

Guidelines for Preparation of Thesis

Biochemistry, Microbiology and Immunology (BMI) Graduate Department

Please consult the Faculty of Graduate and Postdoctoral Studies website for [General Thesis Regulations](#).

1. GENERAL:

A **Master's thesis** should demonstrate that the student is a skilled and credible professional in the area of his/her research and it should show that the student is able to present the results in a scholarly manner. The length should be less than 100 pages, excluding references and appendices. Please also consult the FGPS' resource [Guide for Master's thesis](#).

A **Doctoral thesis**, in addition to fulfilling the above criteria, must embody the results of original investigation and constitute a significant contribution to knowledge. The contribution to knowledge should be of such quality as to merit publication in the scientific literature of the field. The length should be less than 150 pages, excluding references and appendices. Please also consult the FGPS' resource [Guide for Doctoral thesis](#).

Request for exceptions to the page limit should be discussed with the supervisor and Thesis Advisory Committee and then submitted to the Graduate Studies Committee. Most students will write a *classical (or monograph) thesis*, although the Biochemistry program also allows a *manuscript-based thesis* (see section 5.1). The same quality and ethical standards apply to both thesis formats. The thesis **cannot** consist of a series of journal articles.

2. The **THESIS** shall consist of the following parts in the order given:

1. Title page: contains international copyright symbol, see recent theses for format
2. Abstract: a concise and accurate summary (MSc <150 words, PhD < 350 words)
3. Acknowledgements: specifics of collaborations should be stated in section 10.
4. Table of Contents: gives the location of all parts of the thesis.
5. List of Abbreviations
6. List of Figures and Illustrations using their descriptive titles (see 3.3)
7. List of Tables using their descriptive titles (see 3.3)
8. Text
9. References
10. Contributions of Collaborators
11. Appendices, if required
12. Curriculum Vitae (remove all contact information)

3. The **TEXT** shall be divided into the following sections or chapters:

3.1. **INTRODUCTION:** The introductory chapter should (not necessarily in the order shown):

a) Broach the subject of the thesis and give a brief history, emphasizing the milestones

b) In the light of a brief but thorough critical review of pertinent literature, indicate the state of the subject at the beginning of the investigation and clearly formulate the problem chosen for investigation (i.e. a hypothesis must be stated).

c) Indicate why the problem was chosen; and outline logically the approach to the problem. Point out any important aspects of the approach which are unusual and mention any important limitations.

d) Summarize with a concise STATEMENT OF OBJECTIVES or PURPOSE which poses the questions to be answered by the research.

Total length of the introduction should not exceed 20 - 25 pages for a Master's thesis, or 30 - 35 pages for a Ph.D. thesis.

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3.2. MATERIALS AND METHODS:

The source of **Materials** and material specifications (batch#, etc., as required) can be limited to pertinent and general materials that require specific comments. The source of rarely used materials can be given when they are first used. The Materials section can refer to an Appendix for long sequences, plasmid maps, formulations, etc., which are deemed pertinent.

The **Methods** section should be written in the format of a typical paper in a biochemistry, microbiology or molecular biology journal however more detail (such as a standard curve) for key or new methods is expected in a thesis to allow the readers to assess the quality of your work. Procedures performed by others or by companies should be indicated and may need elaboration in section 6. Standard methods can be referenced without comment but modifications to established methods should be identified in the text. Detailed procedures, such as flow diagrams, etc. may be included in an appendix if necessary. The make and model of important major equipment, (such as centrifuges, scintillation counters, etc.) should be identified in the text. Methods used for statistical analyses and criteria should be included; raw data not included in results can be provided in an appendix. Discussions of methodologies should be very limited in the Methods section.

3.3. RESULTS:

The results should be stated with little discussion. However, sufficient commentary should be included so that experiments are adequately described, and are linked together and so that the rationale for the next experiment is clearly defined.

Tables may be included in the text if they are small enough. They should include a good descriptive title and sufficient explanation of the experimental protocol in the legend as to be understandable without excessive reference to the text. When a table is not included in the text, it can be treated in the same manner as a figure (see below). The general format for tables, once selected, should be consistent throughout for similar data.

Figures and Illustrations should be located within the appropriate section on the page following first mention in the text, with a comprehensive legend on the following page that makes the figure understandable without excessive reference to the text. The legend to the figure should include a descriptive title, a brief description of the experiment and a key to the symbols and abbreviations used. For electronic thesis submission, both the figure and the legend pages should be numbered throughout the thesis, consecutively with other pages.

Legends of figures and tables should be single-spaced.

3.4. DISCUSSION:

The discussion should be a critical and comparative interpretation of the results. Reference should be made to the literature cited in the introduction and the relevance of the research should be clearly outlined. A certain amount of speculation is allowable. Examiners like to see models formulated by students based on their results.

The nature of research in our fields is varied and no strict guidelines will be laid down as to the optimal or maximal lengths of these sections.

Note: 'Instruction to Authors' of scientific journals in the chosen discipline will also be helpful in assessing the scope of these sections.

3.4a. THESIS WITH SELF STANDING CHAPTERS:

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Since many research topics involve several different approaches to a single problem or a number of unrelated topics, it is often advantageous to subdivide the text into self-contained chapters. In this case, each chapter should include a brief introduction with a methods, results and discussion sections. A GENERAL INTRODUCTION section should still preface the thesis, and the text should be rounded off by a brief section entitled CONCLUSION or GENERAL DISCUSSION (in the singular) designed to tie the individual chapters together. Even in these cases it is sometimes appropriate to have a single chapter on Methods in order to prevent repetition.

3.5. REFERENCES:

References should be single-spaced with a clear line between entries. One of three reference systems below may be used but they must be used according to the format of the journals specified below.

- A) Sequential numbering Format of ONLY Mol. Cel. Biol. or J. Exp. Med.
- B) Alphabetical listing: Format of ONLY Cell.
- C) Numbered Alphabetical: ONLY J. Virology, J. Immunology or J. Bacteriology.

A) Sequential numbering of the references in the text then lists the references in the reference section in the order of their first appearance in the text (not in alphabetical order).

This format is the briefest citation method; however it is less informative, and more prone to double citation problems than the Alphabetical listing method (below).

B) Alphabetical listing gives the authors and year in the text; in the reference section the papers are listed alphabetically, based on first author. This method requires more space than sequential numbering but is more informative and eliminates the problems encountered by double-citation and/or elimination of references during editing.

C) Numbered Alphabetical numbers authors names in alphabetical order in the reference section, and places the appropriate number in the text.

Students should consult the journals for the full details of each method, such as citing references from books, from proceedings, from theses, etc...

4. CONTRIBUTIONS OF COLLABORATORS

This statement will detail the contribution of collaborators to the student's thesis. It should be written very carefully since a misrepresentation of the contributions of collaborators to joint work constitutes academic fraud and would be subject to serious penalties prescribed by the University. In some cases, work done by collaborators should be mentioned and included in the discussion but not included in the results section - it will depend on the type and extent of collaboration.

5. **GENERAL FORMAT OF THE THESIS:** A reasonably readable **font** (such as Times New Roman, fancy fonts are hard to read by examiners with visual problems and they will arrive irritated...) font size - 12 throughout the entire thesis on 8½" x 11" white good quality paper sheets with a standard 2.5 cm margin.

Italics may be used for emphasis only. Colour lettering is to be avoided (except if required in figures). Only one side of the paper must be typed on. The text must be double-spaced except for footnotes, figure legends, quotations of five lines or more and references which should be single-spaced. Pagination: There should be two sets of page numbers - small Roman numerals for the preliminary pages (title page is page "i"), and Arabic numerals for the text, bibliography, appendices, Collaborators Contributions and Curriculum Vitae.

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For more complete information on preparing a thesis the student should view recent theses and consult the Supervisor, members of the Thesis Advisory Committee and/or the Chairman of the Graduate Studies Committee. The reference, "How to Write a Thesis" (James, A.W. (1967) Science 156, 170) contains information that is still pertinent.

5.1. MANUSCRIPT-BASED THESIS (Biochemistry Program only):

Your thesis may consist of a collection of manuscripts rather than stand-alone chapters, if agreed upon at a recent TAC meeting and documented using the [Permission to Write Paper Based Thesis](#) form. A collection means at least 3 manuscripts and that these manuscripts should be published, in press, accepted or submitted. Normally, two of the manuscripts should have the student as first author. The Thesis Advisory Committee can request exceptions from the Graduate Studies Committee. All the manuscripts need to be merged for consecutive page numbering and the standard thesis format should be followed in addition to:

- A. Each chapter shall be in manuscript format as it was submitted to the journal or is about to be submitted. There should be an introductory page to each chapter clearly explaining the status of the paper and the contribution of the student.
- B. Introduction (limit 30 pages) and General Discussion (limit 10 pages) Introduction should be a broad overview of the thesis topic and not a repeat of the details of the individual introductions of the papers.
- C. A co-authored paper should be in the body of the thesis if the contribution from the student can stand alone as a chapter. The full paper should still be included, with the part of the student clearly defined in the introductory page
- D. A statement from the supervisor and the student should clearly state that more than 50% of the papers were written by the student.
- E. A review paper should go in the Appendix with the student's contribution defined.
- F. Reprints cannot be allowed due to the margin restrictions for binding. If the paper is already published, the final version should be included in word format with margins adjusted to 1.5 inches on the left and the remainder 1" as stated in the guidelines.
- G. Additional data that are not suitable for inclusion in a paper at the time of submission should be placed in the Appendix section.

6. SUBMISSION FOR EVALUATION

By this time, your supervisor should have already submitted the [List of examiners](#) form. Submit as many unbound copies of your thesis to your Academic Unit as there are examiners. Include completed [Statement of thesis supervisor](#) form to the copies of your thesis.

7. SIMPLIFIED REVISIONS:

In spite of all your efforts, some modifications and corrections will probably have to be done after the defence prior to submitting the final electronic version. Extra pages do not require repagination and a new table of contents: just number the new page between 12 and 13, page 12a. For a removed page, let's say the examiners canned page 13, at the bottom of page 12 state "the next page is page 14". Small additions can be kept on the same pages by stretching the margins. Consider doing complicated figure changes by placing a figure box with the corrections over the part that needs to be changed.

6. FINAL SUBMISSION

Graduate students are required to submit the final version of their thesis electronically using [uO Research](#), the University's institutional repository. A [checklist \(PDF\)](#) has been created to ensure that you have completed all necessary steps.