

## BIOL 522- Research Proposal Writing- Winter 2020 CRN13787

Alejandro Acevedo (he/him/his); (360) 650-3653, [Alejandro.Acevedo-Gutierrez@wwu.edu](mailto:Alejandro.Acevedo-Gutierrez@wwu.edu)

**Meeting:** BI 415; M 10:00-10:50 h

**Office Hours:** BI 309: M 15:30-16:00 h, R 13:00-13:30 h, F 10:30-11:00 h, and by appointment

**Communications:** Canvas

### Course Aims

The main goal of this course is to improve your ability to write research proposals. The course will focus on what to include in a proposal, how to prepare for writing a proposal, and elements of writing *per se*.

In order to fulfill these objectives, you will:

- Develop and write a proposal following the Biology Department's Masters thesis proposal guidelines. (You can write your proposal about any topic. However, I strongly recommend that you write about your thesis, and use this opportunity to develop your thesis proposal.)
- Review the proposals of two fellow graduate students.
- Discuss in class topics related to writing proposals and obtaining funding.

### Grading

You will develop the scientific elements of your proposal with your advisor, as they are the best source of knowledge for your field. Your proposal grade in this class will reflect elements of proposal organization, reasoning, clarity and writing style. If you feel at any time that you are getting conflicting advice from me and your adviser (yes, it occasionally happens!), then please let me know so we can work that out.

My expectation is that your motivation as a scientist and grad student is sufficient for you to give your best effort on all aspects of this classes assignments. Differentiation between S and U is based on attendance, participation, and the satisfactory completion of all proposal drafts and reviews. For a Satisfactory grade in the class, you will need an S (>80%) on all individual assignments and an overall class average of 83% or more. See the breakdown of the various assignments below:

Annotated bibliography ( <b>Fall quarter</b> )	5 %
Proposal outline ( <b>Jan 13th</b> )	10 %
First draft of proposal ( <b>Feb 10th</b> )	20 %
Review of proposal from classmate A ( <b>Feb 24th</b> )	10 %
Review of proposal from classmate B ( <b>Feb 24th</b> )	10%
Final draft of proposal ( <b>Mar 9th</b> )	35 %
Attendance and participation (throughout)	10 %

*Assignments can be submitted to my email address or via Canvas.*

### Reading

#### *Required*

Lertzman, K. 1995. Notes on writing papers and theses. Bull. Ecol. Soc. Am. 76:86-90. (On Canvas.)

#### *Recommended*

-Knisely, K. 2017. A Student Handbook for Writing in Biology. 5<sup>th</sup> edn. McMillan. (Any edition is fine.)

-Pullum, G. K. 2009. 50 years of stupid grammar advice. The Chronicle Review 55(32):B15. (On Canvas.)

-Siegal, A.M. & W.G. Connolly. 2015. The New York Times Manual of Style and Usage. Three Rivers Press.

-Strunk Jr., W. 1918. The Elements of Style. W. P. Humphrey. (<http://www.bartleby.com/141/index.html>)

-Basic writing: <https://www.amherst.edu/academiclife/support/writingcenter/resourcesforwriters>

<https://owl.english.purdue.edu/owl/resource/679/01/>

-Technical writing: <http://www.rbs0.com/tw.htm>

### **Inclusiveness and Respect**

You are encouraged to speak up and participate during class. Because the class will represent a diversity of individual beliefs, backgrounds, and experiences, each one of us will respect, appreciate, and embrace every other member of this class.

I am firmly committed to diversity and equality in all areas of life. In this class, I will work to promote an inclusive environment where everyone feels safe and welcome. I recognize that discrimination can be direct or indirect and take place at both institutional and personal levels. I believe that such discrimination is unacceptable and I am committed to providing equality of opportunity for all by eliminating any and all discrimination, harassment, bullying, or victimization. The success of this policy relies on the support and understanding of everyone in this class. We all have a responsibility not to be offensive to each other, or to participate in, or condone harassment or discrimination of any kind. Without failing to speak up, we also have the opportunity to think the best of everyone and give one another the benefit of the doubt.

### **Equal Opportunity Rights**

You have the right to an educational experience that is free from illegal harassment or discrimination on the basis of race, color, creed, religion, national origin, sex, disability, age, veteran status, sexual orientation, gender identity or expression, marital status or genetic information. If you believe you have experienced harassment or discrimination, inform me, an instructor you feel is an ally, one of the two Biology faculty members on the College's Equity, Inclusion, and Diversity Committee (Ben Miner and José Serrano-Moreno), or using the anonymous form under the Equity and Inclusion tab on the Biology Department homepage: <https://cse.wwu.edu/biology/form/equity-and-inclusion-issues-biology#overlay-context=biology>

### **Intellectual Honesty**

Science is based on trust. If a scientist states that she carried out a particular study and obtained certain results, the rest of us trust that she did such thing. This is one reason why there is no tolerance for people who are not intellectually honest, and this class will be no exception. <https://wp.wwu.edu/academichonesty/>

*From WWU:* Plagiarism is presenting as one's own in whole or in part the argument, language, creations, conclusions, or scientific data of another without explicit acknowledgement. Examples include but are not limited to:

- Using another person's written or spoken words.
- Using information from a World Wide Web site, CD-ROM or other electronic sources.
- Using statistics, graphs, charts and facts without acknowledging the source of the ideas.
- Paraphrasing, which is using someone else's argument without acknowledging the source by imitating the argument using other words.

### [Understanding and Avoiding Plagiarism](#)

### **Religious Accommodations**

Western provides reasonable accommodation for students to take holidays for reasons of faith or conscience or for organized activities conducted under the auspices of a religious denomination, church, or religious organization. Students seeking such accommodation must provide written notice to their faculty within the first two weeks of the course, citing the specific dates for which they will be absent. "Reasonable accommodation" means that faculty will coordinate with the student on scheduling examinations or other activities necessary for completion of the course or program and includes rescheduling examinations or activities or offering different times for examinations or activities. Additional information about this accommodation can be found in [SB 5166: Providing religious accommodations for postsecondary students](#).

### **Resources**

*Do you have any concerns about your ability to learn in the classroom or your ability to take assessments in the classroom?* Contact the Disability Access Center for advice, help, and to request accommodation (650-3844 or <https://disability.wwu.edu/>).

*Do you feel unwell or have a health-related question?* Contact the Health Center (650-3400) or visit the website of Student Health ([http://www.wwu.edu/chw/student\\_health/](http://www.wwu.edu/chw/student_health/)).

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*Do you have an emotional or psychological concern or question?* Contact the Counseling Center (650-3400) or visit the website of Counseling Services (<http://www.wwu.edu/counseling/>).

*Do you have a safety concern?* Contact the University Police (650-3555) or visit their website (<http://www.wwu.edu/ps/police/index.shtml>).

*Do you have a family or personal crisis or emergency?* Contact the Dean of Students (650-3450) or visit their website (<https://wp.wwu.edu/students/>).

*Have you or someone you know experienced bias of any kind on campus?* Contact the Equal Opportunity Office for advice and help. (<http://www.wwu.edu/eoo/bias-incident-response.shtml>).

*Do you have concerns related to being an undocumented student?* Contact Student Outreach Services. (<https://wp.wwu.edu/sos/undocumentedstudents/>).

*Do you have financial difficulties?* Go to the Financial Aid Services Center and schedule an appointment with a financial aid counselor ([http://www.finaid.wwu.edu/client\\_services/pages/contact.php](http://www.finaid.wwu.edu/client_services/pages/contact.php))

*Do you identify as a member of the LGBTQ+ Community?* Learn about resources and support by emailing L. K. Langley (they/them/theirs) at [L.K.langley@wwu.edu](mailto:L.K.langley@wwu.edu) or by visiting <https://lgbtq.wwu.edu/>

*Do you or someone you know need confidential support related to sexual violence?* Contact CASAS (650-3700 or <https://pws.wwu.edu/consultation-and-sexual-assault-support-casas>), the Student Health Center, and/or the Counseling Center.

To report sexual violence, please contact University Police, Bellingham Police, and/or the Title IX Coordinator in Western's Equal Opportunity Office (650-3307). Faculty are required to report sex discrimination, including sexual violence that they learn about to the Title IX Coordinator.

*Are you or someone you know in distress?* Help is available anytime, all the time. <https://suicideprevention.wwu.edu/get-help/>

**CLASS SCHEDULE**

<b>Month</b>	<b>Date</b>	<b>Topic in class</b>	<b>Assignments due (17:00 h)</b>
Jan	M 13	Discussion of outline Proposal process in Biology General strategies and sections of proposal writing	Annotated bibliography (Fall quarter) Proposal outline
	M 20	<b>HOLIDAY!!</b>	
	M 27	Paragraph structure, developing questions	<i>Outlines and bibliographies returned</i>
Feb	M 3	Technical writing: discuss Lertzman 1995	
	M 10	Aligning hypotheses, intro, and methods	First draft <i>Draft assigned to reviewers</i>
	M 17	<b>HOLIDAY!!</b>	
	M 24	Peer review	Review of classmate's proposal (classmate A) Review of classmate's proposal (classmate B) <i>Reviews returned to writers</i>
Mar	M 2	Summary; budget & justification	
	M 9	NO CLASS	Final draft (includes response to reviewers)

***Changes might be made to the syllabus along the course. These changes will be announced in advance.***

## Description of Assignments

### **-Annotated bibliography (5%)**

**Due: Fall quarter**

*Aim:* To develop science process skills by preparing the theoretical framework of your project.

*Rationale:* The most difficult thing in science is to develop a good research question, amenable to be answered and placed in an appropriate theoretical framework. The first step in establishing a solid framework is to become familiar with the status of the discipline by critically reading scientific papers.

*Description:* An annotation is just a brief synopsis of the article and is commonly eight to twelve lines long (~1 inch margins, 10-12 point font). NOTE: Copying the abstract will not suffice, since many abstracts are a bit on the “promotional” side and may not include all the necessary information. At the minimum, you need to include your evaluation of the article and how it relates to your thesis research.

#### *RUBRIC OF THE ANNOTATED BIBLIOGRAPHY*

<b>Thoughtfulness</b> (3 points)	<b>Completeness</b> (1.5 points)	<b>Format</b> (0.5 points)
Are citations relevant to the theoretical framework or methodology of the thesis?	Are there 30 primary literature citations in the bibliography?	Does the bibliography have spelling errors?
Do annotations summarize the paper?	Out of the 30 citations, are there eight annotations?	Does the bibliography have errors in sentence structure and punctuation
Do annotations evaluate the paper?	Is all the literature cited using the same format?	
Do annotations relate the paper to the thesis?	Is all the literature cited alphabetically or using another, well-devised format?	

## **-Outline (10%)**

Due: Jan 13<sup>th</sup> 17:00h PST

*Aim:* To develop an outline that will form the foundation of your research proposal.

*Rationale:* Developing a thorough outline is an essential first step to writing a cogent but concise proposal.

*Description:* The focus of the outline part of this assignment is on a) doing the majority of the background research; b) overall organization of ideas and proposal content; c) developing key themes for paragraphs; and d) begin structuring arguments based on the scientific evidence you have researched. To write a clear, complete outline you will need to have done the following:

- thoroughly read and digested at least 30 (minimum) primary literature articles;
- thought about how the ideas and evidence in these articles relate to each other and to the primary research questions and methods for your project;
- developed clear, testable hypotheses from your research questions;
- worked to align background material, specific research questions, and methods to test your key hypotheses for those questions;
- began to structure the paragraphs that will develop your research questions and methods;
  - o developed topic sentences for each paragraph;
  - o for each paragraph, developed bulleted points with supporting literature that fill out the paragraph ideas encapsulated by the topic sentence. Lertzman (1995) has suggestions on paragraph structure.

**What constitutes a Satisfactory outline?** This is NOT a step that can be dashed off a couple of days before it is due. In fact, this step may be one of the most time-consuming steps of the entire proposal writing project, as it requires you to do the majority of your background research, organize your thoughts, and structure your ideas and questions in a cogent way. Only if you do as good a job as possible on the outline will I be able to comment usefully on your proposal organization and content.

1. Goal is a COMPLETE outline
  - a. It's ok to have some text, but not at the expense of having the full outline present.
  - b. If there are things you don't know, that's ok, but you at least need placeholders present.
    - i. Make notes about what your options are, so I know where such parts of the proposal stand in their development. It's better for me to see that you're working on aspects that aren't yet fully resolved, than for it to appear that you've just completely forgotten to include them.
  - c. Need both title AND project summary in the outline.
2. Summary and Intro
  - a. Context: what would you tell your grandmother? What is the take-home message?
  - b. Paragraph structure needs clear delineation.
    - i. Structure outline so that outline levels are commensurate with paragraphs.
    - ii. Organize paragraphs by topic, and have a topic sentence for each.
    - iii. Remember the funnel! Broad to specific.
  - c. Develop the questions and hypotheses to be examined, don't just make the intro a literature review.
3. Questions and Hypotheses
  - a. Avoid surprises. All questions and hypotheses should be developed in the intro.
  - b. Be specific about effect and response variables.
  - c. One prediction or hypothesis per statement, with clearly defined effect and response variables.
  - d. Keep order consistent between intro, questions, hypotheses, and methods. It is often useful to go from most general "pattern" hypotheses to more specific "mechanism" hypotheses.
4. Methods
  - a. Clearly defined and structured experimental design to address questions and hypotheses.
5. Timelines
  - a. When you'll start things AND how long will they take.
  - b. Start writing your thesis by fall 2020, otherwise, it's unlikely that you'll finish in 2 years.
  - c. Different approaches:
    - i. Topic x month grid (preferred): Table or chart showing main tasks by month (recommended) or quarter (a bit too coarse for most MS work).

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- ii. List by month.
  - d. Bottom line: want to be clear about 1) sequence and 2) estimated completion dates.
6. Make sure you include Plans A, B, and C
  7. Eliminate these redundant sentence constructions from your writing (more important for written drafts than outlines): “It has been decided that....” Or “It has been shown that”: this construction is both passive and wordy; you can eliminate this phrase from the beginning of the sentence and not change the meaning at all. This goes for any such construction, no matter what the verb with the past participle, e.g., suggested, shown, presumed, observed, etc. Search and destroy throughout.
  8. Unknowns, assumptions – spread these throughout methods where appropriate. Don’t necessarily need separate sections for them.

*RUBRIC OF THE OUTLINE*

**Completeness and Organization (15 pts)**

All sections (Title, Project summary, Intro/Background, Q’s & H’s, Methods) and subsections covered  
Enough detail in outline to understand the main thrust of arguments and methods  
Main threads of background clearly identified (section headings, paragraph topics)  
Organization within sections is clearly delineated (scale and order of paragraphs is clear)  
Include topic sentences for main background paragraphs (see #9 in Lertzman 1995)  
Include bulleted points for supporting points of each paragraph  
Include citations for key points in all paragraphs  
Methods (or placeholders) included for all hypotheses  
Statistics (or placeholders) included for all hypotheses  
At least 30 peer-reviewed references included  
All cited references are in the Literature Cited section, and vice versa

**Logic (15 pts)**

Main threads of background clearly link to the big question  
Study approach addresses questions being developed in background  
Questions and hypotheses clearly link to background info – no surprises  
Experimental methods test proposed hypotheses, clearly linked  
Effect and response variables clearly outlined in Methods  
Statistical tests appropriate for proposed experimental design

**Feasibility (10 pts)**

Proposal makes clear that the scope of the project is appropriate  
Proposal makes clear that the methods are tractable  
Potential methodological stumbling blocks recognized, with strategies/backup plans for overcoming difficulties  
Reasonable sketch of timeline (will fill in more thoroughly for main draft)

**Scale for each category:**

Covered thoroughly: 100%  
Solid attempt, but needs some improvement: 85%  
Limited attempt; needs substantial improvement: 70%  
There, barely: 50%  
Missing: 0%

## **-First draft of the proposal (20%)**

Due: Feb 10<sup>th</sup> 17:00h PST

*Aim:* To develop science process skills by designing and presenting in written form a scientific study.

*Rationale:* Science is a creative process. Describing and attempting to understand the world involves generating questions, formulating explanations, conducting observations and experiments, and assessing the significance of the results obtained. In order to learn to develop our own ideas and become scientists we have to be active research participants, not merely be told about the results of the work conducted by others.

*Description:* The proposal will entail two full written drafts following the outline stage, with comments from me and other students after the first draft. The emphasis on the first full draft will be on a) refining overall proposal organization; b) critical thinking and structuring logical arguments; c) making sure background information, literature, and paragraph structure help to develop your research questions; and d) beginning to refine writing style. To write a satisfactory first draft, you will need to do the following:

- incorporate comments on overall organization, content, and argument structure from the outline;
- potentially revisit the literature for additional key papers;
- fill in paragraph structure, both writing complete sentences and organizing evidence from the literature;
- develop transitions between important ideas, both within and among paragraphs;
- re-write and proof-read on your own.
- work on incorporating writing suggestions from Lertzman (1995).

**Important note on what constitutes a Satisfactory first draft:** Your first draft must be written as well as you can possibly write the proposal. It should be in the form that you would hand-in for a grade if we were not going through the draft process. Therefore, the “first draft” that you submit should have gone through multiple drafts on your own, during which you refine organization and arguments, work on writing clarity, and thoroughly check for proper grammar and elimination of typographical errors (See points 2 and 3 in Lertzman 1995). The first draft must NOT be an outline or a partially-written proposal. Only if you do as good a job as possible on the first draft, will your classmates and I be able to comment usefully on your writing style and content. That is, it won't help your proposal if we spend all my time commenting on issues that you already knew you needed to fix.

Length: ~15 pages, single-spaced, 11-12 point font, 1“ margins. Clarity, concision, and completeness count more than absolute length.

Structure: Title and Name, Summary, Introduction, Questions and Hypotheses, and Methods (including alternative plans and timeline). References are needed, but do not count against the 15-page limit.

References:

- All sources for ideas must be cited.
- You must draw on at least thirty sources from the primary literature, not including web sites (see annotated bibliography). Listed references must appear in the text, and vice versa.
- References should be from primary literature, in descending order of preference: peer-reviewed scientific journal articles, scientific books, and government agency reports (“grey literature”).
- The WWU library has several on-line search engines to help you find relevant articles; ask your advisor about the best ones for your field. You can (and should) also use the Literature Cited section of any articles to help you find relevant material.
- While you can use web sites for additional information, they must be cited properly (see below) and web sites do not count towards the thirty-source minimum. Of course, on-line scientific journals are okay, but should be cited as journal articles, not web sites. If you have questions about a particular site, contact me.
- Proper and consistent citation style is expected. Again, check with your advisor for the most common format for journals in your field. If you have any questions, look recent issues of the top journal in your field for examples. I encourage you to use the author guidelines from a scientific journal (I frequently use *Conservation Biology*: <https://wol-prod-cdn.literatumonline.com/pb-assets/assets/15231739/Author%20Style%20Guide%20feb2019-1551741575403.pdf>).

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*RUBRIC OF THE FIRST DRAFT*

**Completeness and Organization (10 pts)**

- Includes all sections (Title and Name, Summary, Introduction, Questions and Hypotheses, Methods, References) and subsections
- Main threads of background clearly identified and fully developed (headings & sections)
- Demonstrated understanding of topic (clear logic, key pieces, well-referenced)
- Order of sections follows proposal outline developed in class (or other, as approved by advisor)
- Order of topics within sections helps clarify flow of ideas
- Includes topic sentences for main background and methods paragraphs (see Lertzman #9)
- Organization within paragraphs helps clarify what is known and key remaining questions to be addressed (particularly in this proposal)
- Methods (or developed placeholders in initial draft) included for all hypotheses
- Statistics (or developed placeholders in initial draft) included for all hypotheses
- Well-cited throughout (includes at least 30 peer-reviewed literature references)

**Logic (10 pts)**

- Main threads of background clearly link to the big question
- Clearly articulates importance of specific research questions (next obvious step, filling a key gap, re-evaluating old knowledge)
- Study approach addresses questions being developed in background
- Questions and hypotheses clearly link to background info – no surprises
- Reasoning behind the choice of methods is clear and fully developed
  - appropriateness of experimental design – controls, relationship to hypotheses, statistics
  - experimental methods test proposed hypotheses, clearly linked
  - statistical tests appropriate for proposed experimental design
- Clear methods description
  - logical, appropriate and well-described for audience
  - effect and response variables clearly outlined

**Feasibility (10 pts)**

- Proposal makes clear that the scope of the project is appropriate
- Methods tractable: Clearly articulates feasibility in terms of time, effort, funding, equipment
- Potential methodological stumbling blocks recognized, with strategies/backup plans for overcoming difficulties
- Timeline provides substantial detail (based on monthly or quarterly estimates, with clear description of expected duration of major tasks)

**Writing (10 pts)**

- Logical flow across and within sections
- Strong paragraph structure (see Lertzman #9)
- Adequate attention to other writing issues in Lertzman
- Evidence of proofreading to eliminate grammatical and typographical errors

**Scale for each category:**

Covered thoroughly:  $\sqrt{+}$  (90-100%)

Solid attempt, but needs some improvement:  $\sqrt{\phantom{+}}$  (~85%)

Limited attempt; needs substantial improvement:  $\sqrt{-}$  (~70%)

There, barely: (-) (~50%)

Missing: 0 (0%)

## -Reviews of two proposals (20%)

Due: Feb 24<sup>th</sup> 17:00h PST

*Aim:* To develop science process skills by reviewing the proposals of colleagues.

*Rationale:* One way to improve your skills as a scientist is by evaluating the ideas of another person. Being able to give constructive and thoughtful reviews is a critical skill that not many scientists master. In this assignment, you will provide helpful feedback to the proposal of two classmates, who will incorporate your suggestions into their proposal.

### *Description:*

1. Read over the proposal assignment and rubrics.
2. Thoroughly read over the proposals you are assigned, with an eye towards how well the proposal addresses the different components of the rubric. Don't get too bogged down in details of the Methods.
3. Write up brief answers to the questions posed at the start of each of the sections below.
4. Note the components of the proposal intro and methods, answering the following questions:
  - a. Introductory paragraph. **Question: Did the intro paragraph make you care about, or understand the importance of, the focus of the research? Why or why not?**
    - i. What is the "big question/context"?
    - ii. Is it clearly articulated why this work matters in terms of either big scientific questions or applied issues? Are you convinced?
    - iii. Does the intro paragraph start to focus in on the component of the big question that this project will address?
  - b. Threads of the intro. **Question: Briefly state at least three themes that the proposal is bringing together in the background section, and briefly describe how these are tied together by the research questions.**
    - i. What are the major themes that the writer is weaving together in the intro? Are they clear from headings and/or paragraph content?
    - ii. Do topic sentences for paragraphs clearly articulate the main message of that paragraph?
    - iii. Are the important questions clearly developed, including:
      1. What's known from the literature?
      2. What specific aspects of previous research may have led to current uncertainties?
      3. What are key remaining questions that this study seeks to address?
  - c. Experimental overview. **Question: Did the experimental overview help you understand the specific hypotheses in the following section? Why or why not?**
    - i. Enough description of the experimental system for you to understand the overall approach of the study, but without too much detail that better belongs in the Methods section.
  - d. Questions and hypotheses. **Question: For each hypothesis, note where key information for it was developed in the intro. Were there any hypotheses that took you by surprise?**
    - i. Are they clearly developed in the preceding intro material?
    - ii. Do they logically follow from the "remaining questions" developed in the intro material?
    - iii. Is there sufficient context:
      1. In background material to understand why these are the questions and hypotheses at the focus of this study?
      2. In the experimental overview to understand, at least generally, how these questions and hypotheses will be addressed in the study?
  - e. Methods: Study system and experimental design
    - i. **Questions: Did the experimental design align with the statistics to clearly test the key hypotheses? Briefly describe why or why not.**
5. Summarize your review with the following:
  - a. things that the writers did particularly well.
  - b. issues that could be improved upon.

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*RUBRIC OF THE REVIEW OF PROPOSAL*

<b>Thoughtfulness</b> (4 points)	<b>Completeness</b> (5 points)	<b>Format</b> (1 point)
Are comments and suggestions made by the reviewer well thought and justified?  Are comments and suggestions made by the reviewer constructive?	Did comments and suggestions made by the reviewer address the introductory paragraph?  Did comments and suggestions made by the reviewer address the threads of the introduction?  Did comments and suggestions made by the reviewer address the experimental overview?  Did comments and suggestions made by the reviewer address the questions and hypotheses?  Did comments and suggestions made by the reviewer address the methods?  Did comments and suggestions summarize things that were done well?  Did comments and suggestions summarize things that could be improved upon?	Does the review have spelling errors?  Does the review have errors in sentence structure and punctuation

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**-Final draft of the proposal (30%)**  
**-Responses to reviewers (5%)**

Due: March 9<sup>th</sup> 17:00h PST  
Due: March 9<sup>th</sup> 17:00h PST

*Aim:* To develop science process skills by designing and presenting in written form a scientific study.

*Rationale:* Science is a creative process. Describing and attempting to understand the world involves generating questions, formulating explanations, conducting observations and experiments, and assessing the significance of the results obtained. In order to learn to develop our own ideas and become scientists we have to be active research participants, not merely be told about the results of the work conducted by others.

*Description:* The emphasis on the final draft will be on a) refining overall organization; b) ensuring alignment of background, questions and methods; c) refining logic, critical thinking and structure of arguments; and d) refining paragraph structure and writing. The goal is a proposal that “flows and resonates” (see Lertzman (1995), point 19). To achieve this, you will need to do the following:

- incorporate all feedback from the first full draft;
- identify any gaps in your own knowledge and the available scientific evidence;
- potentially revisit the literature for additional key papers;
- incorporate the writing points from Lertzman (1995);
- re-write and proof-read on your own.

Your proposal should include a section in which you synthesize and address all the comments by the reviewers of your proposal, and indicate how you modified your response based on the comments or why you did not make the suggested changes.

Length: ~15 pages, single-spaced, 11-12 point font, 1“ margins. Clarity, concision, and completeness count more than absolute length.

Structure: Title and Name, Summary, Introduction, Questions and Hypotheses, and Methods (including alternative plans and timeline). References are needed, but do not count against the 15-page limit.

References:

- All sources for ideas must be cited.
- You must draw on at least thirty sources from the primary literature, not including web sites (see annotated bibliography). Any references listed in the reference section must appear in the text, and vice versa.
- References should be from primary literature, in descending order of preference: peer-reviewed scientific journal articles, scientific books, and government agency reports (“grey literature”).
- The WWU library has several on-line search engines to help you find relevant articles; ask your advisor about the best ones for your field. You can (and should) also use the Literature Cited section of any articles to help you find relevant material.
- While you can use web sites for additional information, they must be cited properly (see below) and web sites do not count towards the thirty-source minimum. Of course, on-line scientific journals are okay, but should be cited as journal articles, not web sites. If you have questions about a particular site, contact me.
- Proper and consistent citation style is expected. Again, check with your advisor for the most common format for journals in your field. If you have any questions about this, look in any recent issue of the top journal in your field for examples. I encourage you to download and use the guidelines for authors from a scientific journal (I frequently use *Conservation Biology*: <https://wol-prod-cdn.literatumonline.com/pb-assets/assets/15231739/Author%20Style%20Guide%20feb2019-1551741575403.pdf>).

*RUBRIC OF THE FINAL DRAFT*

**Completeness and Organization (10 pts)**

- Includes all sections (Title and Name, Summary, Response to Reviewers' Comments, Introduction, Questions and Hypotheses, Methods, References) and subsections
- Main threads of background clearly identified and fully developed (headings & sections)
- Demonstrated understanding of topic (clear logic, key pieces, well-referenced)
- Order of sections follows proposal outline developed in class (or other, as approved by advisor)
- Order of topics within sections helps clarify flow of ideas
- Includes topic sentences for main background and methods paragraphs (see Lertzman #9)
- Organization within paragraphs helps clarify what is known and key remaining questions to be addressed (particularly in this proposal)
- Methods (or developed placeholders in initial draft) included for all hypotheses
- Statistics (or developed placeholders in initial draft) included for all hypotheses
- Well-cited throughout (includes at least 30 peer-reviewed literature references)

**Logic (10 pts)**

- Main threads of background clearly link to the big question
- Clearly articulates importance of specific research questions (next obvious step, filling a key gap, re-evaluating old knowledge)
- Study approach addresses questions being developed in background
- Questions and hypotheses clearly link to background info – no surprises
- Reasoning behind the choice of methods is clear and fully developed
  - appropriateness of experimental design – controls, relationship to hypotheses, statistics
  - experimental methods test proposed hypotheses, clearly linked
  - statistical tests appropriate for proposed experimental design
- Clear methods description
  - logical, appropriate and well-described for audience
  - effect and response variables clearly outlined

**Feasibility (10 pts)**

- Proposal makes clear that the scope of the project is appropriate
- Methods tractable: Clearly articulates feasibility in terms of time, effort, funding, equipment
- Potential methodological stumbling blocks recognized, with strategies/backup plans for overcoming difficulties
- Timeline provides substantial detail (based on monthly or quarterly estimates, with clear description of expected duration of major tasks)

**Writing (10 pts)**

- Logical flow across and within sections
- Strong paragraph structure (see Lertzman #9)
- Adequate attention to other writing issues in Lertzman
- Evidence of proofreading to eliminate grammatical and typographical errors

**Scale for each category:**

Covered thoroughly:  $\sqrt{+}$  (90-100%)

Solid attempt, but needs some improvement:  $\sqrt{\phantom{+}}$  (~85%)

Limited attempt; needs substantial improvement:  $\sqrt{-}$  (~70%)

There, barely: (-) (~50%)

Missing: 0 (0%)