

Dickinson College
Department of Mathematics and Computer Science

Honors Thesis Guide

In the pursuit of departmental honors, students are required produce four written documents for submission either to the full department faculty or to their thesis committee. The purpose of this guide is to describe the scope, purpose and format for these documents. For details on the deadlines for submission of the required documents see the "*Requirements for Departmental Honors*."

Scope and Purpose of Required Documents:

Statement of Intent: The statement of intent serves to notify the department faculty of the intention to pursue departmental honors and that both a research advisor and a research area have been identified. This document is intended to be short, typically only 1 to 2 pages. It is not necessary for this document to pose a specific research question. However, it must briefly outline the area which will be researched and describe its relationship to the major field of study (Mathematics or Computer Science). In addition, the research sketch should contain a bibliography of the reading to be completed in the summer between the Junior and Senior years.

Formal Research Proposal: The formal research proposal poses the specific research question that will be investigated, surveys the relevant literature to place the question in context and describes how the research will be performed. This document serves to provide the department faculty with the opportunity to assess whether the proposed work is appropriate for the pursuit of departmental honors. The faculty may also use this opportunity to provide early feedback on the direction, scope or method of the proposed research.

Research Report: The research report is a complete accounting of the research performed to date. As with the formal research proposal, the research report poses the specific research question that is being investigated and surveys the relevant literature to place the question in context. The research report then goes on to describe what has been accomplished thus far and presents any preliminary results that have been obtained. The research report concludes by discussing the work that remains to be completed. This document serves to update the thesis committee on the progress that has been made. It also provides the thesis committee with an opportunity to give feedback on the pace of the work as well as the quality of both the research and the writing.

Honors Thesis: The honors thesis describes the entirety of the research performed. The honors thesis states the specific research question that was investigated and surveys the relevant literature to place the question in context. In addition the honors thesis fully describes the work that was performed, summarizes and analyzes the results, draws conclusions, discusses the limitations of the work and how the limitations might be addressed by further work. The honors thesis is the primary source of information that will be used by the department and the thesis committee in determining if departmental honors are to be awarded.

Format of Required Documents:

The following pages describe the formatting requirements for the Research Report and the Honors Thesis documents. The Statement of Intent and Formal Research Proposal may take any form approved by your research advisor.

Reference & Citation Format:

References and citations appearing in the honors thesis must use a uniform, consistent and accepted format. Your research advisor may provide you with an example of a format that is commonly used in your field.

In lieu of a specific format specified by your advisor you may use the American Psychological Association (APA) style. This section presents a small set of examples that will cover many of the types of references and citations that will appear in an honors thesis. If a particular type of reference or citation is needed, but does not appear in this section, please see one of the many published or on-line APA style guides.

Citation Format:

Citations in the APA style appear either as the year of publication in parenthesis following the use of the authors' name(s) in the text, or as the authors' names and a year of publication in parenthesis at the end of a sentence. For example:

Gould (1989) suggests that co-evolutionary dynamics may be a source of innovation and adaptation in evolution.

It has been suggested that co-evolutionary dynamics may be a source of innovation and adaptation in evolution (Gould, 1989).

When multiple sources are used as references for a single statement, the second form of citation is preferable. In such a case, all sources are listed in a single set of parenthesis and are separated by semicolons. For example:

Researchers in the field of artificial life have studied the factors that affect the genetic assimilation of acquired characteristics through the evolutionary phenomenon commonly known as the Baldwin effect (Hinton & Nowlan, 1987; Mayley, 1996; Ackley & Littman, 1991).

Reference Format:

Books:

Gould, S. (1989). *Wonderful life: Burgess shale and the nature of history*. New York, NY: W. W. Norton.

Driver, P. & Humphries, N. (1988). *Protean behavior: The biology of unpredictability*. Oxford: Oxford University Press.

Cormen, T., Leiserson, C., Rivest, R., & Stein, C. (2001). *Introduction to Algorithms* (2nd ed.). Cambridge, MA: The MIT Press.

Roeder, K., Howdeshell, J., Fulton, L., Lochhead, M., Craig, K., Peterson, R., et.al. (1967). *Nerve cells and insect behavior*. Cambridge, MA: Harvard University Press.

Journal Articles:

Mayley, G. (1996). Landscapes, learning costs and genetic assimilation. *Evolutionary Computation*, 4(3), 213-234.

Hinton, G. & Nowlan, S. (1987). How learning can guide evolution. *Complex Systems*, 1, 496-502.

Nolfi, S., Elman, J. & Parisi, D. (1994). Learning and evolution in neural networks. *Adaptive Behavior*, 3(1), 5-28.

Articles in Edited Books or Conference Proceedings:

Belew, R. (1989). When both individuals and populations search: Adding simple learning to the genetic algorithm. In J. Schaffer (Ed.). *Proceedings of the third international conference on genetic algorithms* (pp. 34-41). San Mateo, CA: Morgan Kaufmann.

Ackley, D. & Littman, M. (1991). Interactions between learning and evolution. In C. Langton, C. Taylor, J. Farmer & S. Rasmussen (Eds.). *Proceedings of Artificial Life II* (pp. 487-509). Reading, MA: Addison-Wesley.

Hamilton, W. (1982). Pathogens as causes of genetic diversity in their host populations. In R. Anderson (Ed.). *Population Biology of Infectious Diseases* (pp. 269-296). Berlin: Springer-Verlag.

On-line Journal:

Randall, M. & Tonkes, E. (2002). Intensification and diversification strategies in ant colony system. *Complexity International*, 9. Retrieved June 10, 2003 from <http://journal-ci.csse.monash.edu.au/vol09/ranal01/>.

Web Site:

Obitko, M. (1998). Introduction to genetic algorithms with java applets. Retrieved June 10, 2003, from <http://cs.felk.cvut.cz/~xobitko/ga/>.

Thesis Formatting:

The following pages provide examples of the formatting requirements for the Research Report and Honors Thesis documents. Every effort should be made to ensure that the documents submitted to your research advisor follow these formatting examples.

The Title of your Honor's Project Goes Here
Using Multiple Lines if Necessary (20 pt)

by

<Your Name Here (16 pt)>

Submitted in partial fulfillment of Honors Requirements
for the <Major> Major
Dickinson College, <academic year>

<Title & Name>, Supervisor
<Title & Name>, Reader
<Title & Name>, Reader

<Month> <Day>, <Year>

<page number, i - does not appear>

The Department of Mathematics and Computer Science at Dickinson College hereby accepts this senior honors thesis by <Your Name Here>, and awards departmental honors in <Major>.

<Advisor's Name> (Advisor)

Date

<Name> (Committee Member)

Date

<Name> (Committee Member)

Date

<Use additional lines as necessary>

Date

<Chair's Name> (Department Chair)

Date

Department of Mathematics and Computer Science
Dickinson College

<Month> <Year>

<page number, ii - does not appear>

Abstract

The Title of your Honor's Project Goes Here
Using Multiple Lines if Necessary (16 pt)

by
<Your Name Here (12 pt)>

The text of the abstract appears in a 12-point serif font such as Times. The abstract is fully justified and double-spaced. More than one page may be used if necessary. However, an effort should be made to limit the abstract to a single page.

Acknowledgments

Any acknowledgments that you would like to make thanking those who have been particularly helpful and/or supportive of your work. The text of the acknowledgments appears fully justified and double spaced in a 12-point serif font such as Times.

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Chapter 1

<CHAPTER ONE TITLE HERE (14 pt)>

1.1. Title of Section 1.1

Each chapter begins on a new page. The word "Chapter" followed by the chapter number appear centered and underlined in a boldface 14-point serif font (i.e. Times) on the first line of the page. Following one blank 14-point line, the chapter title appears in all capital letters in boldface 14-point serif type. Following three blank 14 point lines, the section heading appears in bold 12-point serif type.

All body text is 12-point serif type. The body text is double-spaced and is fully justified. All Paragraphs are indicated by a 1/2 inch indentation of the first line of the new paragraph. There is no additional spacing between paragraphs.

Page margins are 1.25 inches on the left edge, and 1.0 inch on the top, right and bottom edges. Page numbers appear centered, one half inch from the bottom of each page.

1.1.1. Title of Sub-Section 1.1.1

Sub-section headings appear in 12-point bold italic serif type and are three blank 12-point lines below the preceding paragraph.

1.2. Title of Section 1.2

...

Chapter 2

<CHAPTER TWO TITLE HERE (14 pt)>

2.1. Title of Section 2.1

Figures appear centered with a caption below, for example see figure 2.1. Figures are numbered sequentially within chapters, for example the first figure in chapter 2 will be figure 2.1. Figure captions are single spaced, set in a 12-point serif font and are indented 1 inch on both the left and right.



Figure 2.1: The Dickinson College Logo, not to be confused with the Dickinson College Seal.

A single blank 12-point line appears above the figure, between the figure and the caption and below the figure caption.

2.2 Title of Section 2.2

Equations appear indented 1/2 inch from the left margin, for example see equation 2.1. Equations are numbered sequentially within chapters and equation numbers appear in parenthesis 1/2 inch from the right margin.

$$\frac{d}{dx} f(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad (2.1)$$

A single blank 12-point line appears both above and below the equation.

2.3. Title of Section 2.3

Tables are numbered sequentially within chapters and independently of figures. For example the first table in chapter 2 will be table 2.1. Tables appear indented 1 inch from the left margin with a caption above, for example see table 2.1. Table captions are single spaced, set in a 12-point serif font and are indented 1 inch on both the left and right.

Table 2.1: Student application and enrollment data for Dickinson College from 1999-2001.

<u>Year</u>	<u>Applications</u>	<u>Enrollment</u>
1999	3434	620
2000	3801	594
2001	3820	611

A single blank 12-point line appears above the table caption, between the caption and the table and following the table.