

Guidelines for Medical Sciences Honours Supervisors

As supervisor of a Medical Sciences Honours student, you will take on the following responsibilities:

- Clearly explain to your student your expectations and make sure the student understands. Be reasonable in your expectations as this is typically one course out of a full course load. **Also be cognizant of the challenges associated with remote work and be sympathetic to obstacles students may be facing.**
- Provide guidance throughout the research project. In larger research groups, you may hand over the supervision to a senior graduate student, post-doctoral fellow, or research associate. However, as the Principal Investigator, you are ultimately responsible for oversight and grading.
- Ensure your students participate in your research group activities, including group meetings, if possible.
- Review a draft of the **Interim report** before its final submission (remember that the interim report – and thesis – will likely be the first major research documents they prepare, so they will need help). You can ask for clarification, offer suggestions (including alternate wording), and give positive feedback, but do not edit their work. A copy of the final submission will come to you from the Honours Coordinator, after which **you will have 10 days to provide a grade on the evaluation form** ([Appendix A](#); it is worth 15% of the final grade). Upon submission of the Interim Report evaluation, you will also be asked to provide the names of two Faculty members that could potentially act as an additional thesis reader for another student's thesis (**please** make sure they agree to act as readers, if needed).
- Ensure data collection is wrapping up by the **end of February** to allow time for the student to concentrate on writing the thesis.
- Guide your student in writing the **Abstract** for the Medical Sciences Symposium (see [Appendix B](#) for the form and an example); abstract is due in March.
- Guide your student in the preparation of the **platform or poster presentation** to be given at the **Medical Sciences Symposium**. You should strongly encourage your student to do at least one trial run of the presentation in advance of the presentation date, so that necessary changes can be made. **You are expected to cover the cost required to print the poster** if your student does not do a platform presentation. This presentation is worth 15% of the student's final grade. You are expected to attend the symposium and evaluate at least 2 presentations (but not your student's). See [Appendix C](#) for the grading rubric.
- Help the student with the writing of the thesis, within limits (as per the Interim Report, do not edit).
- You (and one other reader) will grade the final thesis (see [Appendix D](#) for guidelines and evaluation form). If there is a discrepancy in the grade between you and the second reader (greater than a full letter grade), the Honours Coordinator will act as a third reader and the final grade will be the average of the three.
- **In addition to grading the thesis(es) of your own student(s), you may also be responsible for reading and grading one other Medical Sciences Honours thesis.** When grading these, keep in mind that you are evaluating it as an example of scientific communication. You will also assess productivity. You will have **14 days** to complete the thesis evaluation. Delegates must be identified by the supervisor and approved by the Medical Sciences Honours Committee. The thesis grade will be worth 40% of the student's final grade for SCIE 4901 + 4902.

- You will also be responsible for assessing the student's research effort. This will make up 20% of the student's mark and will cover intellectual input, commitment and participation in research work and group meetings, experimental skill, interpretive ability and originality, and productivity (see [Appendix E](#) for evaluation form). You are asked to **complete one at the end of the Fall term (worth 5%) and one at the end of the Winter term (worth 15%)**. Feedback from the first evaluation is meant to allow for improvement in the second term. You will have **10-14 days** to complete the evaluation of the student's research effort. This is separate from the interim report and thesis mark.

An Honours Supervisor should alert the Honours Coordinator, as soon as possible, to any problems or concerns with a student (work ethic, personality issues, etc.) or with the way the project is progressing.

IMPORTANT DATES FOR SUPERVISORS

Dec. 8, 2020 – Interim report – Please ensure you see a draft of the student's interim report at least once before they submit it on Dec. 8 (we recommend 10 days before it is due). You are meant to provide feedback, including clarification, suggested changes (including alternate wording), and positive feedback, but please do not edit. Once submitted, you will have **10 days** to complete the evaluation. We also ask that you include names of two faculty members willing to act as thesis readers upon their agreement.

Dec. 18, 2020 – Interim report and first research effort evaluations due

Last week of February - Experimentation/Data collection – Students should be completing any experimentation and data collection, so they can dedicate their time to writing the thesis.

Mar. 19, 2021 – Abstract submission – The student is asked to submit an abstract for the end of year symposium; please review the student's abstract before they submit it on Mar. 19.

Apr. 8, 2021 – Thesis – Please ensure you see at least one draft of the student's thesis before they submit it on Apr. 8 (we recommend 10 days before). Provide feedback, as in the Interim Report, without editing. You will have 2 weeks to complete the evaluation.

Apr. 9, 2021 – Medical Sciences Symposium – Your student will be presenting their Honours work in either platform or poster format (you are responsible for the cost of the poster). You are expected to attend the symposium, where you will mark other students' presentations; you will not evaluate your own student. We ask that you also invite other members of your research team to attend and act as evaluators.

Apr. 22, 2021 – Thesis and second research effort evaluations due

APPENDIX A - MEDICAL SCIENCES HONOURS INTERIM REPORT GUIDELINES AND EVALUATION

Overview

The Interim Report is due the last day of classes in the Fall term. The purpose of this report is to demonstrate that the student understands the literature related to the Honours research. Rather than extensively discussing experimentation and data (since results to this point are unlikely to make a complete story), the emphasis is placed on **background** material and providing a **rationale** for the project. As such, it serves as a mini literature review, upon which the student will expand for the Introduction section of the final thesis. One page of references is sufficient at this stage.

Format

General:

The report should be written in a similar format to a scientific paper. Font should be **12-point, 1.5-spaced** (except for references, which will be 1.0-spaced), **2.5cm margins**. Please do not use jargon or slang; try to be concise. Total number of pages of **text** should be about 10 pages (excluding figures and references).

Sections:

Title page – name, B00#, course number and name, name of supervisor, title of report, date

Table of Contents – can use “References” tab in Word; TOC page numbers are typically Roman numerals, so can use this link for guidelines on how to use different numbering in the same document: <https://bit.ly/2LmXCQ9>

List of Figures/Tables/Schemata – please include at least **one** figure (with legend) highlighting results so far; if no results are available, include a figure on work flow or in the Methods section instead

List of Abbreviations – all abbreviations should be defined when first used in the document (including in the methods and figure legends); a list of these abbreviations should be included

Introduction (3-5pages) – this section is probably the most important at this stage, as it will cover relevant **background** material and provide a **rationale** for the project; this section will include the majority of references (cited material); it will also include the **research question/hypothesis** (For more information on “Research Question versus Hypothesis”: see <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2912019/pdf/0530278.pdf>)

Materials & Methods (approx. 3 pages) - This section details the specific techniques used to generate the data described within the report or methods that may be used in future data collection for this project. If more than one method is described, use subheadings – one for each method. The methods are not conversational accounts of what was done on the project. Be sure to write in the third person using past tense and passive voice.

Use clear and precise descriptions of how experimentation or data collection was done, and the rationale for why specific procedures were chosen. The methods section should describe what was done to answer the research question, describe how it was done, justify the experimental design,

and explain how the results were analyzed. This section should describe the materials used in the study, explain how the materials were prepared for the study, describe the research protocol, explain how measurements were made and what calculations were performed, and state which statistical tests were done to analyze the data (if applicable). Note where chemicals or reagents were purchased throughout the method, if applicable. Do so chronologically and use sub-sections, if necessary. References should be used where needed and listed at the end.

The best example for your guidance will be a recent publication from the research group.

See also (posted on Brightspace):

Kallet, R. H. How to write the methods section of a research paper. Respir Care. 2004 Oct;49(10):1229-32.

Preliminary Results/Figure(s) (1-2 pages)- The purpose of this section is to practice making and formatting **ONE** figure, its title and its legend. Create a figure from original data (i.e. not a model or a copied figure). Figures do not need to be high resolution or publication quality, but they cannot be pixelated, fuzzy, or difficult to read when printed. Include a title, which represents the major conclusion of that figure. Write a figure legend that describes how the data was obtained in the figure in general terms. Leave specific details for the methods section. Make sure to define all abbreviations. Because this requirement is for practice purposes, it will not be graded for this report.

Have each figure, table, or schemata (with its legend) on a separate page, but interspersed in the body, rather than at the end.

Discussion – If the student has acquired preliminary results, it is recommended that they discuss what the results mean and how they may direct future experimentation/study; if they have had difficulty with data collection or analysis to date, they can suggest causes and ways to resolve the issue. This is good practice for thesis-writing, but they **will not be graded on this section**.

References - Use the style of references most common in the research group's field of study (i.e. the reference style of the journal in which the research group most frequently publishes).

Submission

The student will be required to provide **one** copy of their report to the Honours Coordinator by the deadline provided by uploading it to the appropriate Brightspace folder. The supervisor should review the report at least once before submission. The report will make up 15% of the grade in the course. The grading rubric can be found on the next page.

INTERIM REPORT GRADING RUBRIC

Item	Grade
Outline submitted	/5
Introduction (3-5 pages): The Introduction need not be an exhaustive literature review. It should serve to introduce the aspects of the scientific field that are central to your research and to familiarize a non-expert scientist with concepts that are crucial to understanding your research. It identifies the gaps, problems, and issues unresolved by the literature (i.e. provide the reader with a sense of what work has already been done and what needs to be done going forward). It leads to the rationale of your project (usually at the end of this section) and transitions to the next section of the proposal.	/15
Research Question/Hypothesis*: This should be explicit, unprovable, and non-trivial.	/5
Materials & Methods (3 pages, excl. figures): The methods section should clearly describe the specific design of the study and provide clear and concise description of the procedures that were performed. The purpose of sufficient detail in the methods section is so that an appropriately trained person would be able to replicate your experiments. Methods are concise & complete, appropriately referenced. Demonstrates understanding of the content and tools of the field.	/10
References: Sources and citations are used correctly. Use the style of references most common in your field of study (i.e. the reference style of the journal in which your research group most frequently publishes).	/6
Clarity of writing and writing technique: The document is clearly organized, writing is crisp, clear, and succinct. The writing is appropriate for the target audience. No spelling, grammar, or punctuation errors are made.	/5
Formatting: Correct page setup, margins 2.5cm, page numbering, 1.5 line spacing; all sections included	/4
TOTAL	/50

**For more information on "Research Question versus Hypothesis": see*

https://cirt.gcu.edu/research/developmentresources/research_ready/quantresearch/question_hypoth

Comments (Evaluate the student’s grasp of the literature. Provide feedback and make suggestions for change, but please do not make the changes yourself):

Supervisor’s Name (Please print)

Suggested Final Thesis Reader #1

Suggested Final Thesis Reader #2

(Please print name & include department for both and ensure they have agreed to participate)

APPENDIX B – SYMPOSIUM ABSTRACT FORM

STUDENT: _____

SUPERVISOR: _____

Platform presentation

Poster presentation

Example of abstract (250-300 words):

Acute Effects of Mechanical Stimulation on the Stiffness of Cardiac Cells

Background: The heart's mechanical properties are altered by mechanical stimuli, and thus susceptible to changes in the mechanical environment. Chronically, environmental changes are known to alter physical properties of cardiac tissue, which affects its mechanical performance. For instance, a chronic increase in intracardiac pressure generally results in myocardial stiffening, which can lead to heart failure. Acute changes in cardiac mechanics, on the other hand, are known to feedback on the heart's electrical activity, which can lead to deadly arrhythmias. Yet, whether these changes occur with acute mechanical stimulation is unknown. The aim of this study was to investigate the effects of acute mechanical stimulation on cardiac cell stiffness. It was hypothesized that repetitive mechanical stimulation would result in an acute increase.

Methods: A method was developed for measuring the stiffness of single myocytes isolated from the left ventricle of New Zealand white rabbits. This involved the use of specialized carbon-fibres that adhere to the cell surface, coupled to a custom piezo-electric micrometer position system, for controlled stretch of single cells. By stepwise stretch and calculation of applied force, this technique allowed for measurement of the force-length relationship in contracting cells, which is representative of cell stiffness.

Results: To validate the ability of our system to measure acute changes in cell stiffness, force-length relationships of control cells and those exposed to 10 μ m paclitaxel (causing microtubule hyperpolarisation) were measured, which showed an increase in stiffness in paclitaxel treated cells. When cells were instead subjected to 1min of repetitive mechanical stimulation by cyclic stretch, however, no change in stiffness was observed.

Conclusions: Our carbon-fibre based system allows for the measurement of stiffness in single isolated cardiac cells, however it appears that repetitive mechanical stimulation has no acute effect on cell stiffness.

APPENDIX C - MEDICAL SCIENCES SYMPOSIUM PRESENTATION EVALUATION FORM

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

STUDENT: _____ PLATFORM or POSTER (circle)

MARKER: _____

Item	Comments	Grade
Content: Was the presented material appropriate? Was the Background explained? What details were provided?)		/4
Understanding & Questions: Did the student appear to understand the material/project? How well were the questions answered? Was the student prepared?		/4
Organization: Was the presentation well organized such that the data presented were logically analyzed and a clear concluding message conveyed?		/4
Presentation Style: (a) <u>Presentation material</u> - appropriate number of slides (oral) or use of space (poster), effective use of presentation media, pointer use		/1
(b) <u>Voice</u> - clarity, speed		/1
(c) <u>Manner</u> - relaxed/nervous, eye contact with audience, enthusiasm, distracting mannerisms		/1
	TOTAL	/15

General Comments & Suggestions for Improvement:

APPENDIX D - MEDICAL SCIENCES HONOURS THESIS GUIDELINES AND EVALUATION

GUIDELINES

Overview

The thesis is due the last day of classes of the Winter term. This is the culmination of the student's hard work over the past year. Time and care should be taken to produce a polished, well-written report that demonstrates understanding of the literature, the purpose of the project, the conclusions reached from your investigation, and how this may influence further research in this area of study.

Information and feedback from the Interim Report can be used to help write the thesis. Supervisor's comments should help the student achieve a better scientific writing style, as well as focus the report so that it reads clearly and concisely.

Format

General:

The final thesis is written in the format of a scientific paper. Do not use the format of Nature or Science since these are brief reports. The thesis will require a more detailed Materials & Methods section than typically seen in a scientific journal article. For example, do not use "as previously described" to explain how testing was done. We would advise the student to look at past Honours theses from the research group to get a feel for how it is written.

The report should be written in technical language, but that which is accessible to non-experts in the field (the supervisor and one other reader will evaluate the thesis, so the Introduction should provide enough background to familiarize any reader with the material – see more information below in Writing Tips). All abbreviations/symbols should be defined on first mention (including in methods and figure legends). Avoid the use of jargon/slang; be concise.

The body of the thesis (which includes the Introduction, Materials & Methods, Results, and Discussion) should be about **15-20 pages** (1.5-spaced), excluding figures, tables, references (1.0-spaced), and appendices. Please use **12-point font** and **2.5cm margins** all around. Make sure to number the pages.

Sections:

Title page – name, B00#, course number and name, name of supervisor, date, title of report; ensure the title is informative but not extensive.

Table of Contents – can use "References" tab in Word; TOC page numbers are typically Roman numerals, so can use this link for guidelines on how to use different numbering in the same document: <https://bit.ly/2LmXCQ9>.

List of Figures/Tables/Schemata – the report should list figures (with legends), tables, and/or schemata **highlighting** results (i.e. not every result acquired needs to be included in thesis).

List of Abbreviations – all abbreviations should be defined when first used in the document (including in the methods and figure legends); a list of these abbreviations should be included.

Abstract – this is a short, concise summary of the important points of the report (250-300 words). It will introduce background, the problem to be addressed, provide results and conclusions. No reference should be made to any part of the report; the abstract is a stand-alone paragraph. Do not use citations in the abstract. Write this section last, as it is often the most difficult part of the report to write.

Acknowledgements - it is appropriate to acknowledge, in addition to the supervisor, any intellectual and practical assistance, advice, encouragement and sources of monetary support that contributed to the successful completion of the thesis.

Introduction - this will not be an exhaustive literature review; the point of this section is to introduce the reader to aspects of the scientific field pertinent to the project, while familiarizing a non-expert scientist with concepts crucial to understanding the research. The reader should get a sense of what work has already been done and what needs to be done going forward. The introduction must also include a **rationale** for the work. **Goals/objectives/hypotheses** should be explicit.

Materials & Methods - describe all methods used for the project, including those published methods requiring references. If new methods are created, these must be described in a way that allows others to repeat the testing. If more than one method is described, use subheadings – one for each method. The methods are not conversational accounts of what was done on the project. Be sure to write in the third person using past tense and passive voice.

Use clear and precise descriptions of how experimentation or data collection was done, and the rationale for why specific procedures were chosen. The methods section should describe what was done to answer the research question, describe how it was done, justify the experimental design, and explain how the results were analyzed. This section should describe the materials used in the study, explain how the materials were prepared for the study, describe the research protocol, explain how measurements were made and what calculations were performed, and state which statistical tests were done to analyze the data (if applicable). Note where chemicals or reagents were purchased throughout the method, if applicable. Do so chronologically (i.e. the order in which they were used in the study) and use sub-sections, if necessary. References should be used where needed.

Results - there should be a natural flow from one test to the next. Use of subheadings is encouraged in this section. In each subsection, introduce the rationale for the testing, briefly describe what was done, and refer to the appropriate figure/table/schema that reveals the data. Figures, tables, and schemata should be interspersed with the results (i.e. not at the end of the report), but each should be **on a separate page and include the figure legend**.

Discussion - discuss the significance of the data in the context of existing published literature and indicate the next steps forward. If there has been difficulty with data collection or the techniques used, try to identify the cause(s) and suggest ways to resolve these issues. Include citations of relevant literature in this section to support the discussion.

References – references should be cited in a standard journal format; use the style of references most common in your field of study (i.e. the reference style of the journal in which the research group most frequently publishes). An electronic reference manager (ex. Refworks, Bookends, Papers, Endnote)

should be considered. The Library offers frequent sessions on use of Refworks and the program is available for free to all university students.

Appendices (if applicable)- reserved for supplemental information (buffer solutions, computer programming code, surveys, models, etc.). The supervisor can provide advice on appropriate content.

Submission

A draft of the thesis should be given to the supervisor in a timely manner (at least 10 days before the due date), so that constructive criticism can be provided. It is not the supervisor's job to write the thesis so the draft submitted should be in good shape and not a version that needs to be polished dramatically. The supervisor should not edit the work, just provide feedback.

The final product will be marked by the supervisor and by one additional reader. The grade will make up 40% of the student's final grade. The thesis grading rubric is found on the next page.

HONOURS THESIS GRADING RUBRIC

STUDENT: _____

SUPERVISOR: _____

GRADED BY: _____

Item	Comments	Grade
Formatting: margins 2.5cm around, 1.5-spacing, numbered pages, spelling, grammar, punctuation		/4
Sections Present: Title Page, Table of Contents, List of Figures, List of Abbreviations, Abstract, Acknowledgements, Introduction, M & M, Results (incl. figs on separate pages), Discussion, References		/2
Abstract: 250-300 words; introduces background, problem to be addressed, provides imp. results, conclusions		/4
Introduction: appropriate material; logical; references cited; writing quality; unique question id'd, rationale, goals/objectives/hypotheses		/20
Materials & Methods: concise & complete; referenced appropriately; demonstrated understanding of content and tools in field		/5
Results: well-organized; good flow; original figures, labeled clearly, neatly, legible font; figures referenced in text; correct info in figure legends (not repetitive); quantitative tools used appropriately		/30
Discussion: appropriate material included; logical; references cited; writing quality; significance of work; independent and critical thought		/30
References: sources and citations used and formatted correctly		/5
	TOTAL	/100

APPENDIX E - MEDICAL SCIENCES HONOURS SUPERVISOR'S EVALUATION OF STUDENT

STUDENT: _____

SUPERVISOR: _____

Part I. Please answer questions 1-8 using the following rating scale:

1 – Poor 2 – Satisfactory 3 – Good 4 – Very Good 5 – Excellent

You will complete this form twice: once at the end of the Fall term (worth 5%) and once at the end of the Winter term (15%). Remember that these ratings will be converted into 20% of the student's final grade. Therefore, if you give the student 3/5 on each question, they will receive 24/40 or 60% on their performance. Please rate accordingly. Half marks are acceptable. Feel free to include comments, as necessary. This form will be handed back to the student, so constructive feedback is encouraged.

1. **Motivation.** Was the student interested in the research work? Enthusiastic? Did the student take pride in completing tasks well?
2. **Initiative.** Does the student initiate experiments independently when capable? Does the student ask questions or seek help when appropriate? Does the student ask for additional work?
3. **Attitude.** Does the student have a positive attitude about work at the research site? Does the student work well with other members of your research group?
4. **Quality of Research Work.** Are research techniques successfully performed by the student?
5. **Ability to Learn.** Did the student's quality of work improve over the course of the term? Does the student learn from their mistakes?
6. **Application of Knowledge.** Does the student bring an understanding of some of the relevant background material from their classes? Can the student apply this knowledge to research-related activities?
7. **Planning and Time Management.** Does the student allocate enough time to complete technical procedures?

8. **Dependability.** Does the student show up on time? Does the student stay until the task is complete? Does the student adapt to the direct supervisor's schedule if necessary?

Part II. Please answer the following questions with comments only. These comments will help me interpret the ratings from questions 1-8.

1. What do you feel this student did well at your research site? At what did they excel?

2. How could this student improve?

Supervisor Signature

Date