Computer Science

Honours Handbook

Department of Computer Science

Memorial University
St. John's, NL
Canada

Contents

Introduction

The Honours program is designed to offer undergraduate students exposure to scientific research in Computer Science. It is primarily intended for students who feel that research experience will be a valuable asset in the pursuit of their career goals, such as academic studies at the graduate level (MSc and PhD), or professional postgraduate programs (e.g. medical school, etc.).

All Honours candidates in the Department of Computer Science complete the Honours Dissertation courses (COMP 499A/B) over two successive semesters. These should be completed during the final two semesters of the student's program. The Honours Dissertation courses are different than typical undergraduate courses in that they do not involve classroom time, and the majority of coursework involves self-directed and supervised research. The time commitment for each of these courses is approximately equal to a regular 4000-level computer science course.

With the mentorship of a supervisor, Honours candidates work on an independent research project that demonstrates their competence in computer science. The research project and the type of work required from the Honours student will depend on the supervisor. Students can be involved at any (or all) stages, including researching the literature and developing the methodologies; collecting, analyzing and presenting data; writing code; interpreting the results and determining the significance of the findings. The process culminates in a written thesis and a departmental presentation, which aim to familiarize candidates with key aspects of a researcher's toolkit. Publication of the results in a peer-reviewed scientific journal can sometimes be achieved in the longer term, which is a rewarding experience for students.

The Computer Science department's primary faculty and cross-appointees have a broad range of expertise, within which Honours candidates can find a diversity of research topics in computer science, including but not limited to autonomous robots, bioinformatics, cloud computing, complexity theory, data visualization, human-machine interaction, human-robot interaction, interactive 3D graphics, machine learning, networking, spatiotemporal data enrichment, and tactile sensing.

The present guidelines have been developed to help undergraduate students prepare for, undertake and successfully complete their Honours program in the Department of Computer Science. Supervisors are also encouraged to consult this handbook in order to provide informed guidance.

Honours program overview

Inquiries about the Honours program are welcome at any time. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Academic Program Manager (cs-ugradadv@mun.ca) at the earliest opportunity to ensure they complete the appropriate prerequisites, meet the admission requirements, and stay on track for Honours standings.

The Honours program includes additional courses at the 3000- and 4000- level, as well as mandatory completion of COMP 499A/B, which are courses consisting of supervised research leading to the submission and presentation of a thesis. Prospective candidates should familiarize themselves with the requirements of the Faculty of Science Honours degree, and with the Computer Science Honours programs.

Admission

Students who would like to be considered for admission to the Honours program must submit an Application for Honours Program to the Academic Program Manager (cs-ugradadv@mun.ca).

Eligibility

In order to be admitted to the Honours program, students must:

- be enrolled in one of the Major programs offered by the Department of Computer Science
- have completed all Computer Science core courses (1001, 1002, 1003, 2001, 2002, 2003, 2004, 2005, 2006, 2007, and 2008)
- obtained in the core courses a grade of "B" or better, or an average of 75% or higher.

Responsibilities

Student Responsibilities

To manage your progress it's important that you make yourself aware of project and course deadlines, and discuss and plan with your supervisor accordingly.

Students are responsible for making regular appointments with their supervisors for consultation and advice on all aspects of course work (proposal, presentations, thesis writing).

Thesis documents are likely to undergo multiple revisions before the final submission, students are responsible for submitting work to their supervisor with adequate time to review.

Faculty Responsibilities

Supervisors are responsible for being available for regular meetings and consultations with their students.

Supervisors should review and provide feedback on all required work (proposal, presentations, thesis writing) in a timely manner. Meanwhile, students should be aware that faculty members have a wide range of other commitments. Draft documents may be reviewed by the supervisor but will need to be submitted sufficiently far in advance of any deadline.

Supervisors must submit grades to the Departmental Office.

Finding a Supervisor

Once you have been accepted into the Computer Science Honours Program, you will need to find an honours supervisor. Students should approach and secure a supervisor at least one month before the start of semester. Ideally by the start of December, April and August for Winter, Spring and Fall semester start respectively. Once a supervisor has been secured, students should email cs-ugradadv@mun.ca to be given permission to enroll in COMP 499A.

Who can be your supervisor (and co-supervisor)

The supervisor will normally be a faculty member in the Department of Computer Science, or a researcher who holds a current cross-appointment or has official adjunct status with the Department. Occasionally, faculty members from other units (e.g. Biology, Math) may also be supervisors or co-supervisors where the research topic warrants it. In cases where a supervisor is external to the Department a co-supervisor from within the Department of Computer Science must also be established.

How to find a supervisor

Students are responsible for approaching potential supervisors. Some ways students can determine which supervisor would be suitable for them include:

- looking up research interests and websites of faculty members
- volunteering in a prospective supervisor's research lab may help students get a feel for a prospective supervisor's research topics and lab environment
- the Academic Program Manager can be consulted to help identify a suitable supervisor.

Once a student has identified a potential supervisor the student should approach the prospective supervisor directly via email or in person. An email from the supervisor to the Academic Program Manager is required for enrolment in COMP 499A/B.

Developing your Research Project

Overview

The Honours program is a good prelude to graduate school (MSc and PhD programs) since it provides a full introduction to research. Honours candidates are therefore expected to have a high degree of independence and autonomy with respect to their research projects. The relationship that the student develops with their supervisor is key to success. Regarding the research topic, sometimes a student has an idea for their topic, sometimes a supervisor already has a research topic in mind for an honours student, and sometimes the student and supervisor come up with a topic together.

Under the guidance of the supervisor, the candidate is responsible for undertaking all steps of the project, as outlined below.

- A project normally starts with identifying a main goal and possibly several specific objectives, which involves formulating research questions, hypotheses and/or predictions.
- A thorough literature search on the topic of the project is often undertaken.
- Where appropriate, methods to address the objectives are developed in order to collect and/or analyze data.
- Where appropriate, data are subsequently explored using comparative analyses, tables, figures and/or statistical tools.
- Finally, the results are interpreted by comparing them to published findings, and the significance of the research is highlighted.
- All appropriate elements from above should ultimately be presented in the thesis and in the presentation.

Research skills will be learned throughout the Honours program, particularly during the thesis project under the mentorship of the supervisor. If a student has questions about a particular methodology needed, the onus is on the student to talk with the supervisor and/or with labmates, staff and faculty members to find the answers. Similarly, the honours student is expected to be self-directed and seek information from the library or online, in books and in scientific journals. In essence, the student must take ownership of the research experience under the wing of a supervising professor.

Expectations and timeline

Students should register for 499/B during the last two semesters in their program. Students must have secured a supervisor and chosen a thesis topic before they will be given permission to register.

First semester of Honours Project (499A)

COMP 499A is graded with PAS/FAL and is worth 0 credit hours. There are no classes as part of this course, rather, it consists mainly of self-directed and supervised research. Students and supervisors should meet on a regular basis while the student is enrolled in 499A, and the student should be progressing with their research and thesis writing.

As part of this course, students will submit a Research Proposal. The Research Proposal is a short specification of your proposed thesis work and should be written in consultation with your thesis supervisor, it should provide a broad summary of the work you propose to do as your Honours Research Project.

The Research Proposal should include, where appropriate:

1. A short Introduction providing a background outlining the rationale of your research
2. The Research Question and Hypothesis
3. Procedures: a summary of the proposed methods and procedures
4. Time-line: anticipated time to complete research and final thesis

Second semester of Honours Project (499B)

COMP 499B is graded with a letter grade (A, B, C, D, F) and is worth 6 credit hours. Deliverables for this course include:

- 10 - 20 minute presentation
- final thesis

The final thesis is due before classes end for the semester. If a legitimate reason (e.g., medical) exists that you cannot meet the deadline requirements, you can apply for an extension. Application for extension should be submitted to the Academic Program

Manager (cs-ugradadv@mun.ca), should include documentation (e.g., medical, bereavement) and be accompanied with a letter from the supervisor.

Students are required to do a 10 - 20-minute presentation that includes an overview of the student's research question, hypothesis, methods, results and discussion.

Writing Your Thesis

General layout

The following guidelines for the preparation of the Honours thesis are adapted from the regulations for preparing MSc and PhD theses at Memorial. The thesis should roughly follow the standard format of a scientific report or journal publication.

Supervisors and students should discuss the nature of the thesis structure. It should be made clear if any aspect of the study was conducted by other investigators (e.g. labmates, collaborators). Overall, a typical thesis should normally be between 30 – 60 pages of text, including references, but excluding figures, tables and appendices.

The following elements should be included in the thesis:

1. Title page
2. Abstract
3. Acknowledgements
4. Table of Contents
5. List of Tables
6. List of Figures
7. Main text
8. References
9. Endnotes
10. Appendices

Title page

The title page contains the information used to identify the thesis, including the project title, student's name, type of document (e.g. "a thesis submitted to the Department of Computer Science in partial fulfilment of the requirements for a Bachelor of Science/Arts degree with Honours in Computer Science"), and date. In choosing a title, students should keep in mind that it is a valuable scholarly reference

and will often be the only information that a prospective user of the thesis will have available. Care should be taken, therefore, to ensure that the title describes the contents of the thesis as accurately as possible and contains electronically searchable keywords. The title page contains no header and is not numbered.

Abstract

The abstract should summarize the importance of the thesis topic, the general method followed and results and conclusions. It can be longer than an APA style abstract but should not exceed one page.

Acknowledgments

Intellectual contribution, technical/practical assistance, advice, encouragement and sources of monetary support should be acknowledged. Students should strive not to omit any major contributors to the success of their project and the writing of their thesis.

Table of Contents

Each heading and subheading listed in the table of contents must appear in the text of the thesis, and vice versa. The initial page number for each section and subdivision should be shown.

Lists of Tables, Figures and Appendices

Lists of tables, figures and appendices must follow the table of contents if such elements are incorporated in the thesis. Each list should appear on a separate page with the appropriate page numbers. Word processors and LaTeX have useful tools for inserting and updating lists of tables and figures.

Main Text

The general text of the thesis should be double-spaced (including table captions) in portrait format using a 12-point font. For drafts, both sides of the page can be used. Figures and tables can be in the text or at the end.

Computer science projects can differ significantly in their structure depending on whether they are experimental or theoretical. Depending on the project, the following elements could be included in the main text:

Introduction

The Introduction places the research into the larger context of the discipline; and sets out the objectives of the thesis (including research questions, hypotheses and predictions).

Literature review

Depending on the project, the literature review related to the topic of study may be brief or it could be very comprehensive. If the literature review is sufficiently brief, it may be included as part of the Introduction and this section can be omitted.

Material and methods

This section describes the steps involved in the investigation, as well as the specific protocols and the materials used. It should be sufficiently detailed that anyone could read this section and duplicate the procedures. Where appropriate, it is helpful to provide a diagram to illustrate an experimental setup or a table to list the different experimental conditions.

Results

This section outlines the data and presents results obtained during the study or experiments, typically using Tables and/or Figures to support the descriptions in the text. It should keep to the facts, and should not include any interpretation of what the results might mean.

Discussion

This section is used to explain and interpret the data, and determine whether or not a hypothesis was verified or a question was answered. It should emphasize the significance of the results in a broader context and compare them to previous accounts of a similar nature. This is also where any mistakes and limitations may be acknowledged. Typically, the Discussion ends with a conclusion, which is a concise paragraph that sums up the key findings and what they mean.

References

Bibliographical format should be appropriate to the discipline and should use a consistent style. Bibliographic data must be complete, clear and exact, and must give

sufficient information to enable readers to locate the references. The most recent APA format should be used. The MUN Library has an extensive collection of online guides.

Appendices

Appendices are normally included to provide information that would detract from the readability of the main body of the text or to present data or information used in the thesis but not directly obtained by the thesis author. For example: lengthy tables (e.g. www.mun.ca/osc/ 13 large data sets), tabulated statistical results, detailed explanation of methods or procedures, links to videos or websites, mathematical or technical descriptions (e.g. codes, formulas).

Format

Page Numbering. Use APA rules for page numbering. The introduction begins on page 1. All pages prior to the introduction are in roman numerals.

All pages are double-spaced.

Margins:

Left = 1.5 inches

Top/bottom = 1.25 (minimum)

Right = 1.0 inches

Other questions about style and form are to be decided with your supervisor. For example, each figure and table must go on a separate page, but whether you put all figures and tables at the end of the thesis or next to the text page in which they are referenced is up to you and your supervisor.

Guidelines for APA style can be found here:

http://www.apastyle.org/

See Appendix 1 for a thesis template

Submission

The thesis is due before classes end for the semester. On or before this due date students are required to submit a copy of the final version of their thesis to their supervisor. Supervisors will check thesis references and read the thesis for content and typos. The supervisor will then send the student an e-mail indicating whether the student is required to correct typographic errors, incorrect references, and make minor editorial changes; however, no major re-writing is permitted. After the student has made the requested changes, they should send a copy of the updated thesis to their supervisor, and send a copy of the thesis with the signed release form to the Academic Program Manager (cs-ugradadv@mun.ca).

Copyright and Plagiarism

Plagiarism is a serious academic offence and will be handled accordingly. When you are reviewing literature, and using sources (including published works, internet or any other resource), you must properly cite the material. This holds if you are referencing a quote, paraphrasing material or presenting thoughts or ideas from other sources. It is also considered plagiarism to present or rephrase ideas of any other author presenting them as your own.

Self-plagiarism is a form of plagiarism. Submitting your old work (e.g., portions of papers or assignments from other classes) as new is a form of plagiarism if not properly referenced. There are few circumstances where it would be appropriate to include your past work, but if you feel it is necessary to include the material, you must acquire permission to do so.

In all cases references MUST include proper citation in APA format.

Academic Dishonesty

Students are expected to conduct themselves with **academic integrity** in this, and all other courses. Students are expected to familiarize themselves with the regulations of Academic Misconduct (see the University Calendar: http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748).

All work is expected to be your own work.

Evaluation

Your final grade will be submitted when the corrected final version of your thesis has been submitted to your supervisor and the Academic Program Manager, and the signed release form has been sent to the Academic Program Manager.

499A

Students will receive a Pass/Fail based on the completion of a research proposal (at the beginning of the semester), and the submission of an Introduction and Method (at the end of the semester).

499B

Students will receive a letter grade based on:

- research/discussions/work with supervisor during the term (40%)
- final presentation (25%)
- final report (35%)

Appendix

1 Thesis Template

<TITLE>

<AUTHOR>

Department of Computer Science

Memorial University

Supervised by <SUPERVISOR>

A dissertation submitted to the Department of Computer Science
in partial fulfillment of the requirements for the degree of
Bachelor of Science (Honours) in Computer Science

<MONTH YEAR>

Abstract

The abstract should summarize the importance of your topic, your general method and results and conclusions. It can be longer than an APA style abstract but should not exceed one page.

Acknowledgements

- Thank you to my supervisor, <NAME>, for their advice and guidance through this research and helping to make this dissertation possible.
- I would also like to thank <NAME> for their guidance and support.

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Table of Contents

List of Tables

List of Figures

Introduction

Heading

Text

Background

Heading

Text

Subheading

Text

Table 0-1 SAMPLE TABLE

COLUMN1	COLUMN2	COLUMN3

CAPTION: TEXT

Methodology

Heading

Text

Figure 0-1: SAMPLE FIGURE

Subheading

Text

Results and Discussion

Table 0-1: SAMPLE TABLE

COLUMN1	COLUMN2	COLUMN3	COLUMN4	COLUMN5	COLUMN6

Heading

Text

Conclusion

Text

References

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

Author, A. A., & Author, B. B. (Year of publication). Title of chapter. In A. Editor and B. Editor (Eds.), *Title of book* (pages of chapter). Location: Publisher.

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical, volume number*, pages.