

**SC/BIOL 4000 8.0/3.0 - BIOLOGY HONOURS THESIS
INFORMATION PACKAGE
2014-15**

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TYPES OF HONOURS THESIS COURSES

The **3.0 credit course** is an in-depth critical literature review and/or research proposal that demonstrates the student's knowledge and understanding of a topic. The thesis reviews the literature in a particular field or area of interest, identifies gaps or inconsistencies, and develops a specific hypothesis, argument or model. Students are encouraged to propose an experimental strategy to test the hypothesis (with clearly articulated possible outcomes and limitations). The thesis involves considerable self-directed work and must reflect critical thinking and analytical skills and an understanding of the scientific method. A strong thesis is built on a critical review and interpretation of the literature, good organization and presentation of ideas, and on clear, effective communication. The course concludes with an oral defense of the thesis. Typically students spend 4-6 hours/week preparing the thesis. (Some weeks you will need to put in more hours.) The 3.0 credit course is completed in a **single term** (Fall, Winter or Summer) under the supervision of a faculty member in Biology. There are no formal lectures.

The **8.0 credit course** is a hands-on original research project (laboratory- or field-based) that includes a practical and written component as well as an oral thesis defense. This course provides 4th year undergraduate students with research experience in the Biological Sciences and provides an opportunity to enhance critical thinking, analytical and communication skills. The written component should describe the background relevant to the research project, the question(s) being addressed, specific aims, the methodology used, the results obtained, conclusions and a critical discussion and interpretation of the findings and their significance. Students are required to write clearly and concisely (with correct and appropriate grammar, spelling and referencing of materials), and to prepare accurate and clear figures/tables. The research project involves a significant investment of time and effort in the laboratory or field. Typically students spend 10-12 hours/week (although this is likely to depend on the nature and stage of the work). The 8.0 credit course is completed over **two consecutive terms** (i.e., Fall-Winter, Winter- Summer, or Summer-Fall) under the supervision of a faculty member in Biology. There are no formal lectures in this course.

ELIGIBILITY AND ENROLMENT

Students in the **Specialized Honours Program** (Biology, Biomedical Science Stream, Biotechnology Stream) need to satisfy their degree requirements by completing BIOL 4000 3.0 or BIOL 4000 8.0.

BIOL 3100 2.0 is a prerequisite course for all students enrolling in BIOL 4000 3.0 or BIOL 4000 8.0.
There will be no exceptions.

The 3.0 and 8.0 credit courses are open to eligible Honours Biology students in their final year, with a BIOL GPA of at least 6.0. Students must have completed 84 credits prior to enrolling in BIOL 4000. **Eligibility is determined by the Biology Undergraduate Program Director (UGPD) who will confirm eligibility by signing the attached registration form.** The form should be signed by the student, supervisor and advisor prior to submitting to the Biology UGPD.

To enrol:

1. Obtain an information package with registration form from the UG office (108 FS) or UG website (under courses with enrolment forms).
2. Find a supervisor and fill out the form in consultation with the supervisor. You will need to have an advisor and a thesis topic listed on the form.
3. Bring registration form to UG office to be signed by the UGPD.

SUPERVISOR, ADVISOR AND COURSE DIRECTOR

Each thesis requires input from three faculty members: the supervisor, the advisor and the course director. The thesis work is directed by the research supervisor and evaluated by the supervisor, advisor and course director. The Honours Thesis supervisor will be a faculty member in the Department of Biology who has agreed to direct, oversee and evaluate the thesis. Most students use a combination of their experience in SC/BIOL 3100 2.0 and other courses, as well as listings of faculty interests on the departmental web site to identify a faculty member working in an area that interests them. Many faculty members are receiving requests for honours placements several semesters in advance and it is advisable to start looking for a supervisor as soon as possible (at least 6-9 months prior to anticipated start date).

The supervisor and advisor will be full-time members of the Department of Biology at York University. Occasionally, a faculty member from another department at York University may serve as supervisor or advisor **as long as that individual is a member of the Graduate Program in Biology.** When a faculty member who is not a member of the Biology Department (but is a member of the Graduate Program in Biology) serves as the supervisor, then the advisor must be a member of the Biology Department. Normally the advisor is selected by the student and supervisor in consultation.

The **supervisor** is the primary contact for the thesis work, and students should work closely with the supervisor to produce the highest quality thesis. For the 8.0 credit thesis, students are also likely to work closely with one or more graduate students or postdoctoral fellows. It is important that you have a discussion with your supervisor early on regarding expectations (amount of time to be spent on research, frequency of meetings, attendance at lab meetings, preparation of thesis, review and editing of the thesis, etc.). It is advisable to set clear milestones to measure progress towards completion of the thesis. Students should start work on their thesis as soon as possible after enrolling and should take the opportunity to obtain feedback on draft versions of their written work from their supervisor and/or advisor whenever possible.

The **advisor** is a member of the examining committee and participates in the evaluation of the written thesis and presentation at the end of the program. The advisor has general expertise in the area of the thesis topic and students should feel free to seek the advice of the advisor during the

course.

The **course director** oversees the entire Honours Thesis course and ensures that standards are maintained across the department and that evaluations are equitable for all students. If you have concerns about your thesis that cannot be addressed by your supervisor, please contact the course director.

CHOOSING A TOPIC

The thesis topic should reflect the biological interests of both student and supervisor and should be selected early on by mutual agreement. For the 3.0 credit thesis, there is usually a greater range of biological topics to choose from and students are likely to have more independence in choosing the topic because it does not require laboratory or grant support to complete.

EVALUATION

The final grade for the course is based on an assessment of the written thesis (60%) and its oral defense (40%) by the examining committee comprised of the supervisor, advisor and course director. A one hour oral examination will be scheduled during the final examination period of the term and will involve a 15 minute oral/slide presentation followed by questions from the examining committee. The final grade is based on: (i) scientific content, organization and presentation of the written work, (ii) on the clarity and quality of the student's presentation, and (iii) on the level of understanding and knowledge of the research topic, methods and background information during the question period. The examining committee will contribute equally to the awarding of these marks. In the unusual case where an Adviser cannot be present, the Supervisor will arrange for another suitably qualified faculty member to be present.

MEETINGS

There are no formal lectures scheduled for BIOL 4000 8.0 and BIOL 4000 3.0.

DATES AND DEADLINES

Courses may be started in any one of the Fall, Winter and Summer terms. The final **hard copy** version of the thesis (NOT electronic) must be handed in to the supervisor, advisor and course director by 4 pm on the last day of classes in the term in which you are defending. Please bring the course director's copy of the thesis to the reception desk in the Biology Office in Farquharson, Room 247, and have the thesis date-stamped and placed in the Course Director's mail box.

Submission deadlines for the written thesis:

3 credit students: Fall term: Friday, December 5, 2014, before 4:00 pm
 Winter term: Monday, April 6, 2015, before 4:00 pm
 Summer term: TBA

8 credit students: Fall 2014-Winter 2015 term: Monday, April 6, 2015, before 4:00 pm
 Winter-Summer term: TBA
 Summer-Fall term: TBA

A thesis that is handed in late will be penalized at a rate of 5% per day.

SCHEDULING THE ORAL EXAMINATION

Oral examinations (defences) are held during the University examination period (December 9-22, 2014; April 8-24, 2015; summer dates TBA). The date and time for each oral examination is determined by mutual agreement between the student and the examining committee. As soon as you know your exam schedule, you should speak with your supervisor and advisor and find 3 separate one-hour time slots that are acceptable to you, your supervisor and your advisor. Please submit these 3 dates to Ms. Patty Lindsay in the Biology Office by email (patlind@yorku.ca). Ms. Lindsay will confirm the date of the examination and notify you.

Requests for deferred status, i.e., for defences outside of the regular examination period due to illness, compassionate consideration, etc., may be submitted to the course director (benchimo@yorku.ca). The supervisor or advisor cannot approve a delayed defence without the permission of the course director.

THESIS GUIDELINES

While there is no specific length, most honours theses range between 25-35 pages (including data, tables and figures; excluding references and appendices). Text should be double-spaced (excluding references, figure legends, tables) and left justified with 1.0" margin all around. Use a 12 point font. **Pages must be numbered.**

The organization of the 8.0 credit research thesis typically follows that of a scientific research paper as outlined below. The organization of the 3.0 credit thesis can follow a number of styles. Some 3.0 credit theses are in the format of a research proposal. Use these proposed outlines as guides; discuss with your supervisor.

8.0 Research Thesis	3.0 Thesis
Title Page	Title Page
Abstract	Abstract
Introduction	Introduction
Materials & Methods	Critical Review and Evaluation of Literature
Results	Discussion (or Conclusions)
Discussion (or Conclusions)	Proposed Research [optional]
Acknowledgements	Acknowledgements
References	References

The following guidelines are adapted from Information for Authors, Cell (www.cell.com).

Abstract (Summary)

The Abstract consists of a single paragraph of fewer than 150 words. It should describe the new knowledge obtained and significance of the work to a **broad readership**. In particular, the Abstract should contain a brief background of the question, a description of the results without extensive experimental detail, and a summary of the significance of the findings. References should not be cited in the Abstract and abbreviations should not be used.

Introduction

The Introduction should be succinct, with no subheadings, and should present the background information necessary to provide a biological context for the results. The Introduction should identify the biological problems and questions being addressed in the thesis and state the purpose of the work. The introduction should situate your project within the context of what is already known in the field and should make reference to pertinent literature and previous related findings. **The introduction needs to be informative to a broad readership; please keep in mind that not all members of the examination committee will be experts in your topic.** Avoid jargon and define all abbreviations the first time they are used.

Experimental Procedures (Materials & Methods)

The Experimental Procedures should, at minimum, include enough detail to allow the reader to understand the general experimental design and to be able to assess the data presented in the figures. Unpublished protocols and procedures may need to be described in detail. Tables may be used to list materials used in the study (oligonucleotides, strains, etc.); these tables should have a title. This section should also include a description of any statistical methods employed in the study.

Results

This section should be divided with subheadings. **Please include figures and/or tables within the results section and not appended at the end of the thesis.** Figures may appear on a single page or in-line with the text. Figures should follow the page or paragraph in which they are first referred.

Discussion

The Discussion should explain the significance of the results and place them into a broader context. It should not be redundant with the Results section. This section may contain subheadings. This section should refer back to the Introduction, showing how the completed work relates to the original objectives.

Acknowledgments

This section may acknowledge contributions from non-authors.

References

Please include citations in the text and list all references cited in the References section at the end of the thesis. References should include only articles that are published or in press. This section should be accurate and in the style of one of the leading journals in the field. It is recommended that students discuss the reference format with their supervisor. References should be to primary, peer-reviewed literature and recent review articles (excessive use of review articles is not recommended). The following style for references is shown as an example:

- **Article in a periodical:** Wu, B., and White, K.A. (2007). Uncoupling RNA virus replication from transcription via the polymerase: functional and evolutionary insights. *EMBO J.* 26, 5120-5130.
- **Article in a book:** Brown, L., and Benchimol, S. (2005). Regulation of the p53 response by cellular growth and survival factors. In: 25 Years of p53 Research, P. Hainaut and K.G. Wiman, eds. (The Netherlands: Springer), pp. 115-140.

- **An entire book:** Myers, J., and Bazely, D.R. (2003). *Ecology and Control of Introduced Plants: Evaluating and responding to invasive plants*. Ecology, Biodiversity and Conservation Series, (Cambridge University Press).

In most cases, popular science magazines and websites such as Wikipedia, etc. are unacceptable as references for an honours thesis. Government, educational or health institutions may provide online and/or published information that can be cited as shown below:

- Canadian Cancer Society's Advisory Committee on Cancer Statistics. *Canadian Cancer Statistics 2013*. Toronto, ON: Canadian Cancer Society; 2013.
- American Cancer Society: *Cancer Facts and Figures 2013*. Atlanta, Ga: American Cancer Society, 2013. Available online <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-036845.pdf>

There are several software packages that are available to help with referencing such as Refworks or Endnote. Students should have read and understood every reference they cite. Do not rely on abstracts alone when reading or citing papers.

STUDENT PRESENTATION

The 15 minute presentation should provide the examiners with sufficient background information to understand the research question(s) that is addressed in the thesis and the methodology. Students should outline the main points of the thesis, present some (not necessarily all) of the key findings and discuss the significance of their work. Keep in mind that the examiners have read your thesis. A PowerPoint slide presentation is highly recommended. Keep fonts legible and colours simple on the slides, and do not cram the slides with information. Speak slowly and clearly and look at your audience as you are speaking. **Please do not read from your notes.** Practice your presentation in front of friends and then practice some more and be certain to stay within the 15-minute time limit. Use the mouse pointer to guide your audience to specific areas of the slide (laser pointers are not visible on plasma screens). Wear comfortable (but appropriate) clothing. You do not need to dress up for the presentation but by all means wear clothing that builds confidence.

ACADEMIC HONESTY AND PLAGIARISM

Cheating, plagiarism and improper research practices represent major academic offences and carry serious penalties, ranging from a failing grade on the work in question to expulsion from the university. You should be familiar with Senate Policy on Academic Honesty.

<http://www.yorku.ca/secretariat/policies/document.php?document=69>

Always write in your own words. Do not cut and paste someone else's writing into your work with the intention of rewording it so it looks like your own writing. It is helpful to make notes in point form as you read and to write from those notes later after you have closed a reference text (such as a review or research paper). This will ensure that your work is original. Additional resources are available at:

<http://www.yorku.ca/academicintegrity/students/index.htm>

As this course emulates real science, a signed ethics statement (included in this information package) is to be included with each submitted thesis.

Ethics in the BIOL 4000 Honours Thesis

(taken, in part, from the requirements for authors submitting manuscripts to the journal, FEBS Letters).

There are fundamental principles underlying scholarly work produced for this course. The Honours Thesis should:

- be the authors own original work
- reflect the authors own research and analysis and do so in a truthful and complete manner
- properly credit the meaningful contributions of co-authors and co-researchers
- be appropriately placed in the context of prior and existing research

Honours thesis students should note the following:

- (i) Relevant prior and existing research and methodologies will be properly identified and referenced using standard bibliographic and scientific conventions.
- (ii) All reporting, writing and editing that make up the content of the thesis shall be the original work of the author and shall not plagiarize the work of others.
- (iii) Plagiarism can mean the literal copying of the entirety of another's article or paper or other text.
- (iv) Plagiarism can also mean the literal copying of large portions of another's work or even the substantive "paraphrasing" of another's work (e.g. using the same set of sentences from a published text in your work, but changing the order in your text or copying paragraphs from other papers but changing some of the nouns, adjective or verbs to those of your choice while the basic format and content of the paragraph remains the same as the original, etc.).
- (v) Short quotes from the work of others may occasionally be used in the preparation of scholarly or professional manuscripts, but all such quotes should be properly referenced with full bibliographic details of the quoted work, as it is important to place the reported research or conclusions in a scholarly context.
- (vi) Note that to quote or copy text or illustrations beyond a "short quote" will require the author to obtain permission from the rights holder.
- (vii) Co-contributors should be properly and appropriately identified
- (viii) All participants in a research project that is the subject of a paper who made a substantive contribution to the research and the analysis presented in the paper should be identified or credited.
- (ix) Other participants with less responsibility - for example, those who merely assisted in carrying out the research - should be identified and acknowledged for their contributions.
- (x) Research and testing methodologies should be consistent with guidelines of research institutions, relevant societies, or funding agencies, especially those that may involve the treatment, consent, or privacy of research or testing subjects.

All students are required to sign a copy of this page stating that they have read and understood these expectations and submit the signed copy along with their final version of their thesis.

Student Name _____ Signature _____

Student # _____ Date _____

This form should be submitted with the thesis, and will be kept on file by the Course Director.

SC/BIOL 4000 HONOURS THESIS REGISTRATION FORM

Name _____ Student # _____

Email _____ Phone _____

Term _____

Supervisor _____ Advisor* _____

Title and outline of project:

Supervisor's Signature _____ Advisor's Signature _____

Student's Signature _____ Date _____

** The selection of the advisor by the student and supervisor needs to be approved by the course director.*

When the above portion has been completed, please bring this form to the UG office (108 FS) to be approved by the Undergraduate Program Director (Dr. Paula Wilson).

Approval of UGPD _____ Date _____

Please direct any questions to the Course Director (Dr. S. Benchimol).