



# **Department of Neurobiology and Anatomy**

Guidelines for Scientific Presentations and the Preliminary Exam

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# **Neurobiology and Anatomy**

## **Section I: Guidelines for Journal Club and Seminar Presentations**

Preparation and presentation of a discussion paper  
Presentation of a seminar

## **Section II: The Qualifying (Preliminary) Exam**

Preparation of abstracts  
Preparation of written proposals  
Guide for the Qualifying (Preliminary) Examination

## Section I: Guidelines for Presentations

### Preparation and presentation of a discussion paper

#### I. Background:

Read the assigned paper and any online Supplemental Material associated with the assigned paper, and make sure that you *understand* it. If you are unsure about any aspect of the paper (methodology, reagents, etc.), discuss it with the instructor. Once you have read the paper, step back and ask, what is the major question being addressed? Why did they do this study? At this point you should read a few additional papers for background. You may also consult reviews. You are required to meet with the instructor at least once prior to presenting the paper for discussion.

#### II. In your presentation:

1. Introduce the topic: Prepare a clear, straightforward introduction to the biological problem and the experimental system used to address the problem. Be sure to make clear why they undertook this work (i.e. what was the state of field when this study commenced, and what were the unanswered questions this work addressed). It is helpful to use figures from other sources (e.g. textbooks, reviews) to define the "**big question**" and to introduce the system.
2. Discuss the results: Papers are usually organized around the figures that proceed in a logical manner through a problem. Your presentation should (in most cases) follow the order of the figures and include all figures in the paper. Remember that each figure tells a story. That is each figure represents a self-contained set of experiments that address a specific issue.

Organize your presentation of each figure just as you would organize a manuscript. You may want to include some Supplemental Material, but probably don't need to present all of it.

For each figure you should include:

**Introduction:** What question did the investigator address in this experiment(s). i.e., what was the point of this experiment?

**Methods:** What techniques/approach did they use to do the experiment? Be sure to orient the listener to what they are looking at (e.g. "This is a northern blot of mRNA isolated from b-FGF treated and untreated HeLa cells..." or "This is a parasagittal section of mouse telencephalon at embryonic day 12...")

**Results:** What did they observe?

**Discussion:** What did they conclude from these results? **NB:** You should assess whether their conclusions are supported by the results and whether the experiment fully addresses the question. What didn't they show with these experiments?

The "slides" you prepare should be well organized, with individual panels clearly labeled and large enough to see in the back of the room. Do not include extensive text on the slides; it is distracting to the audience and will keep people from listening to what you are saying. In many papers the figures are too complex to be represented effectively on a single slide, so you may need to separate complex figures into parts that address independent questions. In many cases you will need to re-label the panels with simple, informative labels. An effective way to label and present a slide is to put the question being addressed in the

particular experiment as a title at the top of the slide. After you discuss the results shown on the slide, then show the investigators' conclusion at the bottom of the slide and discuss whether or not their conclusion is justified.

3. Summarize the findings: Synthesize the experimental findings of the paper and clearly explain the conclusions of the authors (a list helps). How was the "big question" addressed?
4. Critique the conclusions: Give *your* assessment of what the authors can and cannot conclude based upon their findings. Be critical. How do the current findings compare to other work in the field? What additional experiments could be done to better support the conclusions?
5. Summarize what the next step should be: Based on the conclusions of the paper, what is the next step? How would you proceed to address the next most important question in this field?

## Presentation of a seminar

### I. General Guidelines

- Know your audience and the duration of your talk.
- Make your seminar simple, logical and grammatically correct. Avoid jargon or specialized terms.
- Do not include too much data. Focus on a few points, and provide ONLY the information necessary to evaluate those points.
- Divide the talk into subtopics. Conclude each subtopic and supply a transition to the next.
- Avoid humor, unless you are confident you can pull it off!
- PRACTICE YOUR TALK before you present it. Speak slowly and clearly. Make sure you know how to pronounce all the terms you will be using and what the terms mean.
- Be alive: make eye contact, use an expressive voice, move around--show enthusiasm!
- Don't apologize for data or for slides. If slides do not convey the point, make new ones.

### II. Organization

#### A. Introduction [from the general to the specific]

1. Start with the **big picture**: Why should a non-specialist be interested in your talk?
2. Provide **background** starting with what is generally known and moving to the specific information necessary to understand the subject of your talk.
3. State what is **unknown**: *why* is the current understanding incomplete or inadequate.
4. Make a clear statement of your **hypothesis**: What did you set out to test? Make sure to indicate how your hypothesis addresses what is unknown or unclear about the field.
5. Provide a brief **outline** of what is to come ("To test this idea, we performed three experiments...").

B. Body [a logical progression, directed by the idea(s) you are testing]

1. Identify the **question** or experiment illustrated by each slide ("To address whether factor X is present at the right time and in the right location to influence the development of structure Y, we examined the Y-generating region Z for X-expression").
2. Identify the **slide itself** ("Here you see a longitudinal section through the Z region, stained for X-expression"). Give ONLY as much methodology as is necessary to understand each experiment.
3. State the **result** illustrated by your slide, and the *interpretation* you want people to make ("This illustrates that X is normally expressed in the Z region prior to Y formation, indicating that X may play a role in the development of structure Y").
4. Address the same point at least three times:
  - We wanted to know if \_\_\_ occurs (This sets up your next slide).
  - We tested \_\_\_ by doing \_\_\_\_ (This presents your slide).
  - We determined that \_\_\_ occurs/does not occur (This concludes your slide. Transition to your next point and start over at "a").
5. Make **rational transitions** between slides that relate the data you will present next to the results you have just shown and to the overall outline you gave in the introduction. ("This established that X is present at the right time to influence Y. We *then* wanted to test whether X is *sufficient* to direct Y's development. To do this we...").

C. Conclusion [from the specific to the general]

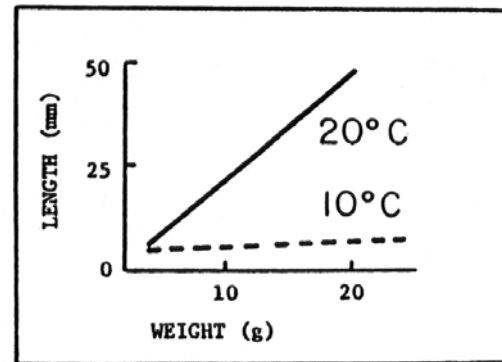
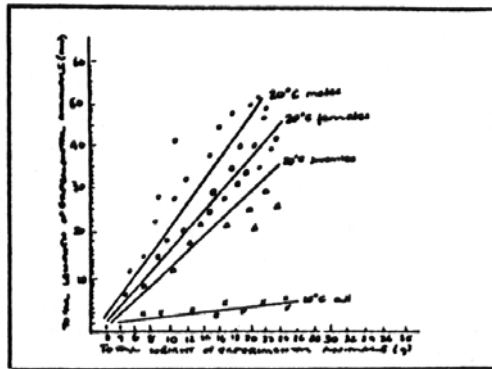
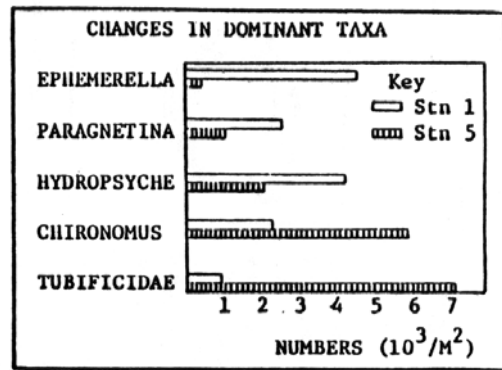
1. Restate the hypothesis; What did you set out to understand? What did you think would happen?
2. Summarize your data. What did you show? How did it support/not support your hypothesis?
3. State the implications for future work. What is the next thing to know?
4. Briefly restate the broad picture and how this work relates to that picture.

# STANDARDS FOR SLIDES

**BAD**

TAXA	STATIONS				
	1	2	3	4	5
<b>EPHEMERELLA</b>	10	10	10	10	10
<b>PARAGNETINA</b>	10	10	10	10	10
<b>HYDROPSYCHE</b>	10	10	10	10	10
<b>CHIRONOMUS</b>	10	10	10	10	10
<b>TUBIFICIDAE</b>	10	10	10	10	10

**GOOD**



## Section II: Qualifying/Preliminary Examination

### Guidelines for preparation of *abstracts*

#### I. General Guidelines

The abstracts for the preliminary examination should be brief (1-2 pages single spaced text; references and figures can exceed the two page limit). The abstracts must be turned into the committee at least one week prior to the abstract meeting. Each abstract should be in the style of a Specific Aims page(s), with a concise statement of the goals (aims), experimental approach and significance of the proposed research. The student's advisor may not participate in preparation of abstracts.

#### II. Typical Problems

1. The proposed abstracts are too close to the thesis work of the student. An important goal of the preliminary exam is to test the student's ability to reason through a problem independently. Abstracts that are too closely related to the student's own research are unlikely to test a student's independent thinking.
2. The proposed abstracts are too narrow or overly simplistic. The preliminary proposal is modeled on a grant proposal, and should address an interesting and important area of research—not merely the next obvious experiment that would follow from a recent finding. Proposed abstracts that address a trivial problem, or advance an important problem in only trivial ways, will not be successful. Similarly, abstracts that overly simplify a complex problem are unlikely to be accepted by your committee.
3. The aims are not hypothesis driven. For each aim (and for each proposed experiment within the aims) you should be able to state in a single sentence *what question* is being addressed. It should be clear from the methods *how* your experiments will address the question and that the experiments will provide a clear answer to the question.
4. The aims are not independent. A common problem with abstracts is that several of the proposed aims depend critically on the successful completion of aim 1 (or on a presumed outcome of the first aim). If you cannot proceed unless aim 1 'works', you have a problem!
5. The experiments are unrealistic. Confine your proposed research to the realm of the possible! Just as in a 'real' grant proposal, you will not be successful if you propose 1.) overly ambitious experiments, 2.) experiments for which there is no currently accepted procedure, 3.) experiments for which reagents are not currently available or 4.) experiments that are not actually possible to conduct.

#### III. Suggestions

1. Talk to other students and look over examples of successful abstracts.
2. Discuss potential topics with your committee PRIOR to the abstract meeting.
3. Consider the general importance and scope of the abstract topic.
4. Read more than a single paper in the research area before deciding on an abstract topic.
5. For each aim, ask yourself, "What if I get a negative result? What if I get the opposite result from what I expect?" If the rest of your proposal depends on a positive finding or one that supports your hypothesis (see #4 above), you need to rethink your experimental design.

## Guidelines for preparation of *written proposals*

### I. General Guidelines

The written proposal should follow the format and style of the current guidelines of an NIH/NRSA proposal.\* Note that the student's advisor may not participate in writing the Qualifying/Preliminary Exam proposal.

\*NIH/NRSA guidelines: <http://apply07.grants.gov/apply/UpdateOffer?id=16446>

### II. Typical Problems

In addition to the problems noted above for the abstracts, the most common problems encountered in the proposal itself are noted below.

1. Insufficient or excessive background material. Background material should be designed to inform the reader about the state of the field and define the importance of the question. This section is not intended to be a comprehensive review of the literature, but it should provide sufficient detail to help the reader appreciate WHY you have chosen to study the questions proposed in each of your Aims and how your proposed experiments will expand on what is currently known.
2. Insufficient or excessive experimental detail. You are expected to understand all of the experimental techniques you propose, and your text should provide sufficient experimental detail to demonstrate your understanding of both the power and the *limitations* of the techniques you employ. Extensive lists of reagents and precise protocols are not necessary. However, vague statements of "we will use the method of Smith and Jones (2002)" are insufficient for the committee to assess your familiarity with the techniques.
3. Failure to consider alternative hypotheses. It is difficult to design an experiment that will be informative no matter what the outcome, and impossible to propose an experiment that is guaranteed to be technically successful. Proposals should include a section that considers "possible problems and alternative approaches" for every experiment. This section should not merely discuss ways to address possible technical problems, but more importantly, it should discuss *1.) alternative ways to test your hypotheses should your experiment prove uninformative and 2.) alternative hypotheses that could be considered should your hypothesis be proven FALSE.* This is usually the most difficult aspect of the proposal to write, but it is also one of the most important.

**Department of Neurobiology and Anatomy**  
**University of Utah**  
Guide for the Qualifying/Preliminary Examination

**The objectives of the Qualifying/Preliminary Examination are, in priority order:**

- (1) Assess the adequacy of the student's didactic training: Does the candidate possess the breadth of knowledge in fundamental biology, chemistry, physics, mathematics and depth of knowledge in cellular and molecular neuroscience, neurophysiology, neuroanatomy and neurochemistry to pursue independent, doctoral research?
- (2) Assess the scholarship of the student's written proposal: Is the proposal clear, grammatically and syntactically correct, and properly organized? Does the proposal reflect critical thinking and proper logic? Are the specific aims, the experimental designs and methods reasonable, the rationale sound? Is the literature survey thorough? Is the statistical design adequate? Are the experimental subjects properly justified and IACUC/IRB policies followed?
- (3) Assess the student's ability to present, explain and defend their ideas: Are the candidate's oral presentation skills acceptable? Does the candidate have sufficient command of the proposal topic to expand on critical points? Can the student teach?

If these assessments are positive, then it is appropriate to advance the student to Doctoral Candidacy in the Department of Neurobiology and Anatomy. These assessments are carried out in two stages.

*The first device is an evaluation of the written proposal by the Preliminary Exam Committee.* The Preliminary Exam Committee conducts the Qualifying Examination (Preliminary Exam) after the Second Year Advisory Committee agrees that the student is ready to proceed with the Examination and the student has filed the departmental "Establish a Preliminary Exam Committee" form (Appendix v, Graduate Student Handbook) with the Director of Graduate Studies. The final written proposal should be delivered to the members of the Preliminary Exam Committee no less than 1 week (2 weeks recommended) prior to the expected examination date. The proposal topic is selected by the Preliminary Exam Committee in an initial meeting with the student. The format should follow the current NIH/ NRSA guidelines\*, adhering to NRSA page limits. This proposal constitutes the formal written examination for the Department of Neurobiology and Anatomy and should be critically judged, addressing quality of writing, technical accuracy, and depth of scholarship. Fundamental breadth and depth may be assessed directly from the written portion of the qualifying examination and later explored in detail in the oral examination. It is not expected that fine details known by experienced workers in the field will be thoroughly comprehended at this point, nor that this first proposal would be competitive with a mentor's application. It should rather serve as an examination on the student's training.

\*NIH/NRSA guidelines: <http://apply07.grants.gov/apply/UpdateOffer?id=16446>

*The second device is the oral examination of the student by the Preliminary Examination Committee.* This examination typically begins with a brief presentation of the proposal material

by the student, followed by rounds of in-depth questioning. The Preliminary Exam Committee should explore the student's fundamental training, ability to explain the research proposal, and capacity for immediate analysis. The examination may uncover areas of weakness that need reparation but are not bars to candidacy. However, deficiencies that render the student incapable of productive, independent research (e.g. failure to understand a statistical design or lack of basic knowledge) are grounds for Failure or a Conditional Pass. A student who fails the Preliminary Exam may be allowed to take the exam a second time at the discretion of the Preliminary Exam Committee. A student who fails a second time will be dismissed from the Program.

At the end of the Qualifying Examination, the Chair of the Preliminary Exam Committee should fill out a departmental "Report of Preliminary Examination" form (Appendix vi, Graduate Student Handbook) and transmit the form to the Director Graduate Studies (DGS) along with a copy of the qualifying examination proposal. If the student needs to be re-examined or to do compensatory work, the Chair of the Preliminary Exam Committee should file a second form with the DGS verifying that the student has successfully completed the Qualifying Exam. Final approval of the Preliminary Exam Committee's decision rests with the Department Chair. Upon receipt of the "Report of the Preliminary Examination" form the DGS will enter the date of the successful exam in Graduate Student Degree Tracking.

Immediately following successful completion of the Preliminary Examination, the student should establish a Supervisory Committee and file an "Establish a Supervisory Committee" form (Appendix vii, Graduate Student Handbook) with the DGS.

### **Common Faculty Questions:**

*How do we choose the topic?* The subject area of the qualifying exam proposal should be distinct from the area of the student's thesis research since this exam is intended to determine the student's ability to think creatively and independently. The Preliminary Exam Committee may select one of the topics proposed by the student or may request the student to make a list of preferred topics, provide a series of short abstracts, or may choose the topic *ab initio*.

*How should the examination proceed and what are the duties of the Chair?* The appointed Chair should call the examination to order, determine that all examiners are present, and then ask the student to leave the room momentarily if the Preliminary Exam Committee desires a brief private session to review any materials or issues pertinent to the examination. The Chair will then invite the student to begin the presentation. Unless necessary for immediate clarification, the student should generally be afforded the courtesy of an uninterrupted presentation. The Preliminary Exam Committee may choose to interrogate the student in separate rounds, focusing on didactic and then research dimensions of the examination. It is usual for each committee member to participate in each round. The Chair is empowered to impose time limits on questioning and otherwise direct the examiners, ensuring that a fair examination is conducted and that the academic standards of the Department of Neurobiology and Anatomy are maintained. After questioning is complete, the Chair asks the student to leave the room momentarily and the Preliminary Exam Committee discusses both the written and oral performances. The Chair may

request a straw vote to guide discussion. Regardless of outcome, constructive criticisms and guidance should be included in the report of the Preliminary Exam Committee. Upon reaching a decision, the Chair recalls the student to the room and announces the decision of the Preliminary Exam Committee. The departmental "Report of Preliminary Examination" form (Appendix vi, Graduate Student Handbook) should be filled out and transmitted by the Chair of the examination to the Director Graduate Studies along with a copy of the qualifying examination proposal. If the Preliminary Exam Committee decides the student needs to do remedial work or re-take the exam, the Chair should file a second "Report of Preliminary Examination" form with the DGS when the student has successfully completed the Qualifying Exam. Final approval of the Preliminary Exam Committee's decision rests with the Department Chair.

Immediately following successful completion of the Preliminary Examination, the student should establish a Supervisory Committee and file an "Establish a Supervisory Committee Form" (Appendix vii, Graduate Student Handbook) with the DGS.

*What questions may we ask?* Any question that you deem will provide an assessment of the student's potential for independent research is proper.

*How long should the examination last?* In general, an adequate student presentation should take 30-45 minutes followed by 60-90 minutes of questioning. In instances of exceptionally good or poor performance, the examination may be truncated. Equivocal performance may prolong the process, but examinations exceeding 3 hours should be briefly recessed by the chair for a private discussion of whether continuing presents a reasonable prospect of resolution.

*What do the outcomes mean?* A **Pass** means that the Preliminary Exam Committee formally certifies the student's clear readiness to assume independent scholarship and research leading to the Ph.D. degree. A **Conditional Pass** may be rendered if a restricted type of deficiency is uncovered, correction of which will, considering the balance of the examination, clearly render the student ready to assume independent scholarship and research leading to the Ph.D. A student whose performance is deficient in several areas or for whom substantial doubt exists as to their ability to assume Ph.D. level scholarship and research should receive a decision of **Fail**. Thus the "benefit of the doubt" accrues to the Department, not the student.

## Information for Students

*How does my topic get chosen?* Your Preliminary Exam Committee is absolutely responsible for approving the topic of the written portion of your qualifying examination. The student will present two, 2-page abstracts to the committee one week prior to the abstract meeting (see Guidelines for preparation of preliminary exam abstracts, Section I). At the meeting, the student will give a 10-minute oral presentation of each abstract. The committee can select one of these topics for a full proposal or may choose another topic if none of these is appropriate. If the student is required to substantially revise their abstracts or generate new abstracts, a second abstract meeting will be held.

*Where do I get the resources for producing the written proposal?* Your mentor is responsible for supplying you with the physical resources to generate, duplicate and distribute the proposal.

This does not necessarily include duplication costs of legal "personal copies" of reference materials.

*What is the format for the proposal?* Submit your proposal with a cover sheet containing the proposal title, your name and contact information, your mentor's name and contact information and clearly state that the proposal is for the Qualifying Examination. Use the current NIH/NRSA proposal format (<http://apply07.grants.gov/apply/UpdateOffer?id=16446>).

How will the proposal be evaluated? The proposal is the formal written portion of the Qualifying Examination required by the University of Utah School of Graduate Studies. As such, it will be judged by your Preliminary Exam Committee for its quality of writing (which is expected to be exemplary) and its contents will serve as evidence of your didactic strengths and ability to carry out independent research. It will also serve as a focus for the oral Qualifying Examination.

*What is the oral examination format?* You will be given an opportunity to make a 30-45 minute presentation of your research proposal. You should provide a succinct overview of the research question and its relevance, outline your specific aims and sketch your experimental plan/methods for achieving those aims. The presentation is a formal examination of your ability to teach. Simply reading your specific aims and methods will likely be deemed inadequate.

*Are the oral examination questions limited to the proposal material?* Absolutely not. The Preliminary Exam Committee is empowered to explore your competence in any of those areas that are prerequisites to admission to the Department of Neurobiology and Anatomy or part of the required core training of a graduate student. This is the breadth and depth examination.

*What happens after the decision?* If you are granted a **Pass**, then you have formally advanced to doctoral candidacy pending approval of the Preliminary Exam Committee's report by the Department Chair, and entry of the date of your successful exam in Graduate Student Degree Tracking by the DGS. A **Conditional Pass** usually implies that a specific deficiency needs remedy, either by passing a course specified by the Preliminary Exam Committee or passing a re-examination on that material within 9 months. A formal **Fail** implies the existence of doubt regarding your ability to assume independent scholarship and research. One re-examination is allowed and must occur within 9 months. A second failure of the Qualifying Exam will result in dismissal from the graduate program. You may petition the Department Chair in writing in case of a disputed outcome, but the decision of the Chair is final.