Research Proposal and Literature Review

GENERAL TIPS:

Written research proposal/literature review is due **Friday, October 26th 2018**
One copy to be submitted to each of your Supervisor and Co-supervisor(s)
The Course Coordinator and Administrator do NOT require a copy

PLEASE MAKE SURE YOU GET YOUR OWN REQUIREMENTS CLARIFIED FROM YOUR SUPERVISOR.

1. WRITE IN A CLEAR, FOCUSED AND LOGICAL MANNER

Suggested Layout:
The report should be written 1.5 space using 11 or 12 point font (Times Roman, Calibri or Arial are popular fonts). Use one-inch margins all around.

Cover page	1 page (Name, Project Title, etc.)
Abstract/Summary	1 page (Usually 150 – 200 words)
Introduction/Lit. review	7- 10 pages
Hypothesis	One sentence
Objectives	One page: 3-4 objectives, 1-2 sentences each.
Methodology	1 - 2 pages: Briefly describe methods to be used and why.
References*	As many pages as necessary. Please use an accepted style such as that of the journal "Cell", "Molecular Cell Biology" etc. or one appropriate to your research field.

*Consult with your supervisor or graduate students about the type of reference manager software they use.

This is a just a suggested layout. Please consult with your own supervisor regarding their personal expectations. If possible, take a look at the reports of previous 4th year thesis students in your laboratory.

Think of this as the draft of Introduction for your thesis. The more effort you put into this document for the **October 26th** deadline, the less you will have to work on it in March for the final report, and you can focus your writing then on the results and discussion aspect of your thesis.

A figure is worth a thousand words. If possible, include one model diagram that captures the overall research theme of your project or the lab.

2. HAVE YOUR PROPOSAL EDITED BY AT LEAST TWO PEOPLE

The more feedback you receive the better as they will see it from different perspectives.
I suggest asking at least two graduate students in your lab to critique your proposal.
One person can be someone who knows little about your proposed research. However they will only be able to comment on its clarity, but not the scientific aspects.

Plan ahead and notify your "editors" of when you will give them a draft and when you need it returned to you.

Please budget your time accordingly. When you have questions, consult your supervisor – do not make assumptions.

Suggested Timeline:

Read as many articles a day ahead of time for this report!

Read at least one article a day	Sept - March 2019.
2- 3 page point-by-point summary	by end of September
Draft to grad students and friends	by Fri Oct 13th
Draft returned to you	by Wed Oct 18th
Report handed in	Friday Oct 26th

That gives you 10 days to incorporate suggestions and feedback from grad students etc.

The 2-3 page point-by-point summary deadline is simply to help you get started with the writing. I would suggest just writing in point form what you already know about your project and the field in general. Then you expand and fill it in. This approach gets you started and reduces your panic as you start reading research articles.

This is seems like a tight schedule but if you don't get a draft to the grad students or someone you trust early enough, they will not be able to critique it adequately and that will defeat the purpose.

You must budget "Me Time" just like you budget studying.
Don't waste your 1-hour breaks between class doing nothing.
Use it to read one research article, organize your weekly schedule, run errands, grocery shop, fill in application forms etc.

Save blocks of time on Saturdays and Sundays for studying rather than grocery shopping etc.

THESIS/PROJECT Research Proposal/Literature Review

Introduction: Importance of writing good research proposals

Learning how to write good research proposals will also help those of you who want to apply for scholarships to do graduate work. According to the Natural Sciences and Engineering Research Council (NSERC; http://www.nserc.ca), which is the primary funding agency for Canadian academics the selection criteria for students entering a Master's program is as follows:

- **50%** academic excellence (your transcript)
- **30%** research ability/potential (gleaned from your references and your proposal)
- **20%** oral and written communication skills (gleaned from both your references and your application); interpersonal and leadership abilities (gleaned from your references and your curriculum vitae)

For students entering a Ph.D., the percentage corresponding to research increases to **50%** and finally to **60%** for post-doctoral fellowships. It is good to recognize that there is increasing emphasis on candidates having good research ability as you ascend the academic ladder. Whether it is warranted or not, professors in University generally live and die by their publication record, and not by their teaching or service record.

Whatever you learn in this course in regards to writing research proposals may become the basis of your livelihood one day. What you put into this component is an investment for your future so I hope you take full advantage of this opportunity.

General Tips

Regardless of your writing style, you need to write in a clear, focused and logical manner. Make sure you give it to someone who knows very little about the proposed research to read it over and comment on its clarity, etc.

Remember that the written research proposal and/or literature review is due on **Friday Oct 26th** for everyone in Bio4C12, Bio4F06 and molBio4G12. Please budget your time accordingly. When you have questions, you should consult your supervisor – do not make assumptions.

I have provided a sample research proposal (for senior theses) and literature review (for senior projects) along with a sample marking scheme used by some professors. I emphasize that this is for some students, and may not be appropriate for everyone. Your supervisor may have given you a different framework, which is fine because your supervisor is the only person who will mark this component of your thesis/project.

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Here are two examples of how the report might be marked, it is NOT a definitive marking scheme, that depends on your individual supervisor.

A. Sample Research Proposal (Senior Theses) – adapted from Dr. Chow-Fraser

For most students, the proposal must be type-written in 12-pt font, with a minimum one-inch margin throughout. It should be 1.5 line spaced with proper headings. The proposal must be no less than 10 pages, excluding the bibliography literature cited.

1. **TITLE (10 marks)**: Make this title descriptive and not too general, so that the reader (adjudicator/supervisor) will have a good idea of what you are about to pitch. For example, my recent NSERC grant was entitled: *xxxxx*. A less descriptive title such as "*xxxxxx"* may have worked but is probably less effective. A title such as "*xxxx"* would have been inadequate.

2. **OBJECTIVE(S) (10 marks):** Articulate the objective(s) of the research in clear plain language. Avoid jargon at this point. Why are you undertaking this research? What relevance does it have to your field? If there is a theory that you are testing, outline that as well. This should NOT be point form. Write in complete sentences. There is no standard for the amount of space this may require.

3. **LITERATURE REVIEW (20 marks):** Review the pertinent literature and write an appropriate synopsis of what is known about the particular problem or ecosystem or population. For some students, this portion of the project may have been done earlier, before you decided on the topic of your project.

4. **WORKING HYPOTHESES (20 marks):** Here is where you will state the statistical hypotheses or experimental hypotheses. This is the most salient part of the research proposal, and which sets this apart from a senior project (6-unit). All senior theses must have a hypothesis or series of hypotheses that will be tested through original investigation. A project may be descriptive or may involve a chronology of events, process, and therefore does not require the student to test a scientific hypothesis.

5. **EXPERIMENTAL/FIELD DESIGN (20 marks):** Outline the experimental or theoretical approach you intend to take and the methods and procedures you will use. Include references whenever possible. Include any problems you may encounter and indicate contingency plans if applicable.

6. **EXPECTATIONS/RELEVANCE (10 marks):** Explain the significance of the proposed research to biodiversity.

7. **LITERATURE CITED (10 marks):** List the references you used in the proposal in alphabetical order in an accepted format from any primary scientific journal. Most journals will have instructions to authors in which they tell you how to cite references.

B. Sample Literature Review (Senior Project; sometimes also required by supervisors for Senior theses) - adapted from Dr. Chow-Fraser

For most students, the literature review must be type-written in 12-pt font, with a minimum one inch margin throughout. It should be single-spaced with proper headings. The review must be no less than 10 pages, excluding the list of references.

1. **TITLE (10 marks):** Make this title descriptive and not too general, so that the reader will have a good idea of what the project is without having to go through the entire document.

2. **OBJECTIVE(S) (10 marks)**: Articulate the objective(s) of the research in clear plain language. Avoid jargon at this point. Why are you undertaking this research? What relevance does it have to your field? This should NOT be point form. Write in complete sentences. There is no standard for the amount of space this may require.

3. **LITERATURE REVIEW (40 marks)**: Review the pertinent literature and write an appropriate synopsis of what is known about the particular problem, ecosystem or population. For some students, this portion of the project may have been done earlier, before you decided on the topic of your project.

4. **PROJECT METHODOLOGY (20 marks)**: Here is where you briefly describe the method(s), procedures, or protocols you will use during your project. If you have a hypothesis that is being tested, indicate this here as well. Include references whenever possible. Include any problems you may encounter and indicate contingency plans if applicable.

5. **EXPECTATIONS/RELEVANCE (10 marks)**: Explain the significance of the proposed research to your field.

6. **LITERATURE CITED (10 marks):** List the references you used in the proposal in alphabetical order in an accepted format from any primary scientific journal. Most journals will have instructions to authors in which they tell you how to cite references.