知。**

4、小组汇报和讨论（40%：报告分 20%，讨论分 20%，讨论科研项目计划，时间安排见教学日历）。**请提前准备。**

撰写科研项目计划要点

Format: Writing a mini research proposal (accounts for 40%)

Note: The Abstract should be written in both Chinese and English. Chinese can be used in other sections. Plagiarism is NOT allowed. The research proposal will not be graded if > 30% is similar to existing documents.

1. Purpose:

1) To improve the ability of reading and understanding the current status of the selected topic in biological sciences.
2) To test students' ability to identify an important question or problem in biological sciences.
3) To test students' ability to design logical experimental approaches to advancing our understanding of the problem.
4) To train students' ability to present their idea and reasoning clearly and logically.
5) To practice writing a grant proposal.

These abilities will be critical for students who want to become a productive and independent researcher in the future.

2. Topic selection

Choose any topic in biological sciences that you are interested in or related to your research field.

3. Requirement

A typical mini proposal will be limited to ~ 6 pages (not including figures and references) in text (Times

New Roman 12 pt fonts, 1.5 line space). The proposal is divided into the following seven sections.

1) Abstract (~300 words)

Specify the importance of the problem, the hypothesis, the key approaches you will use, the goals, and the impact of the work. Each contains 1~2 sentences.

2) Background and significance (1.5~2 pages)

Briefly sketch the background leading to the selected topic, critically evaluate existing knowledge, and specifically identify the gap that the proposal is intended to fill. State concisely the importance and health relevance of the research described in this proposal by relating the specific aims to the broad and long-term objectives. If the aims of the application are achieved, state how scientific knowledge or clinical practice will be advanced. Describe the effect of these studies on the concepts, methods, technologies, treatments, services or preventative interventions that drive this field.

In this section, you should show the reviewers your familiarity with the field and knowledge about research being done by referring to all relevant scientific literature. Make sure you cite the important work in the field. Make sure the literature you cite here is also in the **Reference** section.

Please do your best to include the following information.

(1) State concisely the significance and health relevance of the research described in this proposal.
(2) Provide the most important background information about the topic. Clearly state what is known and what is unknown in the field. Make sure the reviewers can understand the logic of your hypothesis, the major principle and terms you use in the proposal. Please use logic reasoning during the organization of the background information.
(3) Propose your hypothesis. The proposed hypothesis will be based on the published studies or unpublished discoveries in your lab and would advance the field of study in a significant way.
(4) Provide a simple clear diagram to show the main idea of your hypothesis, principle, method, etc.

3) Specific aims (< 1/2 page)

List the specific aims of the research proposal, e.g., to test a hypothesis, solve a specific problem, challenge an existing paradigm, address a critical barrier, or develop a new technique. (2~3 specific aims for your mini proposal, 1~2 sentences for each aim, no more than 3 lines/aim). Do not make your aims too ambitious. Design your specific aims so they answer the question posed by the hypothesis.

4) Research design and methods (2~3 pages)

Describe the conceptual framework, procedures, and analyses to be used to accomplish the specific aims of the project. Include why the experiments are planned, how the experiments are designed, how the data are collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Describe any novel concepts, approaches, tools, or technologies for the proposed studies.

Make sure the experiments are in a logical sequence.

(1) Divide this part into sections based on the number of specific aims. List sets of experiments in the same order as specific aims.

Specific Aim 1 ….

Experiment 1.A …

Experiment 1.B …

Specific Aim 2 …

Experiment 2.A …

Experiment 2.B …

…

(2) Provide a short description of the reasoning that you plan the experiments.

(3) Describe the experiments in a logical fashion to test your hypothesis.

(4) Provide any controls you need to clarify the experimental results.

(5) Use flow charts and decision trees to show paths of experiments and how they progress.

(6) Explain how would the positive or negative results prove or disprove your hypothesis

(7) Discuss the significance of the possible outcomes.

(8) Discuss the potential difficulties and limitations of the proposed procedures.

(9) Provide a brief alternative strategy if your designed experiments are not working or if you get negative results.

(10) Provide a tentative timetable for the proposed experiments.

5) Innovations (<1/3 page)

Clearly specify the innovations of your research proposal. Use bulletin points or short paragraphs (~2 points or paragraphs) to describe the innovations.

6) Preliminary data (from literature or your own study if you have)

(1) List the related data from literature or your unpublished data if you have.

(2) Organize them in a sequential way similar to your proposed research.

(3) Provide a short description of the experiments, results, data, and conclusion.

(4) Specifically state which data are published, which data are not published if you have. You can divide this into two sections.

7) References (~30 references)

(1) Use Endnote or other literature management software.

(2) Cite reference in a format consistent with a specific style for a journal or a grant proposal.

Note: Sometimes Endnote also makes mistake. Check the reference before you hand in your research proposal.

4. Checklist

1) Checklist for Background and significance

(1) Have I written in clear, non-technical terms (not full of jargon) that all reviewers will understand?
(2) Did I include enough background information for the reviewers to understand the field?
(3) Have I shown that I know the gaps, discrepancies, or roadblocks in the field?
(4) Did I show whether my research is innovative?
(5) Did I explain why my proposal is worth funding?
(6) Have I conveyed the significance of my research and how it will increase knowledge in the field?
(7) Did I identify the next logical research beyond this proposal?

2) Checklist for Research design and methods

(1) Does each experiment correspond to one of the specific aims? Are they stated in the same order as the specific aims?
(2) Do the experiments follow a logical sequence?
(3) Did I show why each experiment is important or how it is relevant to the hypothesis?
(4) Is my proposed model system appropriate?
(5) Did I include all relevant controls? Did I design the experiments correctly?
(6) Did I use flow charts and decision trees to show paths of experiments and how they progress?
(7) Did I outline the key methods in detail?
(8) Did I justify my choice of methods in detail? Are the methods I chose appropriate to achieve the specific aims?
(9) Have I included sufficient detail to show I understand and can carry out the research?
(10) Did I state the expected outcome of my research?
(11) Did I provide solutions for potential problems?
(12) Did I address difficulties I may encounter with the proposed approaches? Did I propose alternative solutions?
(13) Did I consider how the limitations of the approaches may affect my results and data?
(14) Did I provide a timetable showing how and when I will accomplish my aims, including any overlap of experiments, estimated delays, and alternative paths?
(15) Have I cited references wherever needed?

3) Checklist for possible experimental results

(1) Did I show the value of the results I expect?
(2) Have I discussed statistical methods to be used?
(3) Did I define the criteria for evaluating the success or failure of a specific test?
(4) Did I state the conditions under which my experimental data would support or contradict my

hypothesis?

(5) Did I state the limitation I will observe in interpreting results?

Note:

1) Please do NOT write what you do NOT want to share with reviewers.

2) You are encouraged to write topics unrelated to your current study. It is also fine if you write a research proposal related to your research.