

## **GUIDELINES FOR THE MICROBIOLOGY & IMMUNOLOGY DEPARTMENT 2024 WRITTEN PRELIMINARY EXAM**

The written preliminary exam (also known as the doctoral written examination) consists of a research proposal, written in a format similar to a NIH pre- or postdoctoral fellowship proposal. The proposal is written whenever the student likes over the course of the Spring semester and the subsequent three and a half weeks.

**1. Prelim exam advisor.** If you have questions or concerns about any aspect of the preliminary examination process, please contact the Prelim Exam Advisor [Bob Bourret, [bouret@med.unc.edu](mailto:bouret@med.unc.edu), 919-215-2733 (cell), 6108 Marsico Hall]. The Prelim Exam Advisor does not review proposals, so students can seek advice without compromising their anonymity with regard to grading.

**2. Preparation.** Writing a successful preliminary exam requires multiple skills, including good choice of topic, critical reading of scientific papers, proposing well-founded hypotheses, experimental design, logical analysis and interpretation of data, clear writing, etc. The MCRO795 course on creating and writing effective research proposals is required for all Microbiology & Immunology Ph.D. students and must be completed before taking the written preliminary examination. The skills acquired in MCRO795 are necessary but not sufficient for success on the exam. Poor writing quality scores in MCRO795 or other indicators that a student is not ready may result in a recommendation to complete appropriate remediation activities before taking the written exam.

**3. Exam period.** The prelim exam period will start with the distribution of the list of foundation publications during the first week of classes of the Spring semester. Students are encouraged to reach a mutual agreement with their research mentor regarding the time during the semester to be devoted to proposal preparation. The expectation is that most proposal preparation outside of the actual writing can be done over the course of the semester in addition to normal graduate student responsibilities. However, at a minimum, there will be a period of at least three and a half weeks immediately following Spring semester final examinations (Saturday, May 11 - Monday, June 3, 2024) during which the student is protected from all other responsibilities (i.e. classes, serving as a Teaching Assistant, laboratory research, etc.) and able to devote 100% of their time to writing their research proposal. The exam may be completed and submitted at any time prior to the deadline, i.e. there is no requirement to wait until the formal May writing period.

**The following items must be submitted by 12:00 noon on Monday, June 3, 2024 to the Student Services Specialist (Jamie Desoto):**

- One .pdf digital file of the completed examination.
- The names of up to two Microbiology & Immunology faculty members requested as potential reviewers.

**This is a firm deadline; late proposals will not be accepted and will receive a grade of Fail. If there is some reason why you cannot make the deadline, then contact the Prelim Exam Advisor soon as you know there might be a problem. The Prelim Exam Advisor will determine if appropriate accommodations can be devised that preserve the integrity of the exam in the context of your situation. For example, there is precedent for a pause in the middle of the exam and an accompanying deadline extension in case of a serious family emergency.**

#### 4. Topic selection

**Foundation publications.** A faculty committee will screen sources such as *Nature Reviews Immunology*, *Nature Reviews Microbiology*, *Trends in Immunology*, and *Trends in Microbiology* to generate a list of at least 30 original research publications to serve as the foundations for research proposals. The list will include at least 20 papers with a focus on "microbiology" (viruses, bacteria, eukaryotic pathogens), and at least 10 immunology papers.

**Permissible topics.** Students will choose one paper from the provided list to serve as the foundation for an original research proposal. The final proposal can take off in any direction from the foundation publication. However, there must be a clear connection between the foundation paper and the eventual proposal, i.e. the paper should inspire, lead to, be the fundamental reference for, etc. the final proposal.

**Project scope.** The scope of proposed work should be comparable to that of a fellowship application from a graduate student or postdoctoral scientist. Specifically, it should be plausible for the proposed research to be accomplished by one person working for three years. Unlimited use of external support services or core facilities (e.g. antibody preparation, mouse breeding, DNA sequencing, etc.) is allowed, but the timeline for such services must be realistic. Similarly, there is no budget limit (i.e. it is OK to propose expensive methods).

**Impermissible topics.** Because we want to evaluate a potential line of investigation that is generated by you and not by your mentor, you may not choose a topic that involves projects from the laboratory where you are carrying out your dissertation research, whether that research is past, present, or future:

- A prelim topic cannot build on data collected in your lab, even if the project was discontinued or there are no plans to follow up on the observation, because your lab originally initiated the project.
- Overlap with current projects should be straightforward to evaluate.
- The prohibition against future projects means that a prelim topic cannot be under serious discussion as a thesis topic or as part of a grant proposal by anyone in your lab. It does NOT mean that your lab can never investigate the topic.
- The spirit of the prohibitions outlined in this section also apply to a student's research experiences prior to joining their dissertation lab. The topic idea should originate with the student, not from a former mentor or lab.
- A prelim topic can apply a method developed or used in your lab. The restriction applies to the topic, not to the method of investigation (unless the method is the topic).

**Topic verification by mentor.** Students are not always aware of all past or anticipated future research activities in their lab. Therefore, students should check with their advisors early in the proposal development process to be sure that their topic is not too close to their lab's research. Although the topic verification statement requires the draft Specific Aims page, a Specific Aims page is neither required nor expected for an early conversation to verify a proposed topic is permissible. Note that topic verification is one of two minor exceptions to the prohibition on students discussing their proposal with Microbiology & Immunology faculty members (see point #6). The conversation should be tightly restricted to verifying the absence of overlap between a student's prelim topic and the lab's research activities.

The research mentor must sign a topic verification statement to be scanned and electronically submitted by the deadline along with the first draft Specific Aims page:

*"Please verify that this proposed prelim topic is permissible by reading the draft Specific Aims page provided by your student and then signing the following statement:*

*The topic of this research proposal has not previously been investigated in my laboratory, is not currently being explored in my laboratory, and is not the subject of an existing or planned grant application from myself or anyone in my lab.*

*Mentor Signature \_\_\_\_\_ Date \_\_\_\_\_"*

If a student has two mentors, then both should sign. If the student's mentor is not physically available to sign the document, then an equivalent email message sent directly from the mentor to Student Services Specialist Jamie Desoto ([jamie\\_desoto@unc.edu](mailto:jamie_desoto@unc.edu)) is an acceptable substitute.

**Deadline for initial choice of foundation publication and first draft Specific Aims page.** By 12:00 noon on Monday, March 11, 2024 at the latest, students must submit by email the following three items to the Student Services Specialist (Jamie Desoto, [jamie\\_desoto@unc.edu](mailto:jamie_desoto@unc.edu)):

- The choice of publication to be used as the foundation of their proposal.
- A .pdf file of the topic verification statement signed by the research advisor(s).
- A .pdf file of the first draft Specific Aims page of the proposed project. This document will not be graded but is intended to encourage serious consideration of all aspects of the research proposal by this date. Students will receive general feedback on the contents of their draft Specific Aims page from MCRO faculty. The draft Specific Aims page should not contain any information that could reveal the identity of the author. The page is subject to the same font/margin/length format rules as for the final document (see section #8). A separate reference list is not allowed.

Note that the deadline falls during Spring Break. Plan accordingly – you can submit before the deadline.

**Deadline for second draft Specific Aims page.** By 12:00 noon on Monday, April 1, 2024 (this is not a joke) or two weeks after receiving faculty comments on the first draft Specific Aims page, whichever is later, students must submit by email a .pdf file of their second draft Specific Aims page to the Student Services Specialist (Jamie Desoto, [jamie\\_desoto@unc.edu](mailto:jamie_desoto@unc.edu)). The draft Specific Aims page should not contain any

information that could reveal the identity of the author. The page is subject to the same font/margin/length format rules as for the final document (see section #8). A separate reference list is not allowed.

Faculty comments on draft Specific Aims pages will be returned to students as quickly as possible following submission. Students need not wait until the March 11th or April 1st deadlines to obtain faculty feedback. Faculty feedback on draft Specific Aims pages may be shared with anyone whom the student is allowed to consult, because the student did not write the text.

We strongly discourage students from changing their foundation paper after March 11th. However, students may switch to a different foundation paper (e.g., if they discover information suggesting their proposed project may not be viable). *The Student Services Specialist must be notified of a change in foundation paper. A change must again be accompanied by a topic verification statement and two draft Specific Aims pages, which will receive faculty feedback.* Students should be completely settled on their project by April 30th at the latest; changes in foundation paper after this date are unlikely to lead to a Passing proposal.

**Deadline for exit from exam.** The purpose of the written preliminary exam is to identify students who need more training in scientific thinking skills such as designing experiments, creating hypotheses, interpreting results, etc. If as a result of attempting the exam, a student recognizes that they are not adequately prepared to successfully complete the exam, then it is generally possible before April 30th to stop without penalty. Such students should consult with the Director of Graduate Studies, who will meet with the student and their advisor to make a plan to develop the necessary skills before retaking the exam. Students who continue to work on the exam after April 30th will receive a grade that is reported to the Graduate School.

If faculty feedback indicates that the second draft Specific Aims page is weak, then the Director of Graduate Studies will initiate a conversation with the student and their advisor about the best course of action. The final decision of whether or not to continue with the exam is made by the student.

**What if you are "scooped"?** Foundation papers are drawn from active areas of research and student proposals often anticipate projects that are underway in the real world. Sometimes the results of a project proposed by a student are published before the student has submitted their exam. If this happens, then consult with the Prelim Exam Advisor (Bob Bourret) immediately. A mutually agreeable course of action will be determined depending on the specific circumstances. You will NOT need to start the exam over. There are serious ethical issues, as well as potentially negative consequences for your exam outcome, to ignoring or not reporting published work that overlaps with your proposal.

## 5. Grading

**Anonymous submission.** The Student Services Specialist will assign each student an alphabetical code (Student A, B, etc.) and will be the only person with the key to the code. Thus, graders will not know the identity of the student whose proposal is being

graded. Codes will be assigned when students submit their choice of foundation publication and first draft Specific Aims page.

To preserve anonymity:

- Prior to submitting the draft Specific Aims pages or full proposals, students should open their .pdf file with Adobe Acrobat Reader and select the "Properties" option under the "File" pull-down menu. In the "Description" category, delete any information that may be present in the "Author" box.
- All communications between the Prelim Exam Advisor and students will pass through the Student Services Specialist.

**Reviewers.** All reviewers will be faculty members with appointments (primary or non-primary) in the Department of Microbiology & Immunology. Each proposal will be graded by Primary and Secondary Reviewers with appropriate scientific expertise, plus one Common Reviewer to provide consistency across scientific disciplines. The Foundation Paper Committee will suggest several faculty members with potentially relevant expertise for each proposal. **Students can provide names of up to two potential reviewers, with the understanding that there is no guarantee their request will be met.** The Prelim Exam Advisor will inspect submitted proposals for compliance with formatting rules, briefly survey the scientific content, and then assign reviewers as follows:

- The Foundation Paper Committee is composed of six faculty members (two experts each in bacteriology, immunology, and virology). The two committee members who work in the topic area of the foundation paper examine the proposal and provide a list of MCRO faculty members ranked according to their relevant expertise.
- The Prelim Exam Advisor assigns Primary and Secondary Reviewers according to the ranked lists suggested by the Foundation Paper Committee, but subject to availability and workload constraints.
- Ideally at least one of the reviewers suggested by the student is used, subject to expertise (high enough on ranked list), availability, and workload constraints.
- To the extent possible, Common Reviewers are assigned a portfolio of proposals balanced across topic areas.
- The Primary and Common Reviewers must have experience with Microbiology & Immunology preliminary exams. Inexperienced faculty may serve as Secondary Reviewers.
- Each faculty member is ideally limited to no more than three review assignments, except for Common Reviewers, who usually review four proposals.
- The Student Services Specialist, who knows the code letter for each student, checks that all assigned reviewers are independent of the student. Advisors/co-advisors, partners of advisors/co-advisors, and members of advisors'/co-advisors' labs are not allowed to review a proposal).

**Grading criteria.** The five criteria upon which the exam will be graded are:

- Is there a clearly presented hypothesis or hypotheses? Is the hypothesis supported by a reasonable rationale? Does testing the hypothesis have the potential to significantly advance the field?
- Are the proposed experiments logically consistent with the Specific Aims, i.e. can the planned experiments actually answer the questions posed? Do the planned experiments represent a reasonable way to address the Aims, or have much better approaches been overlooked?
- Are the reasons for various choices in experimental design explained and appropriate alternate experimental approaches proposed? The nature and extent of what constitutes an appropriate alternate approach depends on the suitability and feasibility of the primary approach.
- Are various possible experimental outcomes and interpretations considered, including the possibility that a hypothesis might be incorrect?
- Is the proposal clearly written and illustrated?

Proposals are not required to include an Innovation section. However, reviewer comments about innovation are welcome, particularly if innovation is a strength of the proposal.

**Scoring metrics.** A three-point scale will be used for each criterion:

3 = Exceeds Expectations. A score of Exceeds Expectations should be used whenever a proposal addresses a scoring criterion noticeably better than we expect from a competent second year Ph.D. student. *A score of Exceeds Expectations should be used whenever performance exceeds expectations, and is NOT reserved only for rare, exceptional performances.*

2 = Meets Expectations. A score of Meets Expectations is intended to cover a broad range, from barely acceptable to competent.

1 = Does Not Meet Expectations. A score of Does Not Meet Expectations is appropriate when a proposal contains significant errors in scientific thinking or understanding, exhibits serious logical flaws, addresses a criterion poorly or not at all, omits or overlooks critical points, etc.

With five component criteria and three reviewers, the maximum possible score is 15 points per reviewer and 45 points overall. If each component is graded as Meets Expectations, then the score would be 10 from each reviewer and 30 points overall.

If no reviewer gives more than one score of Does Not Meet Expectations, then the exam will get a score of Pass.

If any reviewer gives more than one score of Does Not Meet Expectations, then the three reviewers will meet in person to discuss the proposal. At the end of the meeting, there will be a secret ballot submitting new scores. If the total number of points is  $\geq 26$  (the score that would result if one reviewer scored two criteria as Does Not Meet Expectations, two reviewers scored one criterion as Does Not Meet Expectations, and all eleven other criteria were scored as Meets Expectations), then the exam will be awarded a score of Pass. A total score of  $\leq 25$  will result in an initial score of Revise or a final score of Fail.

**Incomplete submissions.** Proposals that are obviously incomplete (or not submitted at all) will not be sent out for faculty review, will not have an opportunity for revision, and immediately will be given a final grade of Fail.

**Opportunity for revision.** The MCRO Ph.D. program encourages an emphasis on excellence. Because all research proposals can be improved, all students will have the opportunity to revise their initial proposal in response to faculty feedback and potentially improve their final grade. Details follow:

**Setting the revision period:**

- No later than three weeks after submission of their initial proposal, each student must inform the Student Services Specialist of the start and end dates for their desired revision period.
- The revision period can last up to two weeks and must begin and end on weekdays. The start and end dates cannot be UNC holidays (e.g. Thursday, July 4, 2024). We expect the two-week revision period to end by Monday, August 5, 2024. To accommodate inflexible summer plans, revisions must be done by the first day of fall semester classes, Monday, August 19, 2024.
- The start date can be no sooner than five weeks after the original submission for students taking the exam for the first time, and no sooner than six weeks after initial submission for students who have previously taken the exam. These waiting periods are to ensure faculty reviews of the initial proposal are complete before the revision period starts. Faculty reviewers are NOT informed of the exam history of students. However, if a proposal from a student who previously failed the exam initially receives a non-passing score, then additional faculty reviewers are consulted before returning reviews to the student.
- When specifying their revision period, students have the option to request "As soon as possible" and also specify "blackout" dates during which the revision may not occur. Although the planned start date for revisions must be at least five (or six) weeks after initial submission, faculty reviews are often completed sooner. If a student requests "as soon as possible", then the revision period will start as soon as reviews are available, if there are at least two weeks before any blackout period. If a blackout period precludes immediate start of revisions, then as soon as grades are available the student will be informed of the start date for their revision period.

**Receiving the initial grade and faculty comments**

- Once proposals are assigned to faculty reviewers, students will be informed of the tentative deadline for review completion, with the understanding that faculty generally (but not always) meet the deadline. If delays in review completion arise or are anticipated, then students will be informed.
- Students will receive their initial grade of Honors, Pass, or Revise as soon as faculty reviews are completed, regardless of when a student's designated revision period is. The grade will be in a letter attached to an email message. Students can choose when they wish to open the attachment to reveal their initial grade.

- Students will not receive faculty comments on their initial proposal until either (i) they decide not to revise and accept their initial grade as final or (ii) the first day of their designated revision period.
- If a student decides prior to the start of their revision period to not revise their proposal, then the initial grade becomes the final grade of H, P, or F. Such students will then be provided with written feedback from three faculty reviewers on their initial (now final) proposal.
- On the first day of their chosen revision period, students who have not yet made a revision decision will receive written feedback on their initial proposal from three faculty reviewers. Such students can then decide to accept their initial grade as final (as in the previous bullet point), or to proceed with a revision.

### **Making revisions**

- An initial grade of Revise will be accompanied by an indication of the extent of revisions needed to Pass.
- Faculty feedback on the initial proposal may be shared with anyone whom the student is allowed to consult, because the student did not write the text.
- Student may discuss the feedback they receive on their initial proposal with their research advisor(s) and/or the Prelim Exam Advisor for the exclusive purpose of making a decision about whether or not to revise. Writing or scientific advice cannot be provided. However, the Prelim Exam Advisor can clarify or answer questions about reviewer feedback if appropriate. This is the second of two minor exceptions to the prohibition on students discussing their proposal with Microbiology & Immunology faculty members (see point #6).
- Students who choose to revise their proposal could potentially improve their final grade to Pass or Honors. There is no guarantee that the grade on the revised proposal will be better than the grade on the initial proposal. However, the final grade will be based on whichever of the initial or revised proposals scores best (i.e. there is no risk of a student lowering their grade during revision).
- Each student decides the extent of revisions he or she wishes to make. To focus the final grading decision on the revised version judged against an absolute standard (rather than extent of improvement), changes between the initial and revised proposals will not be tracked. The same reviewers who evaluated the initial proposal will again review the anonymous revised proposal, which will receive a final grade of H, P, or F.
- When receiving their final grade, whether based on the initial or revised proposal, the identities of the three reviewers will be revealed to the student. To maintain a healthy focus on the outcome that matters (Pass or Fail, with Pass indicating no need for remediation and Fail indicating a need for remediation), students will not be given the individual numerical scores on which their final grade is based.

**Asynchronous grading.** Examinations can be submitted any time prior to the applicable deadline for the initial or revised version. Reviews will be arranged as quickly as possible. Initial grades will be supplied as soon as available. Written reviews will be provided at the start of the revision period chosen by the student or when a student accepts their initial grade as final, whichever comes first. Results of final reviews will be revealed as soon as available.

**Honors.** After all exams are scored, the scores will be examined with regard to the possibility of awarding Honors grades to recognize truly exceptional performances. It is anticipated that Honors grades will be awarded similarly to historic practice (i.e. not necessarily every year). Rarely, a remarkable proposal may merit an Honors grade before all exams are scored.

**6. Obtaining advice and information from others.** You must work independently in preparing the proposal. Therefore, you may not discuss your proposal with other students who choose the same foundation publication. However, you are allowed (and strongly encouraged) to seek advice from colleagues and experts, either at UNC or elsewhere, concerning specific techniques or experimental approaches, or the feasibility of your scientific ideas. You should inform potential consultants that a question relates to the prelim exam, because this context may affect how they answer your questions. There are two important restrictions on obtaining advice about your proposal:

**First, you may not give your written proposal in any form (outline, draft, polished text, etc.) to anyone to read, with two exceptions:**

(i) **The only text from the written preliminary exam that may be shared broadly with others is the Specific Aims (and any sub-Aims) themselves (NOT the entire Specific Aims page and NOT the experimental outline text that often follows Aims and sub-Aims). Thus, you may not receive feedback of any kind on your writing other than the Specific Aims (and sub-Aims, which are logically part of the Aims) themselves. The ban on sharing text that will end up in your proposal extends to writing on a white board, email messages, Powerpoint slides, etc. Similarly, reading your proposal aloud to others would obviously violate the spirit of the rule and is not permitted. Sharing of text is prohibited because we want to assess whether a student can communicate their ideas without assistance. We do not expect students to design their entire project by themselves. Because consultation with others should primarily focus on issues of experimental design and feasibility, there really is no need to show others any text from your proposal besides the few sentences that comprise your Specific Aims (and sub-Aims). If you violate this rule, then you will receive a grade of Fail for the exam.**

(ii) **You may utilize the free services of the trained graduate student writing coaches at the UNC Writing Center (<https://writingcenter.unc.edu>) without limit. This is an educational service, not a copy-editing service. The coaches will provide advice on your document and answer your questions but will not change your words or ideas. You must inform the Writing Center that the document under discussion is part of your preliminary exam, and that their conference summary should be sent to Prelim Exam Advisor Bob Bourret after each meeting.**

Conference summaries do not compromise exam anonymity, because Bob does not have the student codes. Graders will not know which students utilized the Writing Center and which did not. Bob simply monitors how many students use the Writing Center each year as one means to assess the utility of the service. After the exam is over, Bob sends the conference summaries to the student's advisor to help inform future mentoring on writing.

**Second, with the exception of the topic verification procedures described in point #4 and the feedback on your initial proposal described in point #5, you may not discuss your proposal with any faculty member who has an appointment in the UNC Chapel Hill Department of Microbiology & Immunology. This includes both primary and non-primary appointees, and both tenure track and research track appointees, all of whom are potential graders. The rationale is to preserve anonymity of grading. As a matter of fairness, students also may not discuss their proposal with advisors or co-advisors who are not MCRO faculty (there is one such student in 2024).**

Two resources that may be useful for discussions of scope, experimental design, feasibility, and methods are the Prelim Consulting Corps and the Peer Mentoring Network. The Corps is comprised of senior students, postdoctoral scientists, and research associates in the Department of Microbiology & Immunology who have volunteered to provide scientific advice for preliminary exams. A document listing Corps members, contact information, and areas of scientific expertise will be provided. Please be respectful of consultant's time by making an appointment in advance and being prepared for your meeting. The Peer Mentoring Network is comprised of students and postdocs and offers activities such as open office hours, panel discussions, etc. to provide both general and specific advice about the exam. The Prelim Consulting Corps and Peer Mentoring Network are intended to reduce any perceived barriers to conversations about your ideas. However, you would be wise to also talk to a broader set of people.

**7. Generative Artificial Intelligence.** The use of generative Artificial Intelligence software will be allowed without limit in the 2024 MCRO written preliminary exam, subject to the following guidance.

- **Do Not Outsource Your Brain.** Generative AI is a useful tool but cannot replace your critical thinking skills.
- **Missed Educational Opportunities.** Generative AI is likely to become a valuable tool for many tasks. However, before you choose to use generative AI for specific tasks, think carefully about the educational opportunities that you might miss as a result of your choice. In particular, you will continue to need scientific writing and thinking skills that are unlikely to be replaceable by generative AI anytime soon.
- **(In)Accuracy.** Generative AI predicts the most likely next words in a block of text but cannot distinguish fact from fiction. In its quest to create plausible text, generative AI therefore “hallucinates” by making up both false “facts” and fake references to apparently support its claims. Carefully check the accuracy of any claims made by generative AI. You are solely responsible for the accuracy of material in your proposal – you cannot blame the software for false assertions or nonexistent citations.
- **Biases & Limitations.** The results of generative AI models reflect the biases, limitations (e.g., inability to access content behind paywalls), and toxicity of the internet data upon which the models were trained. Furthermore, the training typically has an end date prior to public release, so results may not include recent knowledge.
- **Attribution.** You must provide honest attribution of how the work you submit was accomplished. If generative AI was used to help complete your proposal, then provide

a brief statement on the title page identifying the software employed and how it was used in general terms (e.g., I used ChatGPT/Bard/Your Favorite Software to suggest possible research topics, outline my proposal, summarize knowledge, edit my writing, etc.). Detailed attribution of exactly where in the proposal text generative AI was used is neither practical nor necessary. If you do not use generative AI, then say so.

- **No Effect on Grading.** A student's choice to use or not use generative AI in preparation of their preliminary examination will not be a factor in determining the grade.

**8. Avoid plagiarism. The proposal must be written in your own words; use of sentences (even with a word or two changed) or ideas from another's work, without attribution, is unacceptable.** If it is necessary to use someone else's words, they must be indicated as such by quotation marks, with the appropriate source cited. Violations of acceptable citation practices will be pursued through the Honor System of the University.

**9. Format rules.** The proposal is to be written in the following format. Proposals that do not comply with formatting rules will not be accepted.

- Use our format rules. Do not use NIH format rules.
- The length of the proposal is not to exceed seven pages of text (single-spaced, at least one-half inch margins on all sides), excluding the title page and references.
- Tables and figures are included within the seven-page limit; be sure to make them large enough to be legible.
- Use Arial font, 11 point or larger, for the text, tables, and for figure legends. A symbol font may be used for Greek letters or other special characters. There are no restrictions on fonts or font sizes within figures themselves.
- Pages must be numbered. Include your student code letter in a header on each page (e.g. Student A). Page numbers and student code letters can go within the margins.
- The proposal must include the sections described below; other sections (e.g. Innovation, Background, Future Directions) may be included as desired.

In the following description of required sections, **text highlighted in yellow is advice**, whereas non-highlighted text gives additional format rules:

**Title Page.** The Title page has three elements: the Title, a complete literature reference for the foundation publication from which your proposal is derived, and an attribution of any use of generative AI to prepare the proposal (if none was used, then say so). The Title page does not count against the overall seven-page limit. Do not include an Abstract.

**Specific Aims Page.** **What are you going to do? This section usually opens with an introduction to the topic and its significance, and then defines the broad, long-term objectives of the project and states the major hypothesis that you have formulated. Then, list the Specific Aims, which may be presented as hypotheses to be tested, questions to be answered, or goals to be reached. Starting with the Specific Aims page template used in MCRO795 is a good way to help organize your thoughts and the**

**description of your project.** Literature references are permitted on the Specific Aims page, but are not required. There is a length limit of one page for Specific Aims.

**Significance.** Explain the importance of the topic addressed by your proposed project. Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice. Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed Specific Aims are achieved. (Paraphrased from NIH instructions.)

The proposal format does not contain a required "Background" section, so it is up to the author to decide where to best provide the information necessary for the reader to understand the proposal. Some will undoubtedly go in the Significance section. Other background information will go in the Approach section. Wherever you put background information, be sure to **critically** evaluate existing knowledge and evaluate the conclusions that have been made in previous studies.

**Innovation.** An Innovation section is not required, but may be included if desired.

**Approach.** Describe the overall research strategy and the procedures you will use to accomplish the Specific Aims of the project. Include the means by which you will collect, analyze, and interpret data. Describe any new methodology and its advantage over existing methodologies. **Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the Aims.** For each set of experiments, include a consideration of possible outcomes and how you will interpret those different possibilities. Indicate how you will establish priorities. Point out particular hazards (beyond routine laboratory activities) associated with the planned research and the appropriate precautions to be taken, including institutional approval. (Paraphrased from NIH instructions.) **The scope of the investigation should be appropriate for a three-year project for one investigator (total of three person-years of work).** The Significance and Approach sections together are limited to six pages. The Approach section should constitute most of the proposal (at least four pages).

Note that in contrast to MCRO795 writing exercises, in which students pretend to be authors of their foundation paper, the written preliminary examination should be written from the real world perspective of the student performing the research at UNC. It is permissible to assume that other laboratories will provide you with materials (e.g. strains, antibodies, drugs, etc.) whose creation has been published. Unpublished information included in the proposal must be supported by a citation of Personal Communication based on an actual conversation or correspondence with the source.

**References Cited.** Provide complete references, **including all authors and titles.** Citations for references with more than 50 authors may be truncated using "*et al.*" after listing the first 50 authors. If you get information from Web sites, include the URL in this section. However, do not provide URLs for literature citations. **Use of bibliographic software such as EndNote is strongly encouraged.** The reference list does not count against the page limit. Also, if you refer to DNA sequences or protein structures, you should include the GenBank accession numbers or the PDB file numbers respectively in the text.

**10. Examples of successful proposals.** The Prelim Exam Advisor will post in the Canvas prelim exam resource folder at least three examples of successful proposals and accompanying faculty comments from a previous year.

**11. Avoid computer problems.** Be sure to make a backup copy of all your relevant files (text, figures, references, etc.) on a separate memory device at least once a day. Loss or damage to your files for any reason (hardware or software problems, computer virus, ransomware, theft) will not be accepted as a reason to extend the deadline for exam completion.

**12. Lifting of exam embargo.** After either (i) accepting the grade on the initial version of their proposal as final, or (ii) submission of the revised version, the student may share their proposal with any Microbiology & Immunology faculty members that they choose (e.g. their research mentor), but no one else until the Prelim Exam Advisor lifts the embargo on sharing exam text. Note that sharing a proposal with faculty members other than the research mentor carries the risk of compromising student anonymity during grading. The general prohibition is because other students may be writing or revising proposals based on the same foundation paper. Microbiology & Immunology faculty members are exempt because they cannot talk to students about exams in progress. Because students may revise their proposals (or unusual situations may arise), the embargo may last for several months after the initial June 3 deadline. Once all exams and revisions for the year have been submitted, the Prelim Exam Advisor will inform students that they can share their proposals more broadly.