

Honours Research Project Manual

MICI 4900X/Y

2014 – 2015

Information for Students
and Supervisors

Department of Microbiology and Immunology

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WELCOME TO MICI 4900!!

The purpose of the Honours Research Project and Thesis is three-fold. First, it will provide you with a genuine research experience within an academic setting so that you may learn how scientific research is actually conducted, in contrast to the controlled environment of the student laboratory where experiments have been rigorously tested and the results are predictable. Second, it will provide you with an opportunity to determine whether you might have an interest in pursuing graduate studies, or perhaps even a research-based career. Finally, you will learn how to read the scientific literature, and possibly create some of your own.

Entry into this course is contingent upon certain minimum grade requirements (see Undergraduate Calendar); in addition, you must identify a faculty member who has agreed to be your supervisor.

**PERMISSION TO REGISTER FOR MICI 4900X/Y (or MICI 4901/4902)* WILL BE GRANTED
BY ONLY THE MICROBIOLOGY & IMMUNOLOGY HONOURS COORDINATOR**

* MICI 4901/4902 is designed for those co-op students who are carrying out their research project over a non-standard time frame (see VIII).

I. RESPONSIBILITIES: STUDENTS

MICI 4900 is a full credit course. However, it is by no means a typical course, and so expectations are different. Specifically:

- Make sure that you and your supervisor are clear on what is expected of you.
- From time to time, class meetings will be scheduled by the Honours Coordinator; your attendance is expected.
- After an appropriate period of training, you will take control of your own research project, in which you will not only invest time and energy, you will also make an intellectual contribution. You are, after all, now part of a team, and the project you are working on will likely be an integral part of a larger research thrust. In that regard, you will almost certainly be asked to participate in lab meetings. You should plan on spending the equivalent of at least two afternoons per week in the laboratory.
- Should you experience any serious problems with your project (or your supervisor), you should arrange to discuss this as soon as possible with the Honours Coordinator.
- Budget your time! Don't leave things to the last minute
- Treat the **Winter Report** (see III) as a serious assignment. This is your chance to get detailed feedback on your writing; accordingly, respond to advice and get a revised draft back to your supervisor within as short a period as possible.
- The **Honours Oral Presentation** (see IV) is designed to closely mimic what actually happens at a scientific meeting, and so is a very useful experience. You should plan to practice your talk at a lab meeting, and do so well in advance so that you have plenty of time to incorporate any necessary changes.
- Your **Honours Thesis** (see V) is a major body of work; to the extent possible, you should work on it as you progress through the academic year. The Materials and Methods and References sections can be developed from the very beginning. Figures for the Results section should be generated as data are obtained.

II. RESPONSIBILITIES: SUPERVISORS

Supervising an Honours student is a major responsibility; taking on more than one student is even more so...normally, you are limited to 2 students. Accordingly:

- Take care in choosing projects for your students. Students are expected to break new ground, but they are not expected to develop technology (or materials) that are new to your lab; in other words, the project should be do-able.
- Make sure that what you expect from your student(s) is clearly explained, and fully understood. While doing this, be reasonable in your expectations: remember that MIC1 4900 is just one course, out of a typical load of 5. If problems arise, discuss them with the Honours Coordinator sooner rather than later.
- In larger labs, day-to-day supervision may be assigned to a senior graduate student or postdoctoral fellow; however, the Principal Investigator is ultimately responsible for oversight.
- You should encourage your students to participate fully in all lab activities, including routine lab meetings.
- Re: the **Winter Report** (see III): You (not the grad student or postdoc supervisor) are required to provide detailed feedback, a copy of which goes to both the student and the Honours Coordinator; if necessary, look at any additional drafts submitted by the student.
- Re: the **Honours Oral Presentation**: You should insist on a trial run in advance, so that necessary changes can be made. It is your duty, as a member of this Department, to attend as many presentations as possible, not just those of immediate interest to you.
- Re: the **Honours Thesis**: You are expected to help the student in the initial stages of writing but not write the thesis yourself. One suggestion is to take a poorly written paragraph or two and sit down with the student to show them how the paragraph could be improved. The student could then incorporate your suggestions in writing the remainder of the thesis.
- You are expected to assist in departmental **theses** grading, and not just of those emerging from your own lab.
- In grading theses from other labs, understand that you are *not* evaluating productivity (that is for supervisors only to do, and only if deemed necessary); you are grading the thesis as an example of scientific communication. So, ask yourself: is it well-written; easy to follow; does the discussion have some depth? And so on.
- Inform the Honours Coordinator of any advantage your student may have had (e.g., perhaps your student was able to work in your lab the previous summer).

III. WINTER REPORT

The main purposes of this report are to ensure you are thinking about the implications of your research and to get you started on writing a scientific document that you will expand upon to write your thesis. It will also give your supervisor an opportunity to provide some early feedback on your writing. To that end, you are asked to provide 6-10 pages of text (double-spaced), focusing on the Introduction, in which you will attempt to identify some knowledge gaps in the field, thus providing a rationale for your thesis project; in so doing, you will get into some of the scientific literature relevant to your work. *In addition to* the above, include one figure with a legend, from results obtained thus far, plus a few references (one page max.) Format according to EMBO Journal submission instructions. Supervisors are expected to provide detailed feedback in a timely fashion, and should expect to see (and discuss) a revised draft from you within a few days.

The Report is part of the 21st credit awarded to Honours students, and, like other elements of that item, will be graded pass/fail. In order for us to be able to record that you have completed this assignment, submit a copy of your revised draft to the Honours Coordinator (see VI). If for any reason your supervisor is unable to help you with this, the Honours Coordinator will assign another reader.

IV. HONOURS ORAL PRESENTATION

At the end of March, all the Honours students will present a short talk on their research. Each student will talk for 10-12 minutes, leaving 3-5 minutes for follow-up questions. Since the talk is short, you will need to plan your presentation carefully: you will *not* be allowed to go overtime! Make sure you do a trial run, well in advance, with your labmates and supervisor. They should provide you with constructive criticism and suggestions to improve your seminar. You will be expected to present a reasonable body of work, and be able to answer questions of either a theoretical or a technical nature. Concentrate on providing your audience with the following: enough background information so that listeners can appreciate why your work was worth doing; a description of how you carried out your experiments; major results obtained; conclusions.

We encourage students to use PowerPoint (with projection) as their presentation medium, as this works well, and allows last minute changes to be made. Both a computer and a projector will be available. Files will be downloaded onto the computer one day in advance of your presentation. You are permitted to use **ONLY TWO IMAGES** downloaded from the Internet or from your laboratory and **NONE** from textbooks. This rule is to encourage you to become proficient at using drawing software (e.g., Appleworks, Adobe Illustrator, Adobe Photoshop, Isis, etc.). This is an important skill. In addition, by constructing your own diagrams you should be better able to clearly and concisely illustrate your scientific points, present your information in an appropriate size format, and avoid blurred images that often result when figures (e.g., PDFs) are copied from the Internet. For each Internet image exceeding the one allotted, 4% will be deducted from your presentation score.

V. HONOURS THESIS

In general, writing an Honours thesis is a bit like writing a scientific paper, and uses similar sub-headings (listed below). Here's an example of a well-written paper: [EMBO J. 19, 902, 2000](#); note, in particular, the nice flow from one experiment to the next in the Results section. In at least two respects, however, your thesis will likely differ from a research paper: 1) since it may be graded by readers who are not experts in your field, the writing will need to be accessible to a general audience (avoid the use of esoteric jargon!) and, 2) more detail may be required in the Materials and Methods section. Our best advice would be for you to take a good look at theses that have emerged from your lab. The Departmental library, in room 7-C3, has many Honours theses that you can peruse.

Typically, the body of the thesis (**text** of the Intro, Results and Discussion) should be 15-20 pages in length; Figures and Tables are not included in this page count. You are to use a font size of 12, 2.5cm margins all around, and line spacing of 1.5 throughout, except for 1.0 for the References section. Your report should be assembled with the following chapters, each beginning on a separate page:

- Title page.
- Table of Contents.
- List of Figures and Tables.
- Abstract (see Appendix B).
- List of Abbreviations.
- Acknowledgments.
- Introduction. The Introduction need not be an exhaustive literature review. It should serve to introduce the aspects of the scientific field that are germane to your research and to familiarize a non-expert scientist with concepts that are crucial to understanding your research. It should provide the reader with a sense of what work has already been done, and what needs to be done going forward. You must provide a rationale for your project (best placed at the end of this section).
- Materials and Methods. All methods need to be described. References for published methods must be included. Those new to the lab, if any, should be described in sufficient detail that someone else could repeat the work.
- Results. Flow is important! Take a look at the example referred to above. Use subheadings. In each subsection introduce the rationale for the experiment, briefly write what you did, and refer to the appropriate Figure that displays the data. Figures and Tables should be interspersed within the text, each on a separate page. If there isn't enough space to put the Figure Legend on the same page as the Figure itself, then place the Legend on the page preceding the Figure.
- Discussion. If you obtained data that move the research forward, talk about the significance of your observations in context of published literature, and about what avenues might now usefully be explored. If on the other hand, you've had difficulty with the data collection or with the techniques you were using, try to identify the cause(s), and suggest ways to resolve things in future work.
- References. The format to be used is the same as that used by the EMBO Journal (this applies to the Winter Report as well).
- Appendices (if any). This is usually reserved for things like complex growth media or

buffer formulations; ask your supervisor about this, if uncertain.

Your supervisor should be given a draft of your Thesis so that s/he may offer constructive criticism. Your supervisor's comments should help you achieve better "scientific style" in your writing and focus your report so that it reads clearly and concisely like many papers found in respected scientific journals. You should note that it is not your supervisor's job to write your report, and you should not give your supervisor a sloppy initial draft expecting him/her to polish it.

- **Note on Research Conducted During the Summer:**

The Honours research experience should not interrupt the flow of research in a Principal Investigator's laboratory. It is best if the student experiences the normal flow of research experiments and logic used to solve a problem. Hence there is no need to interrupt a project during a summer research experience simply to try to separate that work conducted in the summer from that conducted during the academic terms and therefore eligible for inclusion in the Honours Report. However, to be fair to students who have not conducted summer research, the onus is on the Honours supervisor and student to ensure that only research conducted during the academic terms is presented in the report and that **background experimental results obtained during the summer are clearly indicated**

VI. EVALUATION

Winter Report: pass/fail. For a passing grade the report must **twice** be **submitted on time:** the first draft to your supervisor and the revised draft to the Honours Coordinator.

MICI 4900X/Y or MICI 4700X/Y has three components:

- **Oral Presentation:** 10% of final grade, calculated as an average of the grades submitted by Faculty Members in attendance (see Appendix C).
- **Thesis:** from supervisor, 15% and, from each of two readers, 25% of the final grade. In the event of markedly discrepant grades, the Honours Coordinator will grade the thesis or assign a third reader.

The thesis is a work of scientific communication, and so a good grade will be contingent upon clear, thoughtful prose that is relatively free of grammatical errors, spelling mistakes and/or typographical errors. Non-expert readers should, without significant difficulty, be able to follow your train of thought. As a general rule, your thesis will *not* be assessed on the basis of apparent productivity (your supervisor can address that, if he/she feels the need).

- **Laboratory performance:** from supervisor, 25% of the final grade for lab work. This is based on such things as work ethic, intellectual contribution, and so on.

Numerical grades will be rounded up from 0.5 within the intervals between letter grades and will be awarded according to the grade scale established by the Senate of Dalhousie University as follows:

Grades & Percentage Range			
A+	90–100	C+	65–69
A	85–89	C	60–64
A–	80–84	C–	55–59
B+	77–79	D	50–54
B	73–76	F	0–49
B–	70–72		

21st Credit: a Faculty of Science requirement, graded Pass/Fail by this Department. You must meet GPA and individual course grade requirements as specified in the Calendar. In addition, you must submit a satisfactory Winter Report and deliver a satisfactory Oral presentation.

VII. PLAGIARISM

Just don't! The attention of all students is drawn to the University's policy on plagiarism described under "intellectual honesty" in the Undergraduate Calendar.

VIII. CO-OP REGULATIONS

Co-op degree programs require that one academic term be interrupted by a work term; accordingly, a co-op degree takes a minimum 4.5 years to complete. While the majority of co-op students spread their program out over a 5-year period, some will elect to carry out their Honours research over a time frame that is not two consecutive terms; such students enroll in MICI 4901/4902, for both of which a single grade will be submitted. MICI 4901/4902 is evaluated in the same manner as MICI 4900.

Note that co-op students who start their Honours research project in January are required to pass in their "Winter Report" at the end of the second week of classes in the Fall term and their Honours thesis on the last day of classes in the Fall term. In addition, co-op students will give their oral presentation late in November, at a date and time mutually convenient to the student and the Faculty.

IX. IMPORTANT DATES

Date	Comment
Sept 9, 2014	Organizational meeting for MICI 4900. 5pm. Location TBA.
Jan 9, 2015	Email PDF draft copy of the Winter Report is due to the Honours supervisor and the Honours Coordinator by Noon.
Jan 16, 2015	Email PDF copy of the edited Winter Report is due to the Honours Coordinator by 10 am.
Jan 23, 2015	Supervisor and marker must return electronic copy of the Winter Report, with comments, to the Honours Coordinator. Expect to meet with your supervisor between Jan 26 th -30 th to discuss feedback.
Mar 23-25, 2015	Oral presentations will be given during this week.
April 6, 2015	Honours thesis: Three (3) copies of the thesis are due to the Honours Coordinator by 10 am.

If a deadline has been missed because of illness, notify the Honours Coordinator, or Undergraduate Secretary in the Departmental office, within 48 hrs. A medical certificate will be due within one week. Other reasons for missing deadlines are not normally acceptable, unless prearranged with the Coordinator. The Winter Report may receive a grade of F if it is late. The grade for a late Honours thesis will be reduced by 10% per day that it is late (including weekend days).

A few meetings will be held during the year at which various aspects of the Honours Research Projects will be discussed (e.g. scientific writing, seminar preparation, etc.). You will receive e-mails from the Microbiology & Immunology Undergraduate Secretary informing you of the timing of these meetings.

Please see the Honours Coordinator if you have any questions:

Dr. Lois Murray, Honours Coordinator
Room 10L, 10th floor,
Sir Charles Tupper Medical Building
902-494-6933
LMurray@dal.

Appendix A

MICROBIOLOGY & IMMUNOLOGY HONOURS STUDENTS: EVALUATIONS

WINTER TERM REPORTS (Fall Term for some Co-op Students)

Background:

The purpose of the Winter Term report is to permit assessment of each student's understanding of the scientific literature related to his/her research project. Although each student should have obtained a number of results in the laboratory by the end of November, it is likely that he/she will not yet have enough data to make a complete story. Thus the Winter Term Report is focused more on the background material than the actual experimental results. The report, therefore, is like a miniature literature review and will serve as the basis for the Introduction in the student's Thesis. In addition to the Introduction, the report will include: a Results section that consists of text that introduces and describes a single Result accompanied by the appropriate Figure with its Figure Legend; Materials and Methods for that Result; and one page of References.

The Winter Term reports must have been edited by the student's supervisor at least once.

Student Name:

Suggested grade: Pass/ Fail

Comments on report: (Does the student appear to have a grasp of the relevant literature? Is the style consistent with the EMBO Journal style? Correct the student's writing on the report. Use lots of red ink or electronic marking.)

Appendix B

MICROBIOLOGY & IMMUNOLOGY HONOURS STUDENTS: EVALUATIONS

Honours Thesis Grading for _____

There are two types of comments for you to write here:

1) for marking purposes only: these will not be shown to the students and will be used to help evaluate the final mark - so be honest.

2) may be shown to students upon request (however: all comments will be anonymous, compiled, and edited by L. Murray prior to discussion with the student).

Confidential comments for grading:

Comments to be passed to student:

Letter to Number Grade conversion	
A+	90
A	85
A-	80
B+	77
B	73
B-	70
C+	65

Supervisor's evaluation of student:

Student's name:

Supervisor's name:

Grade: _____/100

Provide comments on laboratory performance. Evaluate work ethic, originality, intellectual contribution, independent reading & experimentation, amount of effort required to aid student in writing reports, etc..

Faculty sheet for Grading Honours thesis (MICI 4900) for _____

Item	Comments for grading	Grade
Formatting: Page setup: Margins at 1" all around, Page numbering – top right corner, 1.5 line spacing		/2
All sections present: Title page, Table of contents, List of Figs & Tables, List of Abbrevs, Acknowledg, Abstract, Intro, M & Ms, Results, Disc., Refs. Figures and Tables are interspersed throughout the text, each on a separate page		/2
Abstract (approx 300 words) introduces background, problem to be addressed, provides results.		/4
Introduction Is appropriate material included/excluded? Logical? Refs cited? Quality of writing		/22
Materials & Methods Concise, referenced. Lists of primers / plasmids / antibodies.		/5
Results Is it well-organized? Does it flow? Does text reference Figures? Do Fig. Legends contain the correct info. ? Are they NOT repetitive, within themselves or with the text? Are Figures original, labeled clearly, neatly, using sufficiently large font?		/30
Discussion Is appropriate material included/excluded? Logical? Refs cited? Quality of writing		/30
References Cited correctly in text and formatted correctly		/5
TOTAL	Letter Grade:	/100

Appendix C

ORAL PRESENTATION EVALUATION FORM

Please fill out the following form and return the form to the Honours Coordinator immediately after the presentations. Please provide thoughtful comments that will benefit the student.

Student Name: _____

1. **Content:** (Was the material presented appropriate? Background explained? Detail?)

2. **Understanding & Questions:** (Did the student appear to understand the material/project? How well were questions answered? Was the student prepared?)

3. **Organization:** (Was the talk well organized such that the data presented was logically analyzed and a clear concluding message conveyed?)

4. **Presentation Style:**

(a) audiovisual (e.g., appropriate number of slides, effective use of presentation media, pointer use)

(b) **voice** (clarity, speed)

(c) **manner** (relaxed/nervous, eye contact with audience, enthusiasm, distracting mannerisms)

5. **General Comments & Suggestions for Improvement:**

Presentation grade: ____/10

Name of Reader / Supervisor

Date

Department of Microbiology & Immunology