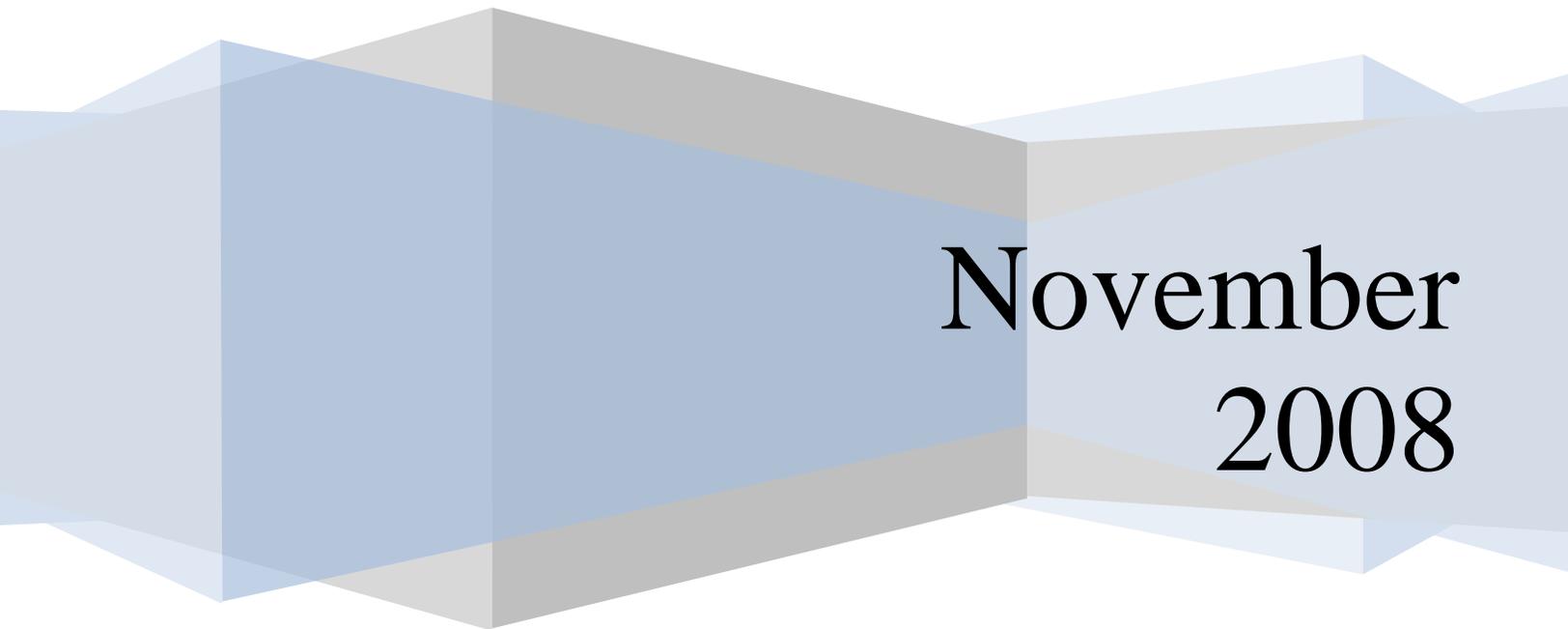


**Brock University**

# **CENTRE FOR NEUROSCIENCE**

**Guidelines of NEUR 4F90 -- Honours Thesis and  
NEUR 4F91 – Literature Research and Seminar**



**November  
2008**

**BROCK UNIVERSITY**  
**Centre for Neuroscience**

**GUIDELINES FOR HONOURS THESIS PROJECTS**  
**NEUR 4F90/4F91**

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**Part One**

**1. ADMISSION OF STUDENTS TO NEUR 4F90/4F91**

- (a) All students registering for NEUR 4F90 must also register for NEUR 4F91 at the same time.
- (b) Admission of students to the 4F90/4F91 program will normally require the achievement of an overall 70% (B) major average in Neuroscience. However, preference for admission will be given to students whose major average is 75% or greater. Students eligible for admission on this basis will be notified by the 4F90/4F91 Coordinator during the summer months. The 4F90/4F91 Coordinator will attempt to accommodate all students who wish to enroll in the 4F90/4F91 program.
- (c) Year IV students who do not meet the above standard may be admitted to NEUR 4F90/4F91 at the discretion of the 4F90/4F91 Coordinator and the supervising faculty member, to the extent that space and facilities permit.

- (d) Students will be supervised by faculty listed as participants in the Neuroscience Program. Other faculty members may act as co-supervisors, provided this is agreeable to the Director of the Centre for Neuroscience.
- (e) Every faculty member has the right to not accept a student for supervision, depending on time or resource constraints or compatibility of research interests.
- (f) A 4F90/4F91 student shall not normally be paid by the supervisor for work done towards the thesis.
- (g) Faculty will not normally supervise NEUR 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 illustrating 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) The supervisor will advise the student regarding the University's policy on ownership of student-created intellectual property. This policy will be discussed, so that the student understands it, and the required form will be completed and forwarded to the Centre for Neuroscience before the student's experimentation begins.
- (c) 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.
- (d) 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.

- (e) 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 submission.
- (f) A most important part of the learning experience of these courses is data analysis, interpretation of results and the integration of these into the current scientific 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.
- (g) The duties of the supervisor cease with the final submission of the thesis, when he or she reverts to membership of the examining committee.

**N. B.:** When NEUR 4F90/4F91 is taken during the September – April period, no thesis investigation will normally be initiated before commencement of the Fall term. Students may carry out projects in the laboratories of faculty members for whom they have worked as summer research assistants but will not normally 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 two committees: an advisory committee and an examination committee.

- (a) **Advisory Committee:** The 4F90/4F91 Coordinator will strike an Advisory Committee for each student. This will consist of the supervisor of the project and one other faculty member in the Centre for neuroscience who has some knowledge of the area in which the project is to be conducted. The Advisory 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 seminar of each student, as outlines in Section 3 and will assist in problem organization, data evaluation, etc.
- (b) **Examination Committee:** Upon submission of the thesis in final form (two copies), the duties of the Advisory committee as such will cease. The 4F90/4F91 coordinator will then appoint an Examination Committee. This will normally consist of at least two members (including the Supervisor), and can include the other member of the original Advisory Committee. One member, who may **not** be the Supervisor, will serve as the Chair of the committee. The Examination Committee will examine and evaluate the thesis. 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 4F90/4F91 Coordinator.

### 3. SCHEDULE AND DEADLINES

#### **Schedule:**

- (a) Each member of the Centre for Neuroscience is expected to participate in the NEUR 4F90/4F91 program and will indicate to the Neuroscience Coordinators 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 on the Neuroscience website. A general meeting of all interested prospective honours students in all three streams 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.
- (b) Each student participating in the program will be required to make his/her arrangements with a supervisor, and to register these with the 4F90/4F91 Coordinator no later than one week following the commencement of the Fall term.
- (c) Each student will be required to meet formally with the supervisory Committee twice during the course:
  - (1) The initial meeting will be scheduled during the first term (or equivalent, see Section 4). The student will describe the nature of the problem and the proposed design of the study. The principal goal will be to provide for committee input.
  - (2) The final meeting involves a seminar and defense and will normally be held within a three-week period after final submission of the thesis. The student will be expected to outline the problem, its background, the design of the study and results obtained and to discuss the conclusions. This will not exceed 40 minutes. A defence of the thesis will follow in closed session with the examining committee. The total session should not exceed 90 minutes.

#### **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 should occur at least three weeks before final submission. This should allow sufficient time for revisions and final submission.
- (c) For the September - April period, the deadline for final submission of the thesis (two copies) to the 4F90/4F91 Coordinator should be no later than 7 to 10 days after the last day of classes in April for those wishing to participate in the Spring convocation. This deadline can be extended to August for those not requiring to convocate until the fall. In this instance, the thesis deadline will normally be the 15<sup>th</sup> of August. However,

it is CRUCIAL that the student seek permission to extend this deadline date with BOTH their supervisor and committee member, AS WELL AS with the 4F90/91 Coordinator, at least one month prior to the normal submission date.

Once submitted, no further revisions will be permitted. This copy is to be graded, as submitted, by the Examination 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, the Director of the Centre for Neuroscience, in consultation with the 4F90/4F91 Supervisor and Coordinator, exercises discretionary powers. There are no predetermined penalties. Penalties are determined on an individual, case by case basis.

#### **4. NEUR 4F90/4F91 TAKEN OUTSIDE THE NORMAL ACADEMIC YEAR**

NEUR 4F90/4F91 may also be taken either during the Winter (January to August) or Spring (May to December) terms. All regulations apply with the exceptions of deadlines noted below. In the case of the Winter term, students would begin on January 1st and submit the thesis by August 7th or, if a weekend, on the following Monday. Spring term students would begin on May 1st and submit their thesis by the last day of classes in the Fall term. The final seminar and oral defence will normally take place in a 90 minute period within two weeks of the submission date of all theses.

#### **5. EVALUATION**

- (a) Two copies of the thesis must be submitted for examination.
- (b) Theses must be submitted in final form on the last day of classes in December or April or early August if started in January 1<sup>st</sup> (see Section 4). An examining committee of at least two faculty members will grade the thesis on research quality and performance (50% of 4F90) and Library Research and communication (50% of 4F91).
- (c) Seminar presentations with a question period thereafter will normally be held within a three-week period after submission of the thesis. The total time for the seminar and this question period will not exceed 40 minutes.
- (d) A closed oral defence with the student and examining committee will be held as soon as is practical after the seminar presentation, usually immediately. 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 30% of 4F90 (Research Quality & Performance) and 30% of 4F91 (Communication) will be assigned to the seminar presentation and defence.
- (e) The total time for the seminar and oral defense should not exceed 90 minutes.

- (f) A grade of 20% for 4F90 and 4F91 will be assigned based on the supervisor's overall evaluation of the student through the entire duration of the course.
- (g) Marks assigned to the seminar and the defence, as well as the evaluation grades from the supervisor are to be registered, in writing, with the Chair of the Examination Committee immediately following termination of the final defence of the thesis. The marks assigned by individual committee members for the Thesis and Final Seminar and Defence will have equal weight.

<b>NEUR 4F90/4F91 FINAL MARK ALLOCATION</b>			
	Supervisor	Committee Member	Totals
<b>Thesis</b>	25%	25%	50%
<b>Final Seminar &amp; Defence</b>	15%	15%	30%
<b>Supervisory Assessment</b>	20%	--	30%
<b>Total</b>			100%

- (h) For purposes of transmission to the Registrar, two final grades will be assigned, one for NEUR 4F90 and one for NEUR 4F91.
- (i) The mark assigned for NEUR 4F90 will reflect the research quality of the thesis document and should be based on the material in the thesis document, the student's performance on the research project, the writing of the thesis and the defence of the thesis during examination. The mark assigned for NEUR 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.
- (j) The 4F90/4F91 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 4F90/4F91 Coordinator should attempt to arrive at some acceptable consensus.

All grades, including the individual mark assignments of committee members, must be returned to the 4F90/4F91 Coordinator.

Prior to submission of the final grades for NEUR 4F90 and 4F91, the results will be reviewed by the 4F90/4F91 Coordinator and the members of the Centre for Neuroscience.

- (k) Final grades will not be transmitted to the Registrar until one corrected copy of the thesis has been received by the 4F90/4F91 Coordinator.
- (l) **Disposition of theses:** The student must deposit **one unbound, corrected and approved copy** of the thesis with the Administrative Assistant to be professionally bound (hard cover). The Centre will pay for the binding of this copy and the copy will be retained by the Centre. The student **must also provide one bound or unbound**

**copy, corrected and approved** to the Administrative Assistant to be forwarded to the Supervisor. Students wishing to have further copies professionally bound (hard cover) may submit them to the Administrative Assistant and arrange for payment at the time of submission.

## 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 Conclusion
- (i) Literature Cited
- (j) Appendices

## 7. BUDGET AND SUPPLIES

- (a) A budget for materials and supplies will be supplied by the supervisor's home department, provided that sufficient funds are available.
- (b) A withdrawal record sheet will be maintained for each project in Science 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 Director.
- (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. APPEALS**

It is recognized that under some circumstances students may wish to appeal a final grade. In such instances, the Director for the Centre for Neuroscience will appoint an ad hoc committee to deal with the appeal.

## **9. GRADUATION**

Students intending to graduate at the Spring Convocation must complete an "application by March 1st. And, 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.

November, 2008

## Part Two

### BROCK UNIVERSITY Centre for Neuroscience

#### INSTRUCTIONS FOR THE PREPARATION AND SUBMISSION OF NEUR 4F90/4F91 BSc (HONOURS) THESES

A student submitting a BSc (Honours) thesis for degree credit must ultimately submit three copies of his/her approved thesis to the administrative assistant of the Centre of Neuroscience 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.** At least two copies of the thesis must be prepared. The two copies shall be submitted in an unbound form to the 4F90/4F91 Coordinator 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.
2. **Faculty approval and disposition of the thesis after the thesis defence.** When the thesis is approved by the examining committee, the candidate shall submit two unbound copies of the approved thesis to the administrative assistant of the Centre no later than seven days after the final date of scheduled exams. The Centre will pay to have one copy professionally bound and this copy will be retained by the Centre. The second copy will be forwarded to the Supervisor either bound or unbound per the student's choice. 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. Any student that does not submit the final copies for binding on time will receive an "Incomplete" grade for 4F90 and 4F91 or 4F92. 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. It should also indicate the supervisor or co-supervisors.
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 departmental laser printers for printing. Students registered in 4F90/91 or 4F92 may use departmental photocopiers (copier touch key available through the print shop) to help complete the thesis work. However, students are not permitted to use departmental photocopiers for the duplication of their theses.
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 supervisor or co-supervisors, 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. Students should follow a format appropriate to the Supervisor's department.

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. A consistent style for footnotes, approved by the Centre for Neuroscience, 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.

For theses in neurobiology, the most commonly used mode of referencing is that known as the name-and-year system. This is outlined in the Literature Cited subsection of the Style Manual for Biological Journals, one copy of which is available in

the office of the Department of Biological Sciences. For theses in neuropsychology, the APA format shall be used.

**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.

**4. 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.

**5. 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)

A comparison of neuronal variation in timing at 3 levels of functioning.

Jennifer Hallam

Neuroscience

(Co-Supervisors: A. J. Mercier and S. Segalowitz)

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

Brock University

St. Catharines, Ontario

April, 2006