

BROCK UNIVERSITY
Department of Biological Sciences

GUIDELINES FOR HONOURS THESIS PROJECTS
BIOLOGY 4F90/4F91

(Approved January 2010 by the Biological Sciences Departmental Committee)

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PART ONE

1. ADMISSION OF STUDENTS TO BIOLOGY 4F90/4F91

- (a) All students registering for Biology 4F90 must **also register for** Biology 4F91 at the same time. Admission to the course requires an override signature from the course coordinator. Students given an override must then register in the course online.
- (b) Admission of students to the 4F90/4F91 program will normally require completion of 14.0 credits and a major average of 75% or greater. Students eligible for admission on this basis will be notified by the Chair during the summer months. The Department will attempt to accommodate students who wish to enroll in the 4F90/4F91 program provided they meet the criteria above.
- (c) Year IV students who do not meet this standard may be admitted to the program at the discretion of the Chair and the supervising faculty member, to the extent that space and facilities permit.
- (d) Every faculty member has the right to refuse supervision of a specific student. However, this will be exercised only under extraordinary circumstances, and must have some defensible basis. The Chair of the Department, in consultation with faculty of the Department, will judge the defensibility of such refusals.
- (e) A 4F90/4F91 student shall not normally be paid by the supervisor while enrolled in the course (see Dept. minutes May 10, 1983).
- (f) Faculty will not normally supervise Biology 4F90/91 students while sabbaticants.

2. RESPONSIBILITIES OF THE SUPERVISOR AND COMMITTEES

The thesis program has been instituted primarily to provide Honours students with significant experience in the investigative process. Although it is undesirable to legislate formal regulations regarding the responsibilities of supervisors and committees vis-a-vis students, some guidelines are appropriate.

Supervisor

- (a) Thesis projects should be suitable for the illustration of the entire research process, from the formulation of hypotheses through to the decision-making steps and the communication of results. They should be real problems and not primarily isolated aspects or technical problems associated with the supervisor's personal research program.
- (b) BSc projects are not the equivalent of MSc studies and their principal goal is not the publication of a research paper. Consistent with the aim of the 4F90/4F91 program, they should be well defined and relatively limited in scope. Open-ended projects should not be encouraged and every effort should be made to avoid studies which are unlikely to yield results within the time period available.
- (c) Since Year IV students cannot ordinarily be expected to have the background knowledge necessary to formulate a research hypothesis and then to design the studies necessary to test it, supervisors should work closely with their students in this phase of the study, and also assist in the development of analytical, observational and related procedures. Previous experience suggests that most students have difficulty in setting up realistic experimental schedules. Supervisors should help with this, and ensure that such schedules are followed.
- (d) Since most students require assistance in the organization of their reports, a schedule has been defined which provides time for the student to prepare and submit more than one thesis draft. Supervisors should ensure that the drafts are of reasonable quality with respect to style, organization, etc., before final typing.
- (e) A most important part of the learning experience of these courses is data analysis, interpretation of results and integration of these into the current biological thought. Since this is the ultimate reason for doing research, it is very important that students be guided through this process by the supervisor and shown how this is accomplished.
- (f) The duties of the supervisor cease with the final submission of the thesis, when he or she reverts to membership on the examining committee.

N.B.

When Biology 4F90/4F91 is taken during any 8 month period, no thesis investigation may be initiated before commencement of the 8 month term. Students may carry out projects in the laboratories of faculty members for whom they have worked as summer research assistants but may not use, for a thesis, any data or material obtained during the tenure of such an appointment. Moreover, no Year II or Year III student may be hired as a research assistant with the understanding that he or she is then obligated to carry out a thesis project under the supervision of the faculty member concerned.

Committees:

Each student registered for the thesis program will be assigned one committee that will act as both an advisory committee and an examination committee.

- (a) **Committee:** The Honours Program coordinator, in consultation with the Chair of the Department, will strike a Committee for each student. This will consist of the supervisor of the project and one other faculty member of the Department preferably with some knowledge of the area in which the project is to be conducted. The faculty member that is not the project supervisor will act as chair of the committee. If students have two faculty members that are co-supervising their project, the committee will consist of both supervisors along with the additional faculty member. The Committee as such, or as individuals, should be available for consultation throughout the project.

This arrangement will not preclude the student's seeking advice from other faculty members. The Committee will hear the first and second seminars of each student and mark the progress seminar and report as outlined in Section 4, will assist in problem organization, data evaluation, and will mark the final thesis, final seminar and final defence as outlined in Section 4.

The committee Chair will be in charge of the final thesis presentation and defence, and will be responsible for collating and returning the final grades assigned to the program coordinator.

3. STARTING DATES

BIOL 4F90 and BIOL 4F91 may be started in fall (September to April cohort), winter (January to August cohort) or spring (May to December cohort). The same regulations apply whether a student starts in the fall, winter or spring with the exceptions of deadline dates. Deadline dates for all three cohorts are listed in section 4.

4. SCHEDULE AND DEADLINES

Schedule:

- (a) Each member of the Department is expected to participate in the Biology 4F90 program and will indicate early in the winter term the areas in which he/she will supervise projects. The area of designation should be supported by a few example project titles. The list of areas and possible titles will be posted in the General Office and a general meeting of all interested prospective Honours students will be held during the winter term (normally in late February). Supervisory faculty will present an overview of their proposed project areas at that meeting.

Each student participating in the program will be required to make his/her arrangements with a supervisor, and to register these with the Coordinator of the Course no later than one week following the commencement of the term in which BIOL 4F90/91 is started.

Two faculty members may co-supervise a 4F90/91 project if so desired.

- (b) Each student will be required to present three seminars during the course:
- (i) The initial planning seminar will be scheduled during the first month of the term that 4F90/91 commences. These seminars should deal largely with the nature of the problem and the proposed design of the study. The principal goal will be to provide for a committee input with respect to the final organization of the study. A 1 to 2 page written outline should be provided to the committee at the start of the seminar. This planning seminar presentation will be no longer than 15 minutes and will be followed by a 5 to 10 minute discussion period.
 - (ii) The progress seminar will be scheduled after submission of the written progress report at the start of the second 4 month term (see Section 4, Deadlines for dates and Section 5 for content). Each student should present her/his findings to date. The committee may then make recommendations as to possible further experiments, data analysis, etc.
 - (iii) The final seminar will be scheduled within a two-week period after final submission of the thesis (see section 4, Deadlines for due dates and Section 5 for content). The student will be expected to outline the problem, its background, the design of the study and results obtained and discuss the conclusions. A defence of the thesis will follow in closed session with the examining committee. The total session should not exceed 1.5 hours.
- (c) Each student will prepare two written reports during the course:
- (i) The progress report will be handed in at the end of the first term. See section 4, Deadlines for due dates and section 5 for content requirements. The progress report is limited to 15 pages in length.

- (ii) The final thesis will be handed in at the end of the second term. See section 4, Deadlines for due dates and section 5 for content requirements. The final thesis is limited to 50 pages in length.

Deadlines:

- (a) Under no circumstances should theses be submitted for examination without prior submission of draft(s) to the supervisor.
- (b) Submission of the first draft to the supervisor will be at least **three weeks before** the final submission date. This should allow sufficient time for revisions and final typing.
- (c) **Due Dates**
- (i) **September – April cohort**
 Planning seminar: Prior to September 30
 Progress Report: December 10 by 5 pm
 Progress Seminar: Friday of the first week of term in January
 Final Thesis: April 1 by 5 pm
 Final Seminar and Defence: Scheduled day prior to April 14
- (ii) **January – August cohort**
 Planning seminar: Prior to January 31
 Progress Report: April 10 by 5 pm
 Progress Seminar: Friday of the first week of term in May
 Final Thesis: August 1 by 5 pm
 Final Seminar and Defence: Scheduled day prior to August 14
- (iii) **May – December cohort**
 Planning seminar: Prior to May 31
 Progress Report: August 10 by 5 pm
 Progress Seminar: Friday of the first week of term in September
 Final Thesis: December 1 by 5 pm
 Final Seminar and Defence: Scheduled day prior to December 14
- (d) For all cohorts, final submission of the thesis (**two copies plus an electronic copy on disk or via email to the biology administrative assistant or the BIOL 4F90/91 Program Coordinator**) will occur **prior to 5 p.m. on the due date** or if a weekend/holiday, on the next official day the University is officially open. No further revisions will be permitted. This copy is to be graded, as submitted, by the Committee. Failure to submit the thesis on the deadline date will carry the **penalty** of a reduced grade unless there are documented medical or comparable reasons justifying late submission or unless, **under rare exceptional circumstances**, the Chair of the Department, in consultation with the Program Coordinator, exercises his/her discretionary powers. There are no predetermined penalties. Penalties are determined by faculty of the Departmental Committee as a whole on an individual, case-by-case basis. The final seminar and oral defence will be scheduled by the course co-ordinator within two weeks of the thesis submission between the last day of classes and the start of the examination period.

5. EVALUATION

- (a) **Progress Report:** Two copies of a typed progress report worth 15% of the grade for 4F91 must be submitted to the 4F90/91 co-ordinator's departmental mailbox (by December 10 (for projects started in September), April 10 (for projects started in January) or August 10 (for projects started in May). If a student has two supervisors, then three progress reports must be submitted. The reports will be distributed to the supervisory committee for grading by the course co-ordinator. If any of these dates should fall on a weekend, then the deadline will be the following Monday. The progress report will only include an introduction and literature survey along with literature cited. The report is to be written in a concise manner such that a complete literature review is presented in 15 pages.

Progress Seminar: After the written report has been submitted, on the Friday of the first week in the following (2nd) term, the student will give a seminar reviewing progress to date for laboratory research worth 15% of the grade for 4F90. (First Friday of Jan for September to April cohort, first Friday of May for the January to August cohort, first Friday of September for the May to December cohort)

cohort). The progress seminar is limited to 20 minutes with a discussion period to follow. The total time, including seminar and discussion should not normally exceed 1 hour.

- (b) **Final Thesis:** Two copies of the Final thesis must be submitted for examination (see Section 6 and Part 2 for details of thesis format).
- (c) **Final Theses** must be submitted in final form on April 1 (for the September to April cohort), August 1 (for the January to August cohort) or December 1 (for the May to December cohort). Both members of the committee (the supervisor and the chair) will grade the thesis for Scientific Merit (50% of 4F90) and Library Research and Communication (50% of 4F91). These marks will be submitted before the seminars and defences, which will take place shortly following the end of classes.
- (d) **Final Seminar presentations:** Final seminars of 20 minutes in length with a question period thereafter will be held within a two-week period after submission of the thesis. Grades worth 15% of 4F90 (Scientific merit) and 20% of 4F91 (communication) will be assigned to the seminar.
- (e) **Closed oral defences:** The closed oral defences in which the student and examining committee meet for not more than one hour will be held after the seminar presentation. Questioning by committee members will normally pertain to the thesis topic but students should anticipate questions on the theoretical basis and appropriateness of methodology used and also on the broad ramifications and significance of their topic. Grades worth 20% of 4F90 (Scientific merit) and 15% of 4F91 (Communication) will be assigned to the defence.

Marks assigned to the seminar and the defence are to be registered, in writing, with the Chair of the Examination Committee immediately following termination of the final defence of the thesis and prior to any discussion. The marks assigned by individual committee members will have equal weight.

Final Mark Allocation:

	4F90 (Scientific merit)	4F91 (Library research and Communication)
Progress report	0	15%
Progress seminar	15%	0
Thesis	50%	50%
Seminar	15%	20%
Defence	<u>20%</u>	<u>15%</u>
	100%	100%

- (f) For purposes of transmission to the Registrar, two final grades will be assigned, one for Biology 4F90 and one for Biology 4F91 based on the marking scheme in section 5(e).
- (g) The mark assigned for Biology 4F90 will reflect the scientific merit of the thesis and should be based on the results, an understanding of those results in the thesis and the defence of the thesis during examination.

The mark assigned for Biology 4F91 will reflect the communicative abilities of the student and the thoroughness of the library research. This will be based in part on the thesis and in part on the seminar presentation.

- (h) The program coordinator will collate all mark assignments, weigh and calculate the average marks for each subsection and for each of the two courses. In cases of **extreme** discrepancies in assigned marks, the coordinator should attempt to arrive at some acceptable consensus.

All grades, including the individual mark assignments of committee members, must be returned to the coordinator of the course.

- (i) Final grades will not be transmitted to the Registrar until corrected copies of the thesis have been received by the course coordinator. Normally, three corrected copies of the thesis are submitted for binding (see section "j" below).
- (j) Disposition of theses: After the thesis has been corrected to the satisfaction of the supervisor, three corrected copies are submitted for binding. If a student has two supervisors, four copies are submitted for binding. One bound copy is retained by the department and deposited in the departmental collection (the binding of this copy is paid for by the department). Of the remaining bound copies, one is the property of the student and the other copy is the property of the supervisor (the binding of these copies are paid for by the supervisor). If the student desires additional bound copies of the thesis, the administrative assistant of the department will make arrangements for these additional copies to be bound at the expense of the student. Cost of binding is currently \$10 per copy [see Part Two, "Instructions for the Preparation and Submission of BSc (Honours) Theses," item #2 in the "General Information" section].

6. THESIS FORMAT

A short thesis outline is available at the end of this document (see Part Two). It is suggested that all theses follow a format similar to the following:

- (a) Title Page
- (b) Acknowledgments
- (c) Abstract
- (d) Introduction and Literature Review (combined or separate sections): concisely outline the problem, the goal of the study and the approach used
- (e) Materials and Methods
- (f) Results
- (g) Discussion
- (h) Summary and Conclusions
- (i) Literature Cited
- (j) Appendices

The final thesis should not be longer than 50 pages. At the discretion of the supervisor, additional data may be included in appendices but will not be marked by the thesis committee.

7. BUDGET AND SUPPLIES

- (a) A budget will be allocated for 4F90/91 projects by the Chair of the Department of Biological Sciences, provided sufficient funds are available.
- (b) A withdrawal record sheet will be maintained for each project in Stores. All in-stock items and all purchased equipment and supplies will be recorded on this. Withdrawal from stock and all purchase orders must be authorized by the supervisor. All purchase orders must be signed by the Chair.
- (c) Students will be held accountable and responsible for all equipment and unused supplies, and these are to be returned in clean condition to the Storeroom prior to the thesis defence.
- (d) In general, the teaching laboratories will have priority in questions of equipment use.
- (e) If possible, students will be provided with individual locked cupboards for the storage of materials.
- (f) The following items constitute reasonable charges against project budgets: apparatus, glassware, chemicals, mileage costs associated with field studies, photographic and drawing supplies used by the student in thesis preparation, reasonable inter-library loan costs. Costs of thesis typing and photocopying are specifically **excluded**.

8. KEYS

There is a deposit of \$20/key with a maximum of \$50. Final grades for each student will not be transmitted to the Registrar until his/her university keys have been returned to the departmental Bookkeeper/Storeskeeper. Exceptions will be made for students who continue to work in the same laboratory as graduate students, student assistants, or research assistants.

9. APPEALS

It is recognized that under some circumstances students may wish to appeal a final grade. In such instances, the Chair of the Department will appoint an *ad hoc* committee to deal with the appeal.

10. GRADUATION

Students intending to graduate at the Spring Convocation **must complete** an "**Application to Graduate**" by March 1st. Students intending to graduate at the Fall Convocation **must complete** an "**Application to Graduate**" by August 1st. These applications are available in the Office of the Registrar and must be submitted to them by the dates listed above.

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PART TWO

BROCK UNIVERSITY

Department of Biological Sciences

INSTRUCTIONS FOR THE PREPARATION AND SUBMISSION OF BSc (HONOURS) THESES

A student submitting a BSc (Honours) thesis for degree credit must ultimately submit **two copies** of his/her approved thesis (plus an electronic version on disk or via email) to the secretary of the department or to his/her delegate before the degree will be conferred. The thesis shall be a report of research work carried out during the candidate's final year. The following regulations are provided for the guidance of students and faculty.

GENERAL INFORMATION

1. **Number of copies prior to thesis defence.** TWO copies (SEE PART ONE FOR DETAILS) of the thesis must be prepared. The TWO copies shall be submitted in an unbound form to the Biology 4F90/91 coordinator's mailbox for examination. Each copy must be adequately secured in a large envelope or in a spring-back folder, but not in a folder requiring the punching of holes in the pages of the thesis. The student should bring her/his own copy of the thesis to their thesis defence.
2. **Faculty approval and disposition of the thesis after the thesis defence.** When the thesis is approved by the examining committee, the candidate must submit two copies (or more if **requested**) of the approved thesis for binding to the secretary of the department **no later than seven days** after the final date of scheduled exams. These copies must be corrected of any errors noted by the examiners and must contain all charts, maps, figures, tables, and appendices as finally approved. One bound copy is retained by the department, others by the supervisor and the student. These three copies are bound at the expense of the department (one copy) and the supervisor (two copies). Any additional copies that the student wishes to have bound will be paid for by the student at a cost of \$10 per copy (payable when the theses copies are submitted to the departmental secretary). Any student that does not submit the final copies for binding on time will receive an "Incomplete" grade for 4F90 and 4F91. Students will also be required to return all keys that were signed out. Grades will not be submitted to the Office of the Registrar until the final copies of the thesis have been submitted and until all keys have been returned.
3. **Rights to lend and reproduce the thesis.** Unless there is a specific arrangement to the contrary, the university will allow the thesis to be consulted or borrowed or to be used in whole or in part in photocopied or microfilmed form.

PAPER AND TYPING

1. A good bond paper must be used for all copies of the thesis. The size of paper must be 8 1/2 x 11 inches, except for drawings and maps, on which no restriction is placed. A margin of 1 1/2 inches must be left on the left-hand side of all bound pages, and margins of 1/2 inch on the other three sides.
2. The title page should bear the title of the thesis and the candidate's name as registered at Brock.
3. All typing and other costs of preparing the thesis are the responsibility of the student. All theses must be typed. Copies of laser-printed theses are acceptable; dot matrix print type is unacceptable. Students are **not permitted** to use the departmental laser printer for printing. Students registered in 4F90/91 or 4F92 may use the departmental photocopier (copier touch key available through the print shop), but students are **not permitted** to use the photocopier for the duplication of their thesis.
4. All typing must be double-spaced; tables and references may be single-spaced.
5. Only right-hand pages should be numbered. These should be numbered in one continuous sequence in Arabic numerals from one onwards. This sequence should include everything bound in the volume.

6. Photographic and other illustrations should be securely fixed by dry-mounting. "Photograph album pockets" or slits in the pages are not acceptable. Under no circumstances should Scotch-tape or a similar material be used for any purpose in a copy of the thesis.
7. Material not bound in the thesis should be placed in an adequately guarded pocket at the end of the thesis. Such material should bear the candidate's name, initials and degree.

FORMAT

A. Preliminary Pages

1. **The first page.** The first page must be a blank, unnumbered sheet.
2. **Title page.** The form of the title page must follow the sample shown at the end of these instructions. It must state the full title of the thesis, the candidate's name in full, the degree expected, the title of the department and the year of submission.
3. **Abstract.** The abstract should be a summary of the thesis outlining the problem, the methods of investigation, the main results and the general conclusions. It should not normally exceed 300 words.
4. **Acknowledgments.** This section should be a brief acknowledgment of assistance given to the candidate during the research and writing.
5. **Table of Contents.** This should set forth all the principal topics or subdivisions of the thesis.
6. **List of Tables.**
7. **List of Illustrations.** This should include separate lists of all figures, plates, and maps.

B. Text

Although the following sections may not be applicable to all theses, they are offered as a guide.

1. **Introduction and Literature Review (combined or separate sections).** The introduction to a thesis should normally present the purpose, methods and scope of the study together with a survey of the literature pertaining to the subject of the investigation.
2. **Methods.** This section should present a detailed account of all methods used in the investigation.
3. **Results.** All results to be presented in the thesis must be given in this section together with any explanations that are necessary.
4. Each **Figure number and legend** should appear on the same page as the Figure and be placed under the Figure at the bottom of the page.
5. **Discussion and Conclusions.** A discussion of the results obtained in the investigation and a summary of the candidate's conclusions should be given in one final section, or may be presented in two separate sections.
6. **Footnotes.** The extensive use of footnotes is not acceptable, but where such additions to the text are considered necessary, they should be placed at the bottom of the appropriate page. A consistent style for footnotes, approved by the major department, must be followed throughout the thesis.

C. Literature Cited

The **Literature Cited** is a very important part of a thesis and care should be given to its preparation. The general form of each citation and the method of abbreviating names of periodicals should be the same as that used in an appropriate journal recommended by the supervisor.

The usually followed mode of referencing is that known as the name-and-year system outlined in the Literature Cited subsection of the *Style Manual for Biological Journals*, one copy of which is available from the departmental secretary.

Formats recommended for the three most commonly used citation types are outlined below:

1. Journal Article

Surname of senior author, initials of senior author (if two authors), and, initials of junior author, surname of junior author (if three authors), comma, initials of second author, surname of second author, and, initials of third author, surname of third author, period, date, period, title of journal article (capitalize first word and proper names only), period, abbreviated journal title, period, volume number, colon, first page number of article, hyphen, last page number of article, period.

2. Book

Author(s) as above, period, date, period, title (capitalize first word and proper names only), period, publisher, comma, place (city) of publication, period, last page number, period.

3. Part of Book

Author(s) as above, period, date, period, title of section (capitalize first word only), comma, p, period, first page of section, hyphen, last page of section, period, In (italicized), initials of author or editor of book, surname of author, comma, title of book (capitalize first word only), period, publisher, comma, place of publication, period.

D. Appendices

Appendix pages are numbered in chronological sequence following the last page of the Literature Cited section of the thesis. Appendices can be used to present material accessory to the argument of the text. These may be of such nature as not to form integral parts of the text. Such material as extensive tables, mathematical developments, and additional experiments may well form appendices. Each topic shall form a separate appendix, which must be identified by an upper case Roman letter. References used in appendices will not be included in the list of references, but should appear as a separate section at the end of the Appendix.

E. Last Page

The last page should be a blank, unnumbered sheet.

These instructions serve as a guide to the principal points to be kept in mind when organizing the thesis. It is the responsibility of the thesis supervisor to ensure that details not considered here (e.g., colouring of illustrations, quality of photographic plates, etc.) are discussed and clarified with the student.

(SAMPLE TITLE PAGE)

Nest Site Selection in Common Terns

Miriam Helen Richards

Department of Biological Sciences

(Submitted in partial fulfillment of the requirements
for the degree of Bachelor of Science - Honours)

Brock University

St. Catharines, Ontario

December 1982