

Guide for the Biology Honours Research Report Project (BIO4004)

What is an Honours research report?

The Honours research report is an optional 3 unit course that is undertaken during the 4th year of study. Under the supervision of a principal investigator, the student will conduct a project designed to broaden her or his general knowledge of a selected field of biology. Projects could include, but are not limited to, either an extensive literature review of a selected topic or a small laboratory or field project. The student will present a detailed research report or comprehensive paper.

Should I do an Honours research report?

Yes, if I:

- Am in an Honours program.
- Am willing to devote an average of 5-6 hours per week to my project.
- Am self-motivated and can manage my time.
- Wish to significantly enhance my qualifications for graduate school or acquire pertinent work experience to showcase during my job search.
- Am interested in, or curious about, becoming a researcher.
- Have a natural curiosity and desire to contribute towards the advancement of knowledge in a field that interest me.

What are the requirements to do an Honours research report?

- Be registered in an Honours program in the Faculty of Science.
- Be in your 4th year of study.
- Have successfully completed a minimum of 81 university units in your study program.
- Have a minimum CGPA of 4.5.
- Have identified a Faculty member that is willing to supervise or co-supervise your research report project.

General expectations of the supervisor

- Develop in collaboration with the student a topic for the research project that is appropriate in scope and character.
- Direct the student to the relevant literature and resources.
- Make the student aware of relevant university and faculty policies and procedures.
- Be aware that Honours students will spend an average of 5-6 hours per week on their project, and that they have other courses and duties.
- Establish with the student mutual expectations and clear objectives.
- Meet at regular intervals with the student to discuss the progress of the literature search or research. If necessary, redirect the student to more pertinent areas.

- Provide, in a timely fashion, formal approval of the project outline (October) and progress report (January). · Contribute to the evaluation of Honours research reports (April).
- Evaluate, in a timely fashion, the thesis of supervised students (April).

General expectations of the student

In collaboration with your supervisor (and co-supervisor, if applicable), you are expected to choose a topic of interest for the proposed research report project. There are many different forms of projects, but in general this project requires you to perform an extensive review of the recent scientific literature. The work should be original and be presented in its final form as a report suitable to be submitted as a review article to a journal within the field of study. For example, the review could deal with a controversial topic where different points of views are presented.

Timeline and requirements (Check the website for specific dates)

Registration

You should obtain a [registration form](#) from the Faculty of Science for the Honours research report. Fill out the form, with the name of the supervisor (and co-supervisor, if any), her or his affiliation (e.g. Department of Biology) and the proposed title of your project. Ideally, this will be completed during the spring or summer before you begin your project; but registration in September is possible. N.B.: Any other specific timeline is to be discussed between the student and the supervisor(s) before the beginning of the project.

Project outline

The first couple of months of your Honours project are generally spent reviewing pertinent literature, familiarizing yourself with the resources available to you. If your report will involve lab work, you may begin experimenting with the techniques you will be using, and developing an outline (essentially, a game plan) of the proposed research. The outline must be approved by your supervisor and submitted online via Brightspace. Your supervisor can also approve your outline by sending an email to bio4009@uottawa.ca. For BIO 4004 students that have a co-supervisor because the primary supervisor is outside of the Department of Biology, the co-supervisor must also approve the outline.

The primary objective of the Project Outline is to ensure that the student and supervisor are actively communicating and on the same page so the student is well-positioned to succeed in their research.

The outline should not exceed one page and should be written in the following format:

- **Title:** The title of your proposal should be informative.
- **Background and rationale:** Position the topic you propose to explore relative to the current state of knowledge (i.e. published research), summarizing what is known and/or not known and why the topic warrants investigation. Be sure to cite your sources.
- **Purpose and specific objectives:** State the purpose of your project, including the central question you intend to answer through your research. List the specific objectives that will be addressed by each part of your research project.

- **Materials and methods:** In general, what methods will you use? Describe your experimental design. What kind of data will you collect? How will you analyse these data? Describe the statistical analyses you will use.
- **Expected results:** What information do you expect to gain by doing this project and how will it contribute to advancing the field of research?
- **Literature references:** List the publications you have cited in your proposal.

Note that if the final research report will be a literature review without experimentation, the outline should primarily state the purpose and rationale of the research and give a breakdown of the points to be discussed in the final report.

Progress report

At the beginning of the second semester, you must complete a progress report of your research project that will be evaluated by your supervisor and submitted to the Department with a grade of "Pass" or "Fail". The progress must be approved by your supervisor and submitted online via Brightspace. Your supervisor can also approve your outline by sending an email to bio4009@uottawa.ca. For BIO 4004 students that have a co-supervisor because the primary supervisor is outside of the Department of Biology, the co-supervisor must also approve the progress report.

The primary objective of the Progress Report is to ensure that the student and supervisor are actively communicating so the student knows what needs to be done to finish their research and thesis before the end of semester.

This report must not exceed two pages and should conform to the following format:

- Student's name.
- Supervisor's name and co-supervisor's name if appropriate.
- Thesis title.
- Specific objectives indicated in the proposal that were accomplished, including a brief summary of the results obtained, if any.
- Specific objectives indicated in the proposal that remain to be accomplished. · Any objectives that have been removed, added, or changed.
- Comments from the supervisor as to the level of satisfaction with the progress of the research including any suggestions for improvement (if desired).
- For BIO 4004 students that have a co-supervisor because the primary supervisor is outside of the Department of Biology, the co-supervisor must also approve the outline.

Honours thesis

Students must present the results of their research in a written thesis. The final copy of your thesis must be submitted to your supervisor in PDF or WORD format (please consult with your supervisor about preference) and to the Department of Biology via Brightspace.

The thesis should be prepared either in the format of a journal article from a prominent journal in your field, or in the format of a formal master's thesis, at the discretion of the thesis supervisor. The student may also consult writing resources online.

The thesis will be evaluated by your supervisor (70%) and by one external examiner (30%) selected by your supervisor.

No extension on the deadline will be given without submission of a medical certificate.

Formats for journal articles vary considerably. Consult the “Instructions for Authors” or “Author guidelines” on the relevant journal web site for details. A typical, general format of a published article would include the following:

Cover page

- Title of the project - this is to be informative and yet concise (not more than 15 words).
- Full name of the author
- Supervisor(s) and co-supervisors (if any)
- The day, month and year of submission

Abstract

The abstract summarizes the rationale for the study, the main methods, results, and the conclusion that you draw from the work. The abstract must stand alone, without reference to the main text. It is entirely uninformative to include sentences like “Implications of the work are discussed”.

Introduction

The purpose of the introduction is to involve the reader in the subject matter of the project and explain the reasons for undertaking the study. The Introduction should describe (and cite) earlier work or similar studies that set the stage for your research. The aim and the objectives of the project should be clearly stated. If your research is hypothesis-driven, state your hypothesis and prediction(s).

Materials and Methods

This section should contain the minimum amount of information needed to fully understand how you produced your thesis, such that someone could duplicate your project after reading it. If conducting a literature review, you can describe the methods employed to search for, identify and include or exclude relevant sources of information.

Results

This section simply states the data – the facts of what happened or what you found; the interpretation of these facts is reserved for the next section, the discussion. The point is to convey your findings simply and clearly, referring to tables or figures, photographs, or other items of documentation that support your statements.

Discussion/Conclusions

This section should bring the thesis full circle, linking your results back to the objective put forth in the introduction and comparing your observations to those reported in published studies on the same or a related topic. Do your results support your hypothesis (if applicable)? Were there any limitations to the methods or analyses? How does your research advance the field of study? What is left unsolved?

References

Every statement of fact in your work, except for very common knowledge, must be supported either by a citation to a published work, or by citing a result that you have shown in the paper. Cite sources using

the format of a major journal in your field. Typically in Biology, references are cited in the text by the author's last name and the date of publication in parenthesis. If a paper has two authors, both names are given. If there are more than two, the name of the first author is followed by 'et al.'. e.g. (Smith 2009) or (Smith and Richards 2010) or (Smith et al. 2011b). Present an alphabetical list of all of the sources cited in the main text. Do NOT include papers that you have read but not cited in the text.

Consult your supervisor or a journal in your field for the format of citations to books, book chapters, web pages, etc. **Maintain a consistent format for citations in the text and the reference list.**

A common format is as follows:

Books: Author(s), year, chapter title, book editors, book title, page numbers of chapter, publisher, city of publisher.

- e.g.: Clarkson DT and AW Robards. 1975. The endodermis, its structural development and physiological role. In: JG Torrey and DT Clarkson (eds.). The development and function of roots, pp. 415-436. Academic Press, New York. Apak R. 2002.

Journal Article: Author(s), year, paper title, journal name, volume number, page numbers.

- e.g.: Vierheilig H, Schweiger P, Brundrett M. 2005. An overview of methods for the detection and observation of arbuscular mycorrhizal fungi in roots. *Physiologia Plantarum* 125: 393-404.

Web Site: Author/s, year, page title, web address (<http://>), date accessed. Note that author/s is/are not always listed – you may have to try links such as “About us” or “Contact us” to discover who or what organization has published the site.

- Ex.: US Library of Congress. 1990. A Country Study: Uganda [Internet] <http://lcweb2.loc.gov/frd/cs/ugtoc.html>. Date accessed: 3 Dec 2007.

N.B.: Web sites vary considerably in their reliability; citations of web sites are expected to be sparse and to reliable sites. Honours students should not be citing Wikipedia in their thesis.

For reports that do not involve experimentation or are meant to review the literature, you can use the above general format for organizing your thesis; but do not include Materials and Methods, Results, or Discussion sections. Rather, you may include an introductory paragraph to introduce the problem or research area, and then present your arguments in the form of other sections. Headings and subheadings are useful for organization. You may end the report with a concluding section. It would be useful to consult with your supervisor and the literature for examples of review-type papers.