

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

COURSE DIRECTOR: Dr. Robert Tsushima

COURSE EMAIL: biol4000@yorku.ca

COURSE eCLASS: <https://eclass.yorku.ca/eclass/my/>

A. GENERAL COURSE INFORMATION

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 biological 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 (critical review). 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 defence 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 the Department of Biology. There are no formal lectures; however, the scheduled lecture time will be used by the course director to meet with students on occasions to discuss the course and provide updates.

The **8.0 credit course** is a hands-on, original, independent research project (laboratory- or field-based) that includes a practical and written component as well as an oral thesis defence. This course provides 4th-year undergraduate students with research experience in the Biological Sciences and provides an opportunity to enhance and apply critical thinking, analytical and communication skills. The written component includes a description of 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, citations and references), and to prepare accurate and clear figures/tables. The research project involves a significant investment of time and effort in the laboratory or field. After initial training, the student is expected to work independently and is expected to perform the research on his/her own. It is highly discouraged to have another trainee perform the experiments on behalf of the student. 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; however, the scheduled lecture time will be used by the course director to meet with students on occasions to discuss the course and provide updates.

B. ELIGIBILITY AND ENROLMENT

The 3.0 and 8.0-credit courses course is restricted to students an **honours Biology program** (Biology, Biomedical Science, Biotechnology, Environmental Biology, Environmental Science).

Biology students must have completed 84 credits prior to enrolling in BIOL 4000 and have a biology GPA of 6.0 or above.

It is the student's responsibility to find a thesis supervisor. The registration form should be completed by the student in consultation with the supervisor. The name of an advisor and a thesis topic must also be filled on the form. The form should be signed by the supervisor and advisor prior to uploading on the Biology courses website. **Eligibility and approval will be determined by the Course Director.**

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 should be a faculty member in the Department of Biology who has agreed to direct, oversee and evaluate the thesis. Most students use the listing of faculty interests on the departmental website to identify a faculty member working in an area that interests them. Many faculty members receive 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 should be full-time members of the Department of Biology. Occasionally, a faculty member from another department at York University may serve as the 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. A supervisor or advisor who has no official association with the Department of Biology will not be approved. Normally the advisor is selected by the student and supervisor in consultation.

C. ROLE OF THE SUPERVISOR

The **supervisor** is the primary contact for the thesis work and the student should work closely with the supervisor to produce the highest quality thesis. The supervisor is expected to oversee the student's research work, actively mentor the student, monitor the student's research progress on a regular basis, and provide constructive feedback on the student's research work, data analysis and interpretation, and written thesis. The supervisor should ensure the appropriate reagents, equipment, computer software, research animals and/or human subjects are available as early as possible to the student to allow the student to complete their research within 6-7 months. Any anticipated delays in the availability of these items should be relayed to the student at the start.

The supervisor is required to evaluate the student's written draft introduction, final written thesis and must be available for the one-hour oral presentation and defence (**see section K**). The supervisor will provide a written assessment of the student's work performance in the lab.

For the 8.0 credit thesis, students may work closely with one or more graduate students, postdoctoral fellows or laboratory technicians. It is important for the student to discuss with the 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 in the course and should take the opportunity to obtain feedback on draft versions of their written work from their supervisor and/or advisor whenever possible.

D. ROLE OF THE ADVISOR

The **advisor** is a member of the examining committee. The advisor typically 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 advisor is required to evaluate the student's written draft introduction, final written thesis and must be available for the one-hour oral presentation and defence (**see section K**).

E. ROLE OF THE COURSE DIRECTOR

The **course director** oversees the honours thesis course, ensures that standards are maintained across the department and that evaluations are equitable for all students. A student who has concerns about their thesis that cannot be addressed by the supervisor or advisor should contact the course director.

The course director will evaluate the student's one-page thesis proposal, written draft introduction, final written thesis and be available for the one-hour oral presentation and defence.

F. LABORATORY TRAINING AND ETHICS APPROVAL

It is the responsibility of both the student and supervisor to ensure mandatory laboratory safety training (i.e. WHMIS II, biosafety) and/or approved ethics training (e.g. use of research animal or human subjects) are completed prior to the start of research work or as soon as possible.

G. 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 space, resources, or grant support to complete the work.

H. LECTURES

There are no formal lectures for BIOL 4000 8.0 and BIOL 4000 3.0; however, the scheduled lecture time will be used by the course director to meet with students on occasions to discuss the course and provide updates.

I. DATES AND DEADLINES

The course will start in any one of the Fall, Winter and Summer terms. The final version of the thesis must be sent to **BIOL4000@yorku.ca**.

Submission deadline dates for the written thesis will be posted on the course eClass page.

Late submission of the written thesis will result in a deduction of 5% per day on the written thesis grade component.

J. THESIS GUIDELINES

While there is no specific length for the written thesis, but theses typically range between 35-45 pages (including data, tables and figures; excluding references and appendices). Text should be double-spaced (excluding references, figure legends, tables) and left justified with 2 cm margin all around. Use a 12-point font. The choice of font is at the discretion of the student. Print on one side of the page. **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 and discuss the format with your supervisor.

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

Each section should start on a new page

Title Page

The student should develop a clear and concise title that reflects the overall focus and/or objective of the thesis. The student's name, student number, supervisor's name and advisor's name should be included.

Contributions

The student must specify their contributions to the work presented in the thesis. The expectation is the majority or all of the work in the thesis was conducted by the student. The student should state the thesis reflects their own work and indicate what research was conducted and analyzed by the student. The student must acknowledge the contributions by others and specify what parts of thesis were not their own.

Omission of the contributions page will result in a **5% deduction** from the written final thesis mark.

Acknowledgments (Optional)

This section may acknowledge contributions from non-authors including the supervisor, students, postdoctoral fellows, and technicians in the laboratory.

Table of Contents

The list of headings and subheadings should be listed in the Table of Contents, as well as a separate list of abbreviations used in the thesis.

Abstract (Summary)

The Abstract consists of a **single paragraph no more than 250 words**. It should describe the new knowledge obtained and significance of the work to a **broad readership**. The Abstract should contain a brief background of the question or objective of the thesis, 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 be avoided.

Introduction (10 pages of text or less)

The Introduction should present the background information necessary to provide a biological context of the thesis. 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 the project within the context of what is already known in the field and should make reference to pertinent literature and previous related findings. Including subheadings in the Introduction makes it easier for the reader. **The introduction needs to be informative to a broad readership and keep in mind that not all members of the examination committee will be experts in the topic.** Avoid jargon and define all abbreviations the first time they are used.

Figures are essential and can be either imbedded in the main text of the thesis or included as a separate page. It is easier for the reader to have the figures close to the relevant text rather than placing the figures at the end of the introduction. Students are encouraged to create their own figures for the introduction section using PowerPoint, Biorender, or any other graphics software.

The student should state the hypothesis/hypotheses or objectives of the thesis.

Materials & Methods (BIOL4000 8.0)

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 need to be described in detail.** Tables may be used to list materials used in the study (oligonucleotides, antibodies, animal or plant strains, etc.); these tables should have a title and the information of what is being presented. This section must include a description of the statistical methods employed in the study.

Results (BIOL4000 8.0)

This section should be divided with subheadings. **Please include figures and/or tables within the results section and not append them at the end of the thesis.** Figures may appear on a separate page or be imbedded within the text. Legends should be informative and allow the reader to

understand the corresponding figure or table. Figures should follow the page or paragraph in which they are first referred.

Critical Review and Evaluation of Literature (BIOL4000 3.0)

A comprehensive and critical analysis of the main focus or hypothesis of the thesis. Information from primary literature supporting and/or refuting the central hypothesis or objective of the thesis should be included.

Discussion (<10 pages)

For the 8.0 credit research thesis, students should reflect on the data they have collected, provide a critical interpretation of the data, and draw conclusions from the data in the Discussion section. The significance of the results should be explained and placed within a broader context. The limitations of the study may be discussed. It should not be a reiteration of the results.

For the 3.0 credit thesis, students should provide an overview of the critical topics presented. This section may contain subheadings and should not be redundant with the Results or Critical Review section. This section should refer back to the Introduction, showing how the completed work relates to the original objectives.

References

Please include citations in the text and list all references cited in the References section at the end of the thesis. **Students should have read and understood every reference they cite.** Do not rely on abstracts alone when reading or citing papers. 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. Students should 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 only. **Students can use any reference format they wish**, but they must be consistent with the formatting throughout the reference section.

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).

Traditionally, popular science magazines (e.g. Scientific American), websites (e.g. Wikipedia), and social media are not used as references for an honours thesis in place of published research articles. However, these sources may be considered due to the changing landscape of rapid information access. 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/acs_pc-036845.pdf

There are several software packages that are available to help with referencing such as RefWorks, Mendeley and Zotero. York University Libraries provides support to Mendeley and Zotero.

TURNITIN

Each student must submit the **final Introduction section only** of their honours thesis to Turnitin using the portal provided on eClass.

Do NOT submit your entire thesis.

Do NOT submit the reference section.

K. EVALUATION

BIOL4000 8.0

	Mark
<p>Outline of thesis project/topic The outline must be more detailed than the description on the course registration form. It should discuss/describe the main focus of the thesis (3.0 and 8.0 credit) and specific experiments to be performed (8.0 credit). One page, double spaced. Submission deadline will be posted on eClass.</p>	5%
<p>Draft of thesis Introduction An initial draft of the Introduction section of thesis (<10 pages, double spaced) plus corresponding references. Include a title page. Submission deadline will be posted on eClass.</p>	10%
<p>Written thesis Due the last Friday of the term. Submission deadline will be posted on eClass.</p>	40%
<p>Oral defence To be scheduled during the University examination period</p>	35%
<p>Laboratory Performance An assessment by the supervisor of the student's work performance in the lab.</p>	10%

BIOL4000 3.0

	Mark
<p>Outline of thesis project/topic The outline must be more detailed than the description on the course registration form. It should discuss/describe the main focus of the thesis or critical review. One page, double spaced. Submission deadline will be posted on eClass.</p>	5%

Draft of thesis Introduction An initial draft of the Introduction section of thesis (<10 pages, double spaced) plus corresponding references. Include a title page. Submission deadline will be posted on eClass.	10%
Written thesis Due the last Friday of the term. Submission deadline will be posted on eClass.	45%
Oral defence To be scheduled during the University examination period	40%

K. SCHEDULING THE ORAL EXAMINATION

Oral examinations (defences) are held during the University examination period. The date and time for each oral examination is determined by the mutual agreement between the student and the examining committee. As soon as the student knows their exam schedule, they should contact their supervisor and advisor to identify 3 separate dates and time slots (at least one-hour long). Please submit these 3 dates to the biol4000@yorku.ca. The course director will confirm the date of the examination and notify the student.

Requests for deferred status, that is for defences outside of the regular examination period due to illness, compassionate consideration, etc., must be submitted to the course director. The supervisor or advisor cannot approve a delayed defence without the permission of the course director.

L. STUDENT PRESENTATION AND ORAL DEFENCE

The oral defence examination committee will be comprised of the supervisor, advisor and course director. A one-hour oral examination will be scheduled during the final examination period of the term. The oral defence is comprised of a 20-minute presentation by the student followed by 30-40 minutes of questioning by the examiners. The **20- minute** student 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. The grade for the oral defence will consist of (i) the clarity and quality of the student's oral and slide presentation, (ii) the level of the student's knowledge of the research topic, background information, methods, and limitations as determined during the oral defence, and (iii) understanding of the research topic as reflected by their ability to answer the questions. The examining committee will contribute equally to the awarding of these mark. See rubric uploaded to eClass.

A PowerPoint slide presentation is highly recommended. Well-designed slides are easy to read and communicate ideas and facts to the viewer effectively. Keep fonts legible and colours simple on the slides, and do not cram the slides with information. Each slide should make just one or two points. Use a clean modern font. Regardless of what font you choose, make sure the text is large and can be read from the back of the room. Avoid dissolves, spins and other distracting transitions between slides (unless they serve a purpose). Figures and other visuals must be of the highest quality (sharp, clear, no pixels, no distortion). Each slide should have a title; data slides should have an informative

caption that describes the experiment and/or the result. Please provide conclusions and insights from the data. Speak slowly and clearly and look at your audience as you are speaking. **Please do not read from your notes and do not read word-for-word the information on the slides.** The slides serve to reinforce what you are saying. Use the mouse pointer or laser pointer to guide your audience to specific areas of the slide and to draw attention to specific elements of the presentation (Note: some laser pointers are not visible on plasma screens). Practice your presentation and then practice some more and be certain to stay within the 20-minute time limit.

Wear comfortable (but appropriate) clothing. You do not need to dress up for the presentation but by all means wear clothing that builds confidence.

M. ACADEMIC HONESTY AND PLAGIARISM

The honours Thesis consists of original scholarly work by the student. It reflects the student's own research and analysis in a truthful and complete manner. Relevant prior and existing research and methodologies must be identified and referenced using standard bibliographic and scientific conventions. Co-contributors and other research participants who have made a contribution to the research project/honours Thesis should be credited or acknowledged. Cheating, plagiarism and improper research practices, including data fabrication, 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.

<https://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>

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. After closing a reference text (such as a review or research paper), you can use your notes to write and organize your paper. This will ensure that your work is original.

Additional resources are available at:

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

N. Bethune College Writing Centre

The Bethune Writing Centre offers instruction in academic and professional writing to undergraduate students affiliated with Bethune College.

<https://www.yorku.ca/colleges/bethune/get-help/writing/>

The Bethune Writing Centre can help you with the following:

- Review your work and learn to self-edit
- Write a critical argument and/or thesis for assignments
- Organize the structure of scientific reports and essays
- Reference and write citations
- Learning strategies and effective work habits
- Personal statements and applications

SC/BIOL 4000 HONOURS THESIS REGISTRATION FORM

Name	<input type="text"/>	Student #	<input type="text"/>
Email	<input type="text"/>	Phone	<input type="text"/>
Term	<input type="text"/>	Date	<input type="text"/>
Supervisor*	<input type="text"/>	Advisor*	<input type="text"/>

Thesis project outline:

Supervisor's
Signature * _____

Advisor's
Signature * _____

*** By signing the form, the Supervisor and Advisor acknowledge they have read and agree with their responsibilities outlined in sections C and D of the course information package**

When the above portion has been completed, please upload the form on the online Machform registration page to be approved by the Course Director. By signing the Machform page, the student has approved all information is correct.

Following approval, the Biology Undergraduate Office will contact the student when an enrolment window is open.

Please direct any questions to the Course Director (Dr. Robert Tsushima) at biol4000@yorku.ca.