Writing Thesis Proposals and Theses

4

Module Four

Engineering Science Communication Handbook

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7th Edition ©1999

Simon Fraser University, Burnaby, BC

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Preface

WRITING THESES AND THESIS PROPOSALS is the fourth in a series of four modules that we have written for you, the students of Engineering Science at SFU. Your comments about writing and your needs as writers have guided and informed our writing of these handbooks.

The first chapter in this module, "Theses and Thesis Proposals," provides you with important information about the thesis proposal and the undergraduate thesis you are expected to write. We recommend that you very carefully read this chapter in order to avoid any unnecessary problems as you near the completion of your studies.

Chapter Two, "Referencing Conventions," describes how to acknowledge information taken from other sources, how to use quotations, and how to prepare a reference list. However, as the conventions for citations and reference lists vary greatly, even within the engineering field, you may find good reasons for using a different convention such as the IEEE format.

Appendix A, "Faculty Areas of Research," is provided for your information and lists the areas of research for ENSC faculty and technical staff as well as for some associate faculty who agreed to be included.

Appendix B, "Thesis Template," provides a general model which you may find helpful as you go about formatting your thesis.

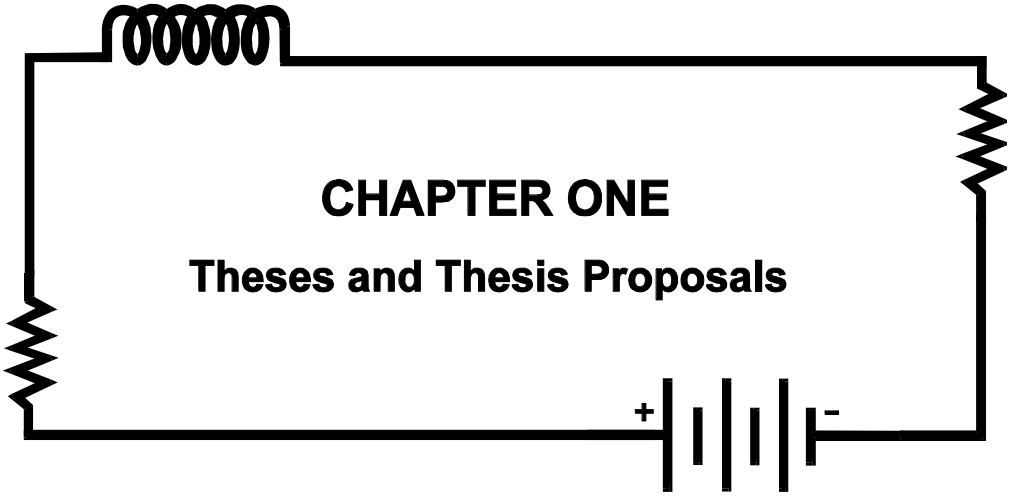
The other three modules cover the following topics:

Module One:	*Communication Skills for Engineering Students*
Module Two:	*Co-op Education and Employment Information*
Module Three:	*Project Documentation and Collaborative Writing*

Please contact Steve or Susan should you need one of these modules.

We wish you all the best, both in your current studies as well as in your future career as an engineer.

Steve and Susan



CHAPTER ONE

Theses and Thesis Proposals

You cannot teach a
man anything; you can only
help him to find it within himself.

Galileo

1.1. General Information About Thesis Projects

- ✓ General Information
- ✓ Frequently Asked Questions

ALL STUDENTS MUST COMPLETE A thesis proposal and an undergraduate thesis as part of the BASc degree requirements. The Thesis Proposal outlines the work to be undertaken in the thesis project. The undergraduate thesis is a formal report based on a research, development, and / or engineering design project undertaken in an industrial setting, a university laboratory, or some combination of the two locations. When the thesis is completed, you are required to defend it. Guidelines for the proposal, thesis, and defense are included in this chapter.

1.1.1. Frequently Asked Questions about Thesis Projects

1.1.1.1. What Defines an Appropriate Thesis Project?

An acceptable thesis project will allow you to demonstrate your ability to work independently on a problem of reasonably large scope and to come up with a good solution. Your project must be a solid and cohesive body of work that requires a good amount of independent effort. The work need not be original nor involve research, so you may implement or analyze something that has been done elsewhere. The project should also draw on fourth year material and demonstrate the application of engineering principles at the senior undergraduate level. Your role in the project should require you to display initiative in conducting the project.

1.1.1.2. How Long Should the Thesis Project Take to Complete?

Proposal and thesis work combined (ENSC 498 and 499) should take the equivalent of 13 full-time weeks of work or study. Typically, this load is spread over two semesters.

1.1.1.3. What Are the Differences Between a BASc and an MASc Thesis?

An MASc thesis will be much more substantial in size and require greater effort than the equivalent of 12 full-time weeks of work. The MASc thesis

normally draws on course work at the Master's level and original, publishable work often results.

1.1.1.4. What If the Thesis Project Qualifies as Master's Level Work?

Students who excel in the Engineering Science program can expect to do well in research, and an advanced degree provides a solid foundation for a career in communications, electronics, or systems. The Department has introduced a combined program to encourage you to proceed to the Master's level or beyond, and to allow you to do so relatively quickly. Though all academic requirements for the two degrees are met separately, linking the BASc and MASc theses, integrating course options, and focusing early on an area of specialization offer an unusually effective approach to graduate study.

You can apply to enter the combined program if you have completed at least 120 semester-hours of credit with a CGPA of 3.5 or above, and have identified a faculty supervisor who has agreed on a thesis topic with you. You apply to the graduate chair. If your application is successful, you are provisionally assigned a place in the graduate program. Note, however, that the standard minimum requirement for admission to our graduate program is 3.3, and if your undergraduate CGPA should fall below this level before you complete the BASc, this assignment will be reviewed and possibly revoked by the graduate committee.

Once accepted into the combined program, you have the following advantages:

- You can substitute graduate courses for some of your undergraduate electives, though you must still separately satisfy the four-course requirement for the MASc.

- Some forms of financial support will be available to you on entering the combined program, for example, teaching assistantships, research assistantships, and some graduate and undergraduate scholarships. However, you may have to wait to apply for some types of graduate scholarship—for example, NSERC scholarships—until you formally graduate from the BASc program.

- You can register for ENSC 498 and 499 in the same semester, and satisfy the requirements for both courses by presenting a proposal for your MASc thesis. The MASc proposal is a substantial piece of work, and will normally be of comparable length to an undergraduate thesis. The proposal will outline the problem to be addressed in the Master's thesis, demonstrating familiarity with the problem's importance, its historical background, and the relevant literature. The proposal will describe the method(s) to be used to tackle the problem, and will justify the use of these methods in preference to possible alternatives. The proposal may describe any anticipated difficulties in

the research, and indicate how these will be handled. In particular, a timetable for the research will be set out, defining appropriate milestones and making use of a Gantt chart or comparable planning tools. Lastly, the proposal will outline the expected conclusions from the research, and explain their significance. The proposal will be defended before a committee, which will normally be the supervisory committee for the proposed thesis. The duration and standards for this defense will be comparable to those for a conventional BASc thesis.

1.1.1.5. How Are Thesis Projects Found?

Students are responsible for finding their own thesis projects. The project may be based on a new work term, an earlier work term, or it could originate through the research activities of faculty members. At least one semester prior to the semester you wish to start work on your thesis project, you should contact professors, companies, and agencies to line up project work. You may also seek advice from the Co-op Coordinators who may well know of appropriate projects available with ENSC faculty, other university departments, or in industry.

When your thesis is part of one of your work terms, you must ensure that your employer understands what constitutes an acceptable thesis project and that all members of your supervisory committee agree that the work you are undertaking will meet the criteria.

1.1.1.6. When Do Students Start Work on the Thesis Project?

Timing depends on the project and the student, but the following sequence of events is the norm:

Time Period (approx.)	Action
Semester 6	Student investigates possible projects and identifies his / her chosen project and potential supervisors.
Semester 7	Student registers for ENSC 498-3 Thesis Proposal, assembles the Supervisory Committee, undertakes supervised study, research and development, and completes a formal proposal for the project. Course work may be done at the same time.
Semester 8	Student registers for ENSC 499-9 Thesis and completes and defends the thesis. Final courses are completed at this time.

1.1.1.7. What If the Project Deals with Confidential Material?

If you are dealing with proprietary information you should ensure that everyone involved is aware of this fact at the proposal stage. Faculty members (academic supervisors and committee members) must be advised that they will be dealing with confidential information when they are asked to serve on the committee.

Before you can register for ENSC 498, your technical supervisor must sign a form, indicating whether or not the project is confidential and, if so, how long it will be held as confidential. Under normal circumstances, the period of confidentiality will not exceed two years from the date you complete ENSC 499. A company may insist that all those read your proposal and thesis sign non-disclosure forms. These forms must be provided by the company. To maintain confidentiality, the thesis defense will be closed to the public.

1.1.1.8. Is Thesis Work Paid?

Not necessarily. If the work takes place in industry, you will likely be paid, but this is not always the case.

1.1.1.9. Who Supervises Thesis Work?

A committee of three is responsible for supervising the student. The composition of the committee will vary depending on the nature of the project.

For a project conducted in industry, the committee is typically composed of

- Technical Supervisor
- Academic Supervisor
- Committee Member

In the case of a faculty member collaborating with an industrial partner, the committee could be composed of

- Co-Technical Supervisor
- Academic & Co-Technical Supervisor
- Committee Member

For a project on campus, the committee may be composed of

- Technical & Academic Supervisor
- Committee Member
- Committee Member

For a project on campus, where two faculty members are collaborating, the committee may be composed of

- Co-Technical & Co-Academic Supervisor
- Co-Technical & Co-Academic Supervisor
- Committee Member

1.1.1.10. Who Qualifies for Each Category of Supervisor?

Technical Supervisor: An individual employed as an engineer, scientist or equivalent with the company or organization associated with the student's project work. The Technical Supervisor will have university degree(s), work experience, and professional qualifications sufficient to provide technical and scientific supervision to the student at the requisite level.

Academic Supervisor: A faculty member in an SFU department or school with specific expertise in the thesis topic.

Committee Member: Faculty or technical staff member in an SFU department or school. This individual may or may not have specific expertise in the thesis topic. Staff members should have a relevant bachelor's or master's degree, appropriate work experience, and professional qualifications. Occasionally, the committee member may be another individual associated with the company or organization where the student is doing their thesis work.

1.1.1.11. What Are the Responsibilities of the Supervisory Committee?

All committee members will be expected to review the thesis proposal, participate in the progress review of the project, review the final thesis, and participate in the thesis defense. Their specific responsibilities are as follows:

Technical Supervisor: Responsible for the day-to-day technical and managerial direction of the student in the project work.

Academic Supervisor: Responsible for guiding the student in the preparation of the thesis proposal and thesis, and for giving technical advice as required.

Committee Member: Provides general guidance and advice as required.

1.1.1.12. Who Chooses the Supervisors?

The Technical Supervisor is normally the project supervisor. The Academic Supervisor should be chosen as soon as a project is identified. In consultation with the academic supervisor and / or technical supervisor, the student should identify a third potential committee member and ask them to participate on the thesis committee.

In some cases, the job of putting your committee together may be easier if you draft a pre-proposal to present your understanding of the project. If you have all members of your committee read and comment on such a document, then you can be relatively certain that they are in general agreement concerning the nature and scope of the project and the way you plan to approach the task at hand.

1.2. Undergraduate Thesis Proposals

- ✓ **Registration**
- ✓ **Deadlines**
- ✓ **Audience and Purpose**
- ✓ **Content Information**
- ✓ **Format Considerations**
- ✓ **Approval Form**
- ✓ **Deferrals**

AN UNDERGRADUATE THESIS PROPOSAL SUBMITTED to the School of Engineering Science can be an individual or joint endeavor. Two students who plan to work on the same project will generally co-write a thesis proposal. They may submit separate thesis proposals only if they are involved in different aspects of a project and can, therefore, propose substantially different sub-projects.

To meet the requirements of ENSC 498, you must write a thesis proposal and have it reviewed and approved by the three members of your supervisory committee. The members of your committee will ensure that the proposal provides a clear indication of the goals of the project, details of the method of approach, and a schedule for completion. They will judge whether or not the schedule is reasonable and if there is a good likelihood of completion. They will also verify that the project is suitable for an undergraduate thesis and that it conforms to School norms.

As such, the thesis proposal is a mini contract. Once your committee members sign it off, they have agreed that the proposed work is sufficient to form an acceptable thesis. This contract is not written in stone, however, and if unforeseen circumstances arise, you may change the thrust of your work midstream—but only after consulting with your supervisors.

When you write a thesis proposal, you are providing your committee members with the information they require to determine if your project is appropriate and if you are prepared to undertake it successfully. You would, therefore, be unwise to progress too far with your thesis work before getting formal approval. If you were attempting to solve the problems of the world in a few months, wouldn't you want to be brought back to reality as soon as possible? Also keep in mind that an oral indication of agreement from your committee members is not always a reliable indicator of their ultimate approval as informal discussions of a project may not provide them with sufficient information or give them sufficient time to reflect on the matter.

Another reason for writing the proposal as early as possible is that if you wait too long, you may find the proposal extremely difficult to write. Typically, students who delay writing their proposals find that they know too much about the subject and have a tendency to write far more than is required (in general, the proposal should be less than ten pages).

1.2.1. Registration

You cannot register for ENSC 498 by phone. Before you can register, you must

- identify your three committee members
- obtain a registration form from Jackie Briggs (Undergraduate Secretary) in the ENSC office
- fill in the form and have it signed by your technical supervisor (only if the proposal and / or thesis is confidential)
- return the form to Annie Radisic, who will manually register you for the course

Please note that your technical supervisor must identify whether or not your project is confidential and indicate how long the proposal must remain confidential. The period of confidentiality cannot extend beyond two years after the project is completed.

1.2.2. Deadlines

Please note that the following schedule provides the ***deadlines*** for the thesis proposal (ENSC 498)**.** You should strive to complete these tasks earlier.

6th Week of Classes: Initial draft should have been reviewed by your academic and technical supervisors. (If you would like them to review it, you can also give a copy to a communication lecturer and your other committee member at this point,.)

8th Week of Classes: 2nd draft should have been resubmitted to supervisors, if required.

10th Week of Classes: 3rd draft should have been submitted to all committee members.

12th Week of Classes: Final draft must be signed off by supervisors and committee member(s). **When everyone has signed off, you MUST give a clean draft and the sign-off sheet to Jackie Briggs, (Undergraduate Secretary). YOU WILL NOT RECEIVE CREDIT FOR ENSC 498 UNTIL YOU HAVE PROVIDED THIS COPY TO JACKIE.**

Please also note: The 12th week of classes is also the deadline for requesting a deferral.

If you are out of town while completing your thesis, be sure to allow sufficient time so you can meet the above deadlines. Also keep in mind that at any stage in the acceptance procedure, the proposal may be returned for revision.

1.2.3. Audience

Your thesis proposal is written for the members of your committee. You can, therefore, assume a high level of general technical knowledge, but some members will likely be less familiar than others with the technical aspects of your project or its practical applications. Think carefully about what each committee member may need to know in order to judge the value and feasibility of your project. When in doubt, err on the side of providing too much rather than too little information.

1.2.4. Purpose

The key goal of your proposal is to persuade your thesis committee members to approve your project. To do so, you must convince them of the following:

- That the project is worth doing insofar as it fills an existing need or advances research or technology in some significant way;
- That it is technically feasible and the necessary facilities and funding are available;
- That you have the technical expertise necessary to carry it out;
- That it can be completed in the time allowed;
- That you have a clear sense of what the project entails and of the methods involved in completing it successfully;
- That it is challenging for a senior engineering student.

1.2.5. Some Points about Content

On average, the three main content sections—the introduction, technical description, and conclusion—generally run about eight to twelve pages, but we have no set length requirements. Your proposal should cover the general points discussed below as concisely as possible.

1.2.5.1. Introduction

Briefly describe the nature of your proposed project early in the introduction, ideally within the first paragraph. Then provide relevant background information on your project and explain why it is worth doing. Include any theoretical and / or historical information which may help the committee member who is least familiar with the project to understand it well enough to place it in the appropriate context and to judge its appropriateness in terms of technical difficulty and scope. Also ensure that you have provided sufficient background information about the company (if applicable) and your role there to enable your academic supervisor to place the significance of the project in a more general context.

1.2.5.2. Central Sections

The central section(s) should inform your committee of how the project will proceed. Outline your intended method, time frame, and, if appropriate, the budget for the proposed project, providing as much detail as possible. Divide the project into an appropriate number of smaller tasks and discuss each separately being sure to consider the following:

- Give each task a brief descriptive title which clearly indicates what is involved in completing it;
- Describe the method involved, compare it to other methods, and point out the advantages of your approach;
- If appropriate, include a system block diagram to help your readers visualize the system or device you are working on;
- Discuss any technical risks and how you plan to deal with them. If any part of the proposed work is especially risky or may not pan out, include contingency plans;
- If appropriate, identify the deliverable or milestone which concludes the task (a report, an outline for documentation, or a completed prototype);
- Indicate the approximate time required to complete the task.

At the end of the central section(s), include a project schedule in the form of a Gantt chart which provides an overview of the tasks in the project and the time required to complete each. This chart should indicate the smaller tasks into which the project will be divided, the order in which you will undertake the tasks, and the approximate time devoted to each task. Note that these sub-tasks should be easily identified with the your discussions of them and should be listed in the same order you presented them in the text.

Figure 1 provides an example of a Gantt chart for a Thesis Proposal (adapted from Brian Hargreaves' thesis proposal, *Design of a Single-Channel Fiber Optic Digital Video Transmission System*, SFU, 1992, p. 8).

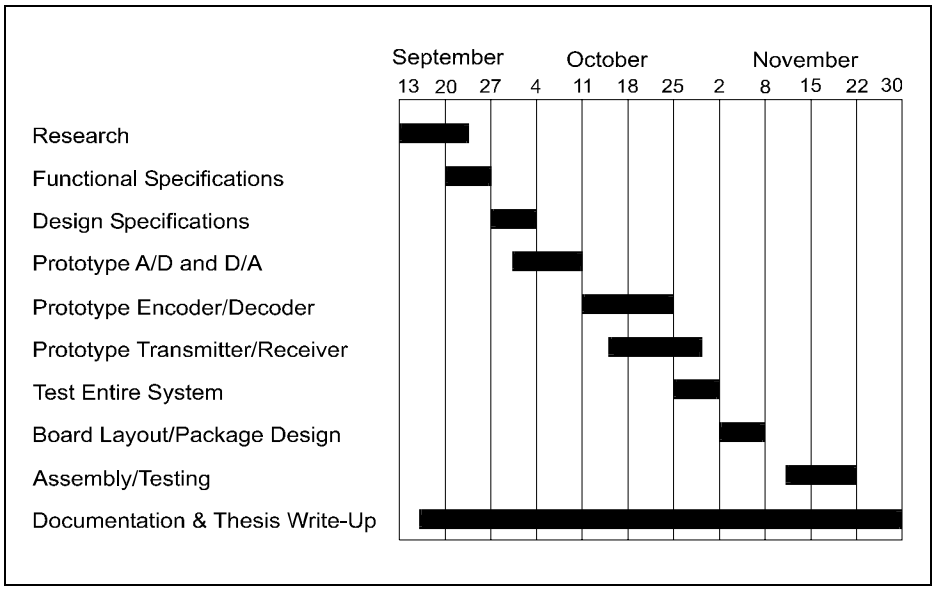


Figure 1: Project Schedule for a Thesis Proposal

1.2.5.3. Conclusion

While the conclusion may include a brief summary, it is also an important place to sell your project to your readers. Stress, expand upon, or add points that will convince your committee that your proposed project will both succeed and make a valuable contribution to your field. Be sure that your final sentence creates the sense of an ending.

1.2.6. Format Considerations

Please refer to the general guidelines for formatting documents in Module One of the *Engineering Science Handbook*. Your proposal should include the following pages or sections:

- Title Page
- Approval Form (see Figure 2)
- Table of Contents
- Lists of Figures and Tables (if appropriate)
- Introduction
- Central Section(s) describing tasks
- Conclusion
- References (if required)
- Appendices (if required)

Note that a thesis proposal does not require an abstract (unless your committee members ask for one). Nor do you need a list of figures or tables if only one or two are presented in the document.

1.2.7. Approval Form

Note that the sign-off procedure for your proposal requires an approval form as shown in Figure 2. **Create your own form using the appropriate titles for committee members as indicated earlier in this chapter.** Attach the approval form to the first complete draft you submit for review.

SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE

UNDERGRADUATE THESIS PROPOSAL

Name: _____ **Student #:** _____ **Option:** _____

Area of Research: _____

PROPOSED SUPERVISORY COMMITTEE

Academic Supervisor: _____

Technical Supervisor: _____ Company: _____

Committee Member: _____

TITLE OF PROJECT: _____

ACADEMIC SUPERVISOR: _____ Date Submitted: _____

Comments: _____

_____

APPROVED: _____ _____
Signature Date

TECHNICAL SUPERVISOR: _____ Date Submitted: _____

Comments: _____

_____

APPROVED: _____ _____
Signature Date

COMMITTEE MEMBER: _____ Date Submitted: _____

Comments: _____

_____

APPROVED: _____ _____
Signature Date

Figure 2: Thesis Proposal Approval Form

1.2.8. Deferrals

Late proposals will be accepted **only** if the Director of the School responds favorably to a *written* request. To request a deferral, write a letter to the Director outlining the reason why you need the deferral and providing a date by which the proposal will be approved and submitted. Have your academic supervisor note agreement with your request either on your letter or in a separate note. Give your letter along with comments from your academic supervisor to Annie Radisic, the Departmental Assistant. Requests for deferrals should be made before the end of the 12th week of classes.

1.3. Undergraduate Theses

- ✓ **Registration**
- ✓ **Deadlines**
- ✓ **Audience and Purpose**
- ✓ **Getting Started**
- ✓ **Content Information**
- ✓ **Format Information**
- ✓ **Deferral**
- ✓ **The Thesis Defense**

YOUR THESIS IS A FORMAL document in which you must demonstrate your command of the technical area under investigation. At the same time, it should include enough background material so that your readers can understand and follow what you did. For example, one of your peers should be able to duplicate your work using the information that you provide in your thesis. A thesis should also be cohesive in that each part should be relevant to explaining or solving the problem in question.

An undergraduate thesis written for the School of Engineering Science can be an individual or joint endeavor. If two students working on the same project co-write a thesis, they will both receive the same grade for their work. Two students working on the same project may write separate theses only if they are involved in different aspects of that project and can produce theses which differ substantially.

1.3.1. Registration

You cannot register for ENSC 499 by telephone. Pick up a registration form from Jackie Briggs (Undergraduate Secretary) in the ENSC office. After your *academic* supervisor has signed the form, return it to Annie Radisic, who will manually register you for the course.

1.3.2. Deadlines

The following time lines are ***deadlines***. Ideally, you should complete your tasks earlier.

Early in semester	Have met with or contacted committee members to review progress of project.
6th week of classes:	Detailed outline or partial draft should have been submitted to your supervisors and the communication lecturer for their initial responses. Any anomalies, such as a reference system other than the author-date system (see Chapter Two), should be approved by your committee and a communication lecturer.
10th week of classes:	Final draft submitted to all committee members and communication lecturer.
11th week of classes:	Final draft signed off by the communication instructor and the academic supervisor; defense date being arranged and room booked through undergraduate secretary. Note that you should allow at least two weeks between booking a room and the defense.
13th week of classes:	Thesis defended.
1st week of exams:	Final revisions completed and thesis ready for binding. **Note that if you wish to graduate in the semester immediately following your thesis semester, you MUST submit the revised thesis to Jackie 3 full weeks prior to convocation (ensure the approval page is sighed by all committee members, except for theDirector). If you wish to convocate on June 4th (or October 1st), your revised thesis MUST be submitted by May 14th (or September 10th) at 4:00 pm in the main office. IF YOUR REVISED THESIS IS NOT SUBMITTED BY THIS DEADLINE, YOU WILL NOT BE ABLE TO GRADUATE.**

Note that the above schedule assumes that 498 and 499 are completed in different semesters. If you are taking 498 and 499 at the same time, you must work out a schedule of deadlines with your committee members and a communication lecturer.

Also note that the above schedule only allows one week for the communication lecturer to read and sign-off your thesis. This schedule is only possible if you have previously had a significant portion of your thesis reviewed and have revised the rest accordingly. If you first hand in your thesis to the communication lecturer in the 10th week of classes and major revisions are required, you will not be able to defend by the 13th week of classes, and you may have your graduation delayed.

And finally, note that you cannot book a room for your thesis defense until the communication lecturer and your academic supervisor have signed the *Thesis Defense Approval Form* indicating your thesis is ready for defense. This form is available outside the communication lecturers' offices, and a completed copy of it must be provided to Jackie Briggs, the Undergraduate Secretary, in order to book a room.

1.3.3. Audience and Purpose

Write your thesis for your peers. Imagine that it will be read by other senior engineering students. Assume that your readers will not be specialists in your area and will likely be unfamiliar with some of the technical aspects of your project and with its practical applications. Keep in mind that providing such readers with appropriate background information is essential.

A successful undergraduate thesis will demonstrate your skill as a scientific-technical writer and your ability to integrate knowledge, to solve technical problems, to undertake and complete a challenging project, and to maintain professional standards. Your success will be judged both in terms of your technical content and communicative competence in presenting that content both in the thesis and during the oral defense.

1.3.4. Getting Started

Be sure to allow sufficient time to revise and polish your work. Most people underestimate the amount of time it will take to write a major piece of work and make matters worse by putting off writing to the last possible minute. This combination of wishful thinking and procrastination is particularly dangerous when writing a relatively long document on a long-term project. The most productive approach is to write sections of the first draft as your work progresses. By making writing an integral part of your thesis project—instead of a separate, final step—you can significantly reduce the sense of drudgery and frustration which often accompanies after-the-fact writing. By drafting in stages, you can also help ensure the success of your project because putting concepts into words clarifies your thinking, brings potential problems into focus, and identifies wrong turns.

1.3.5. Some Points about Content

It may be useful to think of your thesis as an extended technical report in which the introduction, central sections, and concluding section form separate chapters. Descriptions of the major content sections follow.

1.3.5.1. Abstract

The abstract provides readers with an accurate summary of the scope and content of the thesis. It should briefly describe your project, its significance, the method of your research or product development, your results, and your contribution to the field. The most common problem with thesis abstracts is that they abstract only the introductory elements of the thesis, failing to provide enough technical information and / or omitting any discussion of results.

Consider the abstract as a very short version of your thesis which could be published as a separate document. Use the past tense, minimizing technical language and ensuring that any technical terms you do use are either familiar to all potential readers or adequately defined. Include only information also found in the thesis.

1.3.5.2.Acknowledgments

Acknowledge the help you received from those who worked with you on your project or provided significant help in terms of advice, information, constructive criticism, financial support, or facilities.

1.3.5.3. Introductory Chapter

The introduction explains in general terms what the thesis is about and provides a context for your work. To decide what information your reader requires in terms of background context consider the following points:

- A thesis reporting on research requires a description of the state of the art and an explanation of how your research contributes to the field;
- A thesis describing a hardware development project requires an explanation of what motivated the project and a justification for investing time and money in it;
- All theses must provide relevant theoretical and / or historical background information necessary for the reader to understand the proj??ect, to place it in its appropriate context, or to judge its contribution to the field.

In the introduction, also explain what you have accomplished and what contributions you have made to the field. In addition, briefly describe the successes and, if appropriate, the shortcomings of your project. Finally, conclude with a road map for the rest of the thesis which orients your readers to what is to follow by indicating the organization and content of the thesis.

1.3.5.4. Central Chapters

The central chapters of your thesis are shaped by the nature of your project rather than by a standard format. Organization and content are determined by the decisions you make concerning the appropriate order in which to present your material, the relative importance of that material (whether it will appear under a major heading, sub-heading, or sub-subheading), and the level of detail required. Organizing and developing these chapters requires careful thought, imagination, advance planning, and a willingness to revise your initial plan or outline as the work progresses or as you write the thesis.

Although your thesis must contain sufficient detail so that someone could replicate or build upon your work, these central chapters should contain only as much detail as is necessary to describe your project fully and demonstrate its significance. Place such turgid details as mathematical derivations, computer programs, or elaborate circuit diagrams in appendices.

1.3.5.5. Concluding Chapter

The final chapter summarizes the preceding ones, but it also discusses any constraints, failures or weaknesses of your project, emphasizes its contribution to the field, and, if appropriate, indicates possible future research or describes on-going product development. Strive for a strong final word, perhaps by stressing the potential impact of your accomplishments or describing what you or others might accomplish if work on the project were to continue.

1.3.5.6. References

Refer to Chapter Two of this handbook for the recommended method of citing sources within the document and of listing references in the Reference section. For theses, this author-date system is preferable to the IEEE format which is designed to save space and is not as reader friendly.

1.3.5.7. Appendices

Place as much turgid detail as possible in appendices (for example, mathematical derivations, computer programs, elaborate circuit diagrams). Your thesis should contain all the detail necessary for replication, but much of this detail should appear in appendices rather than in the central chapters. Your chapters should provide sufficient detail and context so that your readers can appreciate the full significance of your accomplishments, but an appendix is the appropriate place for those details which are useful only to someone who plans to apply your work (perhaps by acting upon a proposal for future work presented in your final chapter).

1.3.5.8. Copyright

If you reproduce copyrighted material, including illustrations, you may need written permission from the copyright holder. Within certain limits, a number of publishers allow copying for educational purposes under the CAN copy agreement. One of the communication lecturers should have a copy of this agreement. Or ask one of the reference librarians about it.

1.3.6. A Few Issues of Format

Carefully review the general guidelines on format in Module 1. As well as the general guidelines, you must follow the following specific guidelines.

1.3.6.1. Sections of the Thesis

Include the following sections in your thesis in the order listed below:

- Title Page (see Figure 3)
- Approval Page (see Figure 4)
- Abstract
- Acknowledgments
- Table of Contents
- Lists of Figures and Tables
- List of Acronyms or Technical Terms
- Introductory, Body, and Concluding Chapters
- References (see Figure 5)
- Appendices

Please note that Appendix B provides a sample template for the format of your thesis. For users of LaTeX, this template is available from Jacques Vaisey. If you use Word for Windows, Steve Whitmore can show you how to set up a style sheet / template to simplify the task of formatting you thesis.

1.3.6.2. Margins and Paper

Margins must be at least 1.25 inches (3.2 cm) on the left side of the page and 1 inch (2.5 cm) on the top, bottom, and right sides. Ensure that page numbers, titles, and so on are within these margins as several mm will be trimmed from bound copies of the thesis. Use plain white, 8 1/2" by 11" (21 cm by 28 cm) 20-lb. *bond* paper.

1.3.6.3. Typeface and Print Quality

Use the same type face throughout, with the possible exception of appendices, which must nevertheless produce clear photocopies. Whether or not you

use proportional spacing or justification is up to you. (You may prefer the look of a justified page, but an unjustified one is easier to read.) The final draft of your thesis, with the possible exception of some appendices, must be laser printed.

1.3.6.4. Submitting the Post-Defense Draft

After defending your thesis and making final revisions, you must provide the School of Engineering with a carefully edited and corrected original and 3 photocopies of the thesis. At the same time, double check that you have obtained all the necessary signatures. These 4 copies are submitted to Jackie Briggs, the Undergraduate Secretary, who arranges for binding of the thesis. Normally, the original and 3 copies are sirlox bound: the original for the School, and copies for the technical supervisor, the academic supervisor, and the student. Please ensure that you request **WHITE** sirlox binding (using white allows the title to be written on the edge of the thesis making it easier to identify when it is filed on a shelf). If you would like your personal copy of the thesis hardbound, the cost is $20.00 which must be paid when you submit the copies. The Undergraduate Secretary will not send the thesis for binding until this fee is received. If you want more copies, either hard bound or sirlox bound, you are responsible for the cost, and these additional copies should be requested at the time of submission.

When the thesis has been duplicated, you must review all copies for accuracy before they go for binding. After the bound copies return from the binder, the technical supervisor will be mailed a copy and you will be advised by mail that the thesis is available for pick up or ready to be mailed (at an additional cost). Be sure that the Undergraduate Secretary has your current address, email, and phone numbers.

1.3.6.5. Sample Pages

Figure 3 and Figure 4 provide samples of a thesis title page and an approval page, respectively. Please note that the sample approval page is for a project conducted in industry. Variations in the supervisory committee are outlined earlier in this chapter.

TITLE OF THESIS
[In upper case letters, centered on appropriate number of lines]

by

Your Name(s)
[In upper and lower case letters]

A THESIS SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF APPLIED SCIENCE
in the School of Engineering Science

SIMON FRASER UNIVERSITY
[As shown here]

DATE
[Month Year]

All rights reserved. This work may not be
reproduced in whole or in part, by photocopy
or other means, without the permission of the author.

Figure 3: Sample Thesis Title Page

APPROVAL

Name:

Degree:

Title of Thesis:

[signature line]
[Name]
Director
School of Engineering Science, SFU

Examining Committee:

Chair and Academic Supervisor

[signature line]
[Name]
[Position]
School of Engineering Science

Technical Supervisor:

[Name]
[Position]
[Company]

Committee Member:

[Name]
[Position]
[School or Department]

Date Approved: _____

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Figure 4: Sample Thesis Approval Page

1.3.7. Deferrals

If something happens so that you can not meet the end-of-term deadlines, you must submit a written request for a deferral to the Director, preferably with a note of support from your academic supervisor. Letters should be given to the Departmental Assistant, Annie Radisic, no later than the 12th week of classes.

1.3.8. The Thesis Defense

A thesis cannot be officially accepted until it has been defended. Once your academic supervisor and the communication lecturer feels the thesis is ready to defend, you are responsible for coordinating an acceptable date for all committee members to attend the defense. **If you have a technical supervisor who is unable to attend the defense (this may be the case if the technical supervisor is from outside the Lower Mainland), then the technical supervisor should submit written comments and questions to your academic supervisor prior to the defense.** Once the date is set and your academic supervisor and the communication lecturer have signed the *Thesis Defense Approval Form*, you should contact the undergraduate secretary, Jackie Briggs, in the Engineering Science Administrative Office to book a room. You may also wish to post notices or send out an e-mail announcing the date and providing an abstract for the defense presentation.

In general, you are expected to give a 15 to 20 minute summary of the research and work upon which your thesis is based. Your talk should define what the problem is and then summarize how you attacked the problem and what results you obtained. You need not go into each and every point discussed in your thesis. The objective is to show your command of the material and to explain to the audience (who may not have read your thesis) the main results of your work. More generally, your aim is to make your presentation concise, interesting, informative, and professional. Of course, visual aids should be used to help achieve these goals. You should also spend a significant amount of time practicing and polishing your presentation.

1.3.8.1. Presentation

Following your presentation, you are expected to answer questions from faculty and observers. This question period generally lasts about an hour. Committee members and observers may ask questions from any area of your thesis work; however, the most common types are as follows:

- Clarifications;
- Questions probing your understanding of the technical issues;
- Questions about the validity of your assumptions;
- Questions asking you to explain why you took a certain approach;
- Questions about what would happen if something were changed;
- Questions about possible extensions to your work.

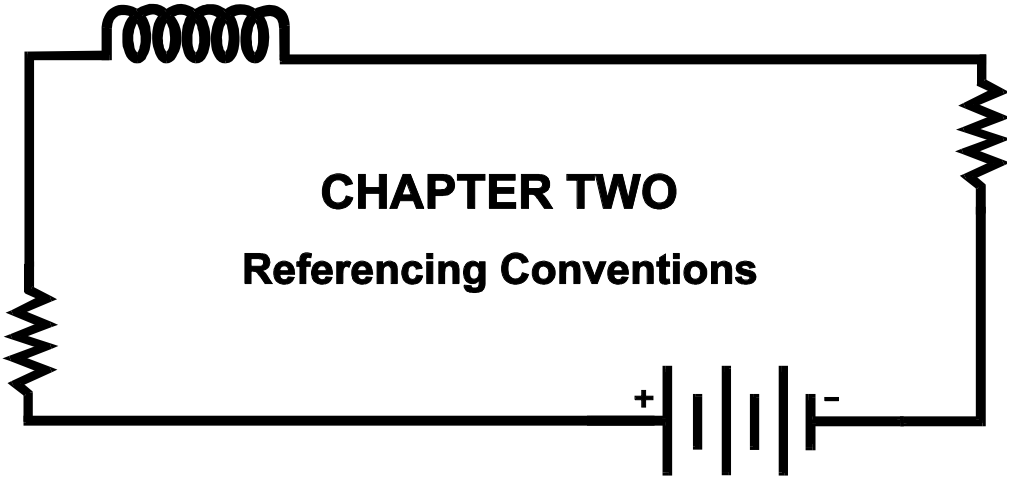
We advise you to prepare answers to what you think are the most likely areas for questions. But always expect the unexpected. And remember that if

you do not know the answer to a question, it is far better to admit it than to attempt an answer.

1.3.8.2. Outcome

When the question period is over, you and all the observers will be asked to leave the room while your committee members consider various issues related to your work (most notably, any revisions which you might be required to make) and decide the outcome of the defense. Finally, you will be asked to return to the room for final comments from the faculty.

A defense has several possible outcomes. If your work is deemed outstanding, you will be passed with distinction. You may also be passed without further revisions to your thesis or you may be passed but asked to make minor changes before submitting the thesis for binding. If your thesis requires major changes, your committee may defer a pass until a specific date by which time you must submit an acceptable final draft. In the unlikely event that you do not fulfill the thesis requirements, you will fail. However, this last outcome is highly unlikely if you have kept in close touch with the members of your committee, have had your thesis approved in principle by your academic supervisor, and have prepared carefully for the defense.

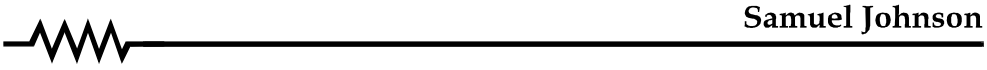


CHAPTER TWO

Referencing Conventions

Knowledge is of two kinds.
We know a subject ourselves, or we
know where we can find information upon it.

Samuel Johnson



2.1. Referencing Conventions

- ✓ **Citing by Author & Date**
- ✓ **Quoting**
- ✓ **List of References**

PROFESSIONAL ETHICS AND THE LAWS of copyright require that you acknowledge your reliance on other people's ideas whether you quote their words or use your own. The conventions for citing sources differ extensively from journal to journal, editor to editor, publisher to publisher, and discipline to discipline. In electronics-based engineering fields, for example, the traditional referencing conventions are those sanctioned by the Institute of Electrical and Electronics Engineers (IEEE).

In this approach, all references to a single source are followed by the same number, and the full reference is given in a numbered list at the end of the document. Unfortunately, this system was a major drawback for writers prior to the widespread use of word processors because every time they added, deleted, or reordered sources, they had to change the numbering system and reorder and renumber the reference list. More recently, of course, this problem has been resolved as the references can simply be treated as a type of endnotes when word processing.

Another, perhaps more important, drawback is for the reader who must check the reference list to discover the authority being cited. Because the IEEE convention was designed neither for the writer nor the reader, but to save space in the journal, it is not the best choice for reports, theses, or project documents.

For this reason, unless a supervisor requests otherwise, theses can generally use the more practical and user-friendly author-date system which is a general set of conventions widely used in the pure, applied, and social sciences. In this system, sources are cited by author and date (in parentheses within the text) and an alphabetically ordered reference list is provided at the end of the report.

The following outlines some issues to consider when using the author-date system.

2.1.1. Citing Sources by Author and Date

To cite references within a report, place the author's last name and the year of publication in parentheses:

> Recent research (Black, 1995) supports this explanation.

Several variations of this basic pattern are described below.

2.1.1.1. Two or More Publications by the Same Author in the Same Year

If an author has two or more publications in the same year, distinguish between them by appending lower case letters (*a, b, c,* etc.) to the year of publication (also use these letters after the dates in the reference list):

> (Black, 1995a; 1995b).

2.1.1.2. More than One Author

When a publication has two authors, include both names:

> (Smith and Jones, 1994).

When a publication has three authors, include all three names the first time you refer to it, but for subsequent references use the first author followed by *et al*.:

> (Smith, Jones, and Brown, 1996) for first reference; (Smith *et al*., 1996) for subsequent references.

When a paper has four or more authors, cite it as (Black *et al*., 1993) in the first citation.

2.1.1.3. More than One Source Cited

If you give two or more references together, separate them with semi-colons:

> (Smith and Jones, 1994; Smith *et al*., 1996).

If you list several sources by the same author, give the name once and then separate the various dates with semi-colons:

> (Brown, 1986; 1992a; 1992b; 1995).

2.1.1.4. No Author Given

When no author is given, but the source is published or sponsored by an association, corporation, government agency, or other group, the name of the group serves as the author's name (both in the citation and in the reference list). If neither an author nor sponsoring group are indicated, give the name of the publication. In either case, try to make the reference in the sentence rather than within parentheses:

> These estimates are based on data provided by the National Research Council (1995).

2.1.1.5. Unconventional Sources

For sources such as interviews, personal letters, or mail exchanges, give the full name of the person you communicated with and the nature and date of the communication:

> (John Brown, letter to the author, July 1996)
> (Bill Smith, telephone interview, 10 Sept 1996)
> (Susan Eaglets, mail exchange, Aug-Sept 1996)
> (Aaron Bates, email to the author, 4 Nov 1996)

You can create similar citations for films, videos, recordings, television programs, and the like. Do not worry about whether or not you are following *the* convention because one may not exist. You can always create your own convention, keeping two general principles in mind. First, create a citation that follows the same general pattern as conventional citations. Second, provide similar information to that usually included, but add any additional information readers need to locate the source (either in the citation or in the reference list)**.**

If you are *not* including a source in a reference list, include all necessary information in your citation. That is, identify the author, artist, director, or appropriate equivalent to an author. Provide the name of the piece or program or another appropriate equivalent to a title. Provide the name of a company, studio, station or other equivalent to a publisher, and, if possible, provide a date of publication or equivalent.

> (Buckner and Whittlesey, Directors, *Do Scientists Cheat?*, Videotape, Boston, MA, WGBH Educational Foundation, 1988)

If you are including a source in your reference list, then the citation should provide the equivalent of an author and a date. If the author is unknown, use the publisher or the title (whatever is available and appears first in your reference list.)

> (Buckner and Whittlesey, 1988)

Increasingly, research takes us online. While information you acquire from *Usenet Newsgroups* and the *World Wide Web* (WWW) home pages may have changed or disappeared by the time someone reads your paper or report, proper citations and references are nevertheless important. When you find information you might use, copy all available information, including author, title, date, name of the newsgroup or home page, *Universal Resource Locator* (URL), and anything else that might help readers not only find an available source, but also identify a deleted source so that a member of a newsgroup or the owner of a home page will know what the reader wants found.

> (XYZ Inc., *Thermistor Price List*, www.xyz.nz/~thermistors/pricelist/, 22 May 1996)

2.1.1.6. Additional Information often Included in Parentheses

Wherever possible, you should assist your reader in finding the information you have cited. To do so, place a volume, page, section, or equation number after the date, separated from the main citation by a comma:

> (Smith and Jones, 1984, 55) to refer to a single page, or
> (Smith *et al*., 1985, 14-17) to refer to more than one page;
> (Brown, 1986, sec. 11.5) if an entire section is relevant;
> (Black, 1987, eq. 10) to refer to an equation.

2.1.1.7. Omitting Information from Parentheses

Omit from the parentheses any information already given in the text. For example, if the author's name appears in the sentence, omit it from the citation. If both the name and date appear in the sentence, you can omit the parentheses or use them only for page, section, or equation numbers:

> This method was first proposed by Smith and Jones in 1984 (45-51).

2.1.1.8. Placing References Within a Sentence

Wherever possible place your reference at the end of the sentence (or just before a punctuation mark). Readers find it disruptive when the reference is placed between the subject and the verb. This is especially true when the reference is a lengthy one. Often you can revise the structure of a sentence to ensure that lengthy references come at the end.

Sometimes, however, this sort of restructuring is awkward and you may need to place your reference within the sentence. Note, for example, how changing the reference location in the following sentence could result in some ambiguity:

> Researchers (Smith and Jones, 1984) have reported findings which support this alternative explanation.

If you put the citation at the end of the sentence, it would appear that Smith and Jones provided the alternative explanation, rather than providing support for it. Consider another example:

> Existing methods (Brown, 1986; Black, 1987) fail to account for this potential problem.

Again, both Brown and Black describe existing methods, without necessarily being aware of the problem under discussion. If you put the citation at the end of the sentence, you would suggest that they were concerned with this problem.

2.1.2. Quoting

If you quote a "short" passage, that is, one less than four lines of text, enclose it in double quotation marks. The punctuation for the sentence will come after your parenthetical reference:

> One of the requirements is that "Each bid must be accompanied by a certified check or cash to the amount of nine thousand dollars" (Brantwurst, 1989, 46).

If you quote a "long" passage, that is, one which contains more than four lines of text, do not enclose it in quotation marks, but offset it from the rest of your text by beginning on a new line and indenting the entire quotation:

> Eric Brantwurst notes the following requirement:
>
> > Each bid must be accompanied by a certified check or cash to the amount of nine thousand dollars. All certified checks must be drawn on some responsible bank doing business in the city of Vancouver, and shall be made payable to the City of Vancouver. (1989, 45)

Note that if your document is double spaced, a long quotation is usually single spaced. Also note that the punctuation mark precedes the parenthetical reference if the quotation is indented.

If you quote a passage that itself contains a quotation, indicate the quotation within the quotation in one of two forms, depending on whether your quotation is short or long. If your quotation is short, your source's quotation will be reformatted in single quotation marks:

> Dagwood Brunster recalls an extraordinary engineering feat: "Sam Williams, the chief engineer, shrieked at all of the layabouts who were drinking coffee laced with rum, 'Get off your duffs, or I'll recall your engineering licenses, and throw you overboard to boot!'" (1989, 47).

If your quotation is long, your source's quotation will remain as is, in double quotation marks:

> Dagwood Brunster recalls an extraordinary engineering feat:
>
> > Sam Williams, the chief engineer, shrieked at all of the layabouts who were drinking coffee laced with rum, "Get off your duffs, or I'll recall your engineering licenses, and throw you overboard to boot. Move it before you lose it!" Shortly, they were all back at work, sweating profusely under the warm Arctic summer sun. (1989, 47-48)

In the latter example, note the quotation comes from two consecutive pages. The parenthetical reference (1989, 47-48) indicates that your quotation consists of a passage on page 47 that is continued on page 48.

Another issue to consider when quoting is that the syntax of the quotation must agree with the syntax of your text. You must therefore check the tense of the quotation and if it is plural or singular. You should adapt your sentence to match the syntax of the quotation. If you must change a verb in the quotation to ensure that it agrees with the syntax of your sentence or change a pronoun to a noun for clarity, enclose the addition in square brackets: *[were]* or *[the President]*.

Finally, you should also ensure that the quotation is grammatically correct. If the quotation contains a grammatical, spelling, or other error, you can indicate that you are aware of the mistake in the quoted text by placing *[sic]* after the error.

2.1.3. Preparing a List of References

The following descriptions and examples cover the most common types of references. As you read through them, take careful note of the indentation, punctuation, capitalization, and use of quotation marks and italicization. Also note that journal titles and conference names are usually abbreviated to save space. If you are unsure of the appropriate abbreviation, use full titles in your reference list.

You should also familiarize yourself with the following conventions to ensure that you know what information to record while you have access to a particular reference source. You will save a lot of time and effort if you incorporate the reference into your text and if you add the reference to your reference list when you are initially using the material. Few things are more frus-

trating than being required to go back and retrieve a source several weeks or months after using it. Also note that the convention for the following examples is common in the Sciences and Applied Sciences, but is not used consistently. Variations in referencing conventions are discussed at the end of this section.

2.1.3.1. Journal Articles

Author(s). [last name first for first author listed followed by initials]. Date. [Month and Year]. Title. [Capitalize only the first word of the title]. *Name of the Journal.* [italicized]. Volume, page numbers. [end with a period].

Brady, P. T. September 1969a. A technique for investigating on-off patterns of speech. *Bell Syst. Tech. J.* Vol. 48, 2445-2471.

-----. December 1969b. A model for generating on-off speech patterns in two-way conversation. *Bell Syst. Tech. J.* Vol. 49, 3001-3049.

Osborne, W. P. and M. B. Luntz. August 1974. Coherent and noncoherent detection of CPFSK. *IEEE Trans. Commun.* Vol. COM-22, 1032-1036.

Note the second example above. If you list the same author or authors for more than one entry, replace the name(s) on subsequent entries with five unspaced hyphens. Also note the third example above. Put the last name before the initials only for the first author if more than one author is listed.

2.1.3.2. Articles in Collections Other than Journals

Author(s). Date. Title. *Title of Publication*. Names of editors [if appropriate]. Publishing information [place of publication: publisher or place of conference if publishing information not provided], page numbers. [Note the colon between place of publication and publisher.]

Batcher, K. E. 1968. Sorting networks and their applications. *Proc. AFIPS 1968 Spring Joint Comput. Conf.* Montvale, NJ: AFIPS Press, Vol. 32, 307-314.

Burg, J. P. 1967. Maximum entropy spectral analysis. *Proc. 37th Meet. Soc. Explor. Geophys.* Oklahoma City, OK.

Cappello, P. R. and K. Steiglitz. 1981. Digital signal processing applications of systolic algorithms. *CMU Conference on VLSI Systems and Computations.* H. T. Kung, B. Sproull, and G. Steel, Eds. Rockville, MD: Computer Science Press.

2.1.3.3. Unpublished Conference Papers

Author(s). Date. “Title,” presented at Conference name, Place.

Divsalar, D. and J. K. Omura. June 1979. Performance of mismatched Viterbi receiver on satellite channels. Presented at Int. Conf. Commun., Boston, MA.

2.1.3.4. Unpublished Theses or Dissertations

Author. Date. *Title.* [Italicized with major words capitalized]. Degree, University, Place.

Haavik, S. J. 1966. *The Conversion of the Zeros of Noise*. M.Sc. thesis, Univ. Rochester, Rochester, NY.

2.1.3.5. Books

Author(s). Date. *Title* [Italicized with major words capitalized]. Volume (if applicable), edition if other than first (i.e., 2nd ed.). Place of publication: publisher. [Note the period before publishing information and the colon after place of publication].

Weinstock, R. 1952. *Calculus of Variations with Applications to Physics and Engineering.* New York: McGraw-Hill.

A sample reference list is provided in Figure 5. Note that you single space the individual items, but double space between them.

Note that underlining is sometimes used to indicate italics. Underlining is a holdover from the time when typewriters were common and specialized fonts were rare. It represents a convention for telling the typesetter to set the underlined text in italics when the document was destined for formal publication. Underlining is becoming increasingly rare because it cuts off the descenders on lower case letters, and, in any case, support for italicized fonts by word processors and printers have eliminated the need for this use of underlining.

References

Batcher, K.E. 1968. "Sorting networks and their applications," in *Proc. AFIPS 1968 Spring Joint Comput. Conf.* Montvale, NJ: AFIPS Press, Vol. 32, 307-314.

Brady, P.T. September 1969a. "A technique for investigating on-off patterns of speech," *Bell Syst. Tech. J.* Vol. 48, 2445-2471.

-----. December 1969b. "A model for generating on-off speech patterns in two-way conversation," *Bell Syst. Tech. J.* Vol. 49, 3001-3039.

Burg, J.P. 1967. "Maximum entropy spectral analysis," in *Proc. 37th Meet. Soc. Explor. Geophys.*, Oklahoma City, OK.

Cappello, P.R. and K. Steiglitz. 1981. "Digital signal processing applications of systolic algorithms," in *CMU Conference on VLSI Systems and Computations*, H.T. Kung, B. Sproull, and G. Steel, Eds. Rockville, MD: Computer Science Press.

Divsalar, D. and J.K. Omura. June 1979. "Performance of mismatched Viterbi receiver on satellite channels," presented at Int. Conf. Commun., Boston, MA.

Haavik, S.J. 1966. *The Conversion of the Zeros of Noise.* M.Sc. thesis, Univ. Rochester, Rochester, NY.

Osborne, W.P. and M.B. Luntz. August 1974. "Coherent and noncoherent detection of CPFSK," *IEEE Trans. Commun.* Vol. COM-22, 1032-1036.

Weinstock, R. 1952. *Calculus of Variations with Applications to Physics and Engineering.* New York: McGraw-Hill.

Figure 5: Sample Reference List Following Author-Date System

2.1.3.6. Variations in Reference Lists

As mentioned earlier, referencing conventions are far from standardized and vary greatly among disciplines, fields, publications, and companies. However, certain trends are worth noting, including general stylistic differences

between pure, applied, and social sciences on the one hand and the arts and humanities on the other. These differences are presented in Table 1:

Table 1: Comparison of Arts and Sciences Referencing Conventions

Arts/Humanities Style	Science/Social Science Style
• Author's given name spelled out	• Only use initials for given names
• Date of publication at the end	• Date of publication after author
• Main words in titles capitalized	• Only first word and proper nouns in titles capitalized
• Full titles for books and articles	• Subtitles usually omitted
• Titles of articles in quotation marks	• No quotation marks to indicate articles
• Titles of publications may be written out in full	• Titles of publications usually abbreviated

For example, compare the two versions of the following entry:

> Wise, Penelope. "Money Today: Two Cents for a Dollar." *No Profit Review* 2 (1987): 123-42.
>
> Wise, P. 1987. Money today. *No Profit Rev*. 2:123-42.

Of course, the shorter entry represents the science-oriented style you will most often use. However, knowing something about the other style is useful when writing papers for humanities courses and when working on interdisciplinary projects. Also note that the version of the science style above is a middle-of-the-road option. You could use a somewhat longer or an even shorter entry:

> Wise, P. 1987. Money Today: Two cents for a dollar. *No Profit Rev*. 2:123-42.
>
> Wise, P. 1987. *No Profit Rev*. 2:123-42.

What variation of the style you use may be a matter of the style adopted by a publisher or an instructor, but when you have a choice, it should be governed by your reader's needs and expectations. The longer version above provides more information for the reader by providing a subtitle that provides more indication of the content of the article. The shorter version provides just enough information for the reader to find the source, which may be all some readers require. Whatever variation you choose, be consistent throughout a document.

At the beginning of this section on referencing conventions, we mentioned the IEEE style. While the author-date system is more common across fields, systems using numbers as references are standard in some fields such as electrical and electronics engineering. The variation in this general approach is between numbering sources according to the order in which they are cited (IEEE format) and numbers assigned sources based on alphabetical order. An example reference list using the IEEE style follows.

[1] B. Oakley, II, "HyperCard courseware for introduction to circuit analysis," in Proc. ASEE Annu. Meet., 1991, pp. 496-500.

[2] *Microsoft Video for Windows,* Microsoft Corp., 232-100-901, 1994.

[3] K. L. Conway, "Putting technology in its place: the classroom," *Institute for academic Technology*, Spring 1991, p. 5.

[4] P. R. Keller and M. M. Keller, *Visual Cues*, Los Alamitos, CA: IEEE Computer Society Press, 1993.

Did you examine the style of entries closely enough to notice that like the humanities style, IEEE format uses quotation marks for articles and puts dates at the end? If so, you may also have noticed that only the first word of titles are capitalized as expected for a science-based style. Also note that unlike either generalized style, items are separated by commas and page numbers are indicated by *p.* for a single page and *pp.* for two or more pages.

We draw your attention to IEEE conventions to emphasize a point. Referencing conventions vary widely. Even within the IEEE, conventions vary slightly from one society to the next. And so, whenever your situation changes or you are asked to publish, take a careful look at examples of appropriate referencing conventions.

For a little practice, study the following reference list representing the American Society for Engineering Education style and note the similarities to and differences from the IEEE example above:

1. Tonso, K. L., "Becoming Engineers While Working Collaboratively: Knowledge and Gender in a Non-Traditional Engineering Course," Part of Margaret Eisenhart's Final Report to the Spencer Foundation entitled "The Construction of Scientific Knowledge Outside School," 1993.

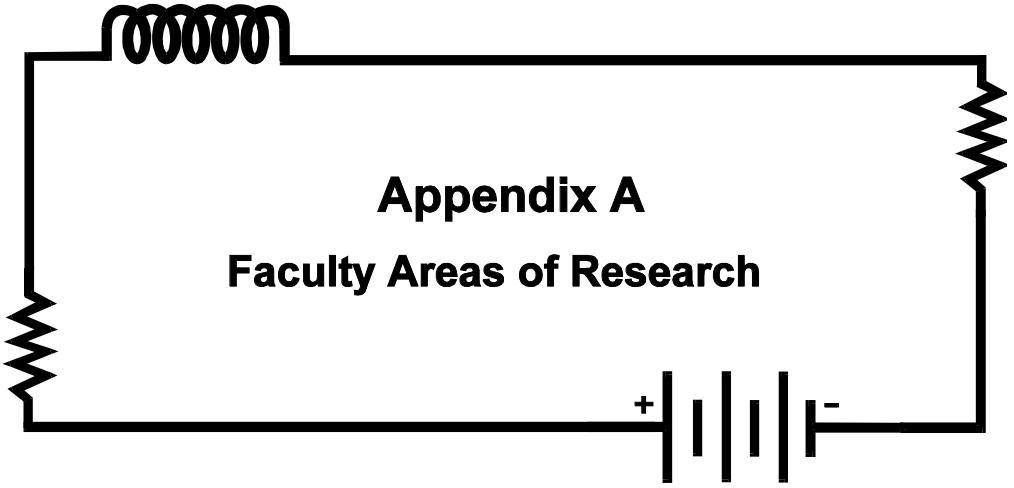
2. Lunsford, A., Ede L., "Why Write...Together: A Research Update," *Rhetoric Review*, 5, 1986, pp. 71-76.

3. Gere, A. R., *Writing Groups: History, Theory, and Implications*, Southern Illinois University Press, Carbondale, Illinois, 1987, pp. 55-76.

4. "Learning Together Makes a Difference," *The Teaching Professor*, June/July, 1994, p. 5.

As you have surely noted, the format is different, but did you also notice that the last name comes first for second (and subsequent) authors, that all the major words in a title are capitalized, and that subtitles are provided? And did you note the shared use of commas to separate entries and *p.* and *pp.* before page numbers? An eye for detail is extremely useful when the time comes to prepare a reference list, but note that style sheets are often available, providing both instructions and examples to follow.

Finally, keep in mind that what may seem to be needlessly fastidious detail has a purpose: following the conventions of a given group right down to the way it cites sources and prepares reference lists helps establish your identity as a member of that group. Conventions of style, format, and organization change from group to group, and the ability to appreciate the differences is part of your education and preparation for an increasingly interdisciplinary profession.



Appendix A

Faculty Areas of Research

What greater or better
gift can we offer the republic
than to teach and instruct our youth.

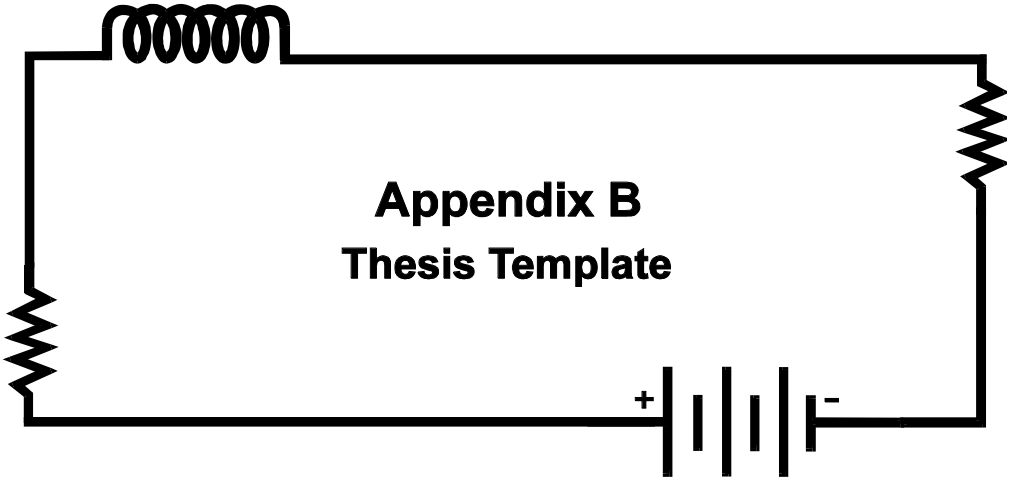
Cicero

3.1. Faculty and Staff Areas of Research

Parveen Bawa *Associate, Kinesiology*	Experiments and computer models: spinal circuits, spinal neurons, reflexes, muscle properties.
John S. Bird	Statistical signal processing, system performance analysis, underwater acoustics and optics, radar, sonar and communications applications.
C.R. Bolognesi	High-speed compound semiconductor device design, fabrication and characterization; new high-performance heterostructure materials for electronic / optoelectronic devices.
Thomas W. Calvert	Information processing in people and machines, bio-medical applications, computer graphics and animation.
James K. Cavers	Mobile communications, signal processing, network protocols.
Glenn H. Chapman	Microelectronics (fabrication, defect avoidance techniques, device physics), laser processing of materials, VLSI / wafer scale integration, computer aided engineering.
M. Jamal Deen	Microelectronics, low temperature electronics, semiconductor devices, device reliability, IC technology.
John C. Dill	Computer graphics, computer aided engineering, design and manufacturing.
Robert Frindt *Associate, Physics*	Condensed matter Physics, nano-composites, surfaces and interfaces
William A. Gruver	Robotics and automation, grasping and manipulation, motion planning and control, industrial automation, applications to prosthetics, manufacturing, and hazardous environments.
Kamal K. Gupta	Computer vision, robotics, interpretation of three dimensional scenes, motion planing, spatial reasoning.
R. H. Stephen Hardy	Computer networks, very large scale integrated implementation of communications protocols, interaction between network and device technologies and network performance.
Paul K. M. Ho	Modulation techniques, signal processing, communication theory, adaptive error control techniques.

Rick Hobson *Associate, Computing Science*	VSLI/FPGA systems; vector computer design; parallel computer design; arithmetic functions; interpreter design.
Andy. Hoffer *Associate, Kinesiology*	Methods for extracting sensory signals from nerves; closed-loop control of electrical stimulation of paralyzed muscles; design and fabrication of neural interfaces.
Frank Huang	Power electronics, electrical drives, factory automation, real-time and embedded systems.
John D. Jones	Applications of artificial intelligence to engineering design, design for manufacturing, finite-element analysis, heat transfer and thermodynamics.
Albert M. Leung	Microelectronics, integrated circuit technology, integrated sensors.
Patrick Leung	Electronic systems implementation, programmable logic device architecture, digital signal processor applications.
Ash Parameswaran	Silicon micromachining, integrated microelectronics and micromechanical sensors and actuators, commercial IC process compatible sensor and actuator design, IC design microelectronic processing, process and device simulation.
Shahram Payandeh	Robot mechanics and control, kinematics of mechanisms, grasping and manipulation, knowledge-based approaches in robotics.
Andrew H. Rawicz	Reliability physics and engineering, VLSI reliability, physical transducers, integrated sensors, film technology, nonlinear optics, materials processing in microelectronics.
Mehrdad Saif	Control theory, large scale systems, optimization theory and application to engineering systems.
Shawn Stapleton	Passive RF/microwave circuits, GaAs monolithic microwave integrated circuits, nonlinear RF/microwave devices, active RF/microwave circuits.
Susan Stevenson	Rhetoric, the role of communication programs in engineering education and, more generally, their role in fostering critical thinking, engineering ethics, cross-cultural communication, and advanced English-as-a-second-language instruction.
Marek Syrzycki	Microelectronics. semiconductor devices, digital and analog VLSI design, integrated circuit technology, integrated sensors, IC fabrication defects, yield and reliability of VLSI IC's.

Ljiljana Trajkovic	Data communications (collection, characterization, and modeling of traffic in high-speed networks), computer-aided design tools (novel algorithms for simulation of transistor circuits), theory of nonlinear circuits and systems.
Jacques Vaisey	Image compression and processing, signal processing, digital communications.
Steve Whitmore	Writing processes of Engineers, project documents and writing in industry, writing and desktop publishing with computers, instructional methods and psychology, advanced composition, information processing in relation to style and format, group dynamics and project management.
Bill Woods	Microelectronic processes (assembly, packaging, and materials), electronic packaging, cleanroom facilities (standards and practices).



Appendix B
Thesis Template

A good imitation is
the most perfect originality.

Voltaire

4.1. Thesis Template

The following template was devised by Jacques Vaisey (and somewhat embellished by Steve Whitmore). It is provided to assist you with formatting your undergraduate thesis. For users of LaTeX, a soft copy of the template is available from Jacques; for users of Word for Windows, Steve can show you how to set up a style sheet and template for your thesis.

ON THE INTEGRATION OF ANTS AND LEAVES IN A BALANCED DIET

by

Fred Sloth

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
BACHELOR OF APPLIED SCIENCE
in the School
of
Engineering Science

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SIMON FRASER UNIVERSITY
July 7, 1995

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APPROVAL

Name: Fred Sloth

Degree: Bachelor of Applied Science

Title of Thesis: On the Integration of Ants and Leaves in a Balanced Diet

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Critter's Dietary Supplements Inc.

Committee Member:

Dr. Eagle Eye
Associate Professor
School of Engineering Science

Date Approved: _____

Abstract

Put your abstract here.

Acknowledgments

I would like to thank my senior supervisor, Dr. A. Aardvark, for her support and guidance throughout this meal.

Contents

List of Figures

List of Tables

Same format as list of Figures.

Abbreviations

Include a list of abbreviations here if you like.

Chapter 1

Introduction

This is the first chapter. Others can be added in a similar manner.

1.1 Away We Go

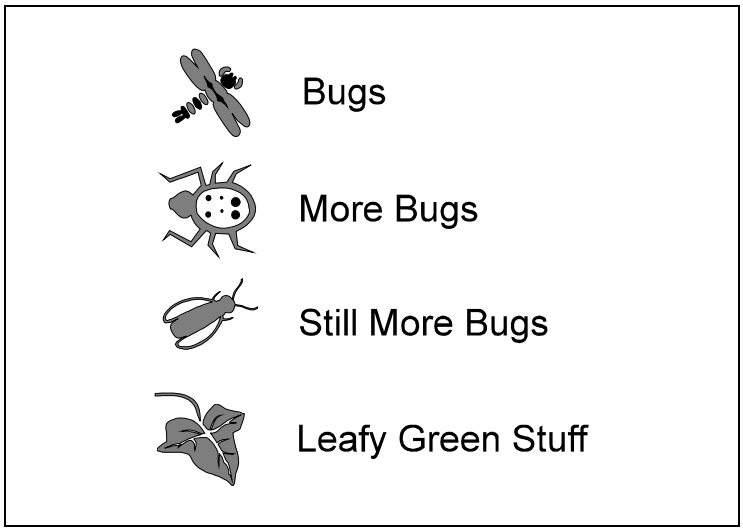

Figure 1.1: Symbols for the Four Basic Food Groups

Appendix A

Seven Types of Tasty Ants

References

Sloth, F. and A. Ant. April 1983. “The delicacies of the forest,” *Transactions on Munching*, MUN - 31, 532-540.