



SCHOOL OF  
CONTINUING  
STUDIES

# **FORMAT GUIDELINES FOR THE MASTER'S THESIS IN PREDICTIVE ANALYTICS**

Northwestern University  
School of Continuing Studies

Formatting questions not addressed in this document should be directed to  
Student Advising in the School of Continuing Studies

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## **OVERVIEW THE MASTER'S THESIS IN PREDICTIVE ANALYTICS**

The capstone project or thesis in the MSPA program represents an opportunity to conduct original applied research under the supervision of a capstone project advisor or supervisor. Capstone projects are evaluated by a team of two readers, one of whom can be a professional with appropriate skills and expertise external to Northwestern University and one of whom must be a Northwestern University faculty member. The first reader is the student's primary advisor, supporting the student through a quarter of regular capstone advising. After the first reader approves of the capstone, the second reader reviews it. Both readers must be approved in advance by the academic adviser for the MSPA program in the School of Continuing Studies.

The capstone project is a wholly individual effort and represents an opportunity to apply specific skills gained through sustained independent study. The project must consist of original intellectual analysis of a predictive analytics problem. The capstone project is likely to draw upon and integrate a number of different perspectives or analytical approaches reviewed in courses in MSPA program. Typical projects come in one of three forms: (1) business case study, (2) simulation experiment, or (3) predictive analytics competition.

**Business Case Study.** This type of project often arises within the student's work setting and is usually supervised by a predictive analytics practitioner. The student identifies a problem that a manager faces and data relevant to the problem. The student analyzes the data, develops a predictive model, and uses that model to make recommendations to management. A detailed description of the case study problem and data set is prepared as part of the project documentation.

**Simulation Experiment.** A project of this type is often an extension of work done in previous courses and is usually supervised by a predictive analytics faculty member. Alternative modeling methods, traditional and/or data-adaptive, are selected for evaluation. Experimental data consist of random draws from an actual data set or simulated data generated to conform selected distributional assumptions. Relevant factors, including modeling method, distribution type, and sample size define the experimental design. Statistical criteria are defined for evaluating the predictive accuracy of methods. The student conducts a statistical simulation for each cell in the design, analyses the results, and draws conclusions about the alternative modeling methods.

**Predictive Analytics Competition.** This type of project relates to an active data mining, text mining, or predictive analytics competition and is usually supervised by a predictive analytics faculty member. The typical competition relates to a decision that needs to be made by a business or public sector manager. The student analyses the data and provides relevant predictions. The student prepares a formal/official entry into the competition, identifying the entry by his/her name and affiliation with the Northwestern University MSPA program. Documentation for the competition, including the description of the problem and the available data should be included in the appendix of the capstone thesis.

Regardless of the type of capstone project, the capstone thesis provides documentation for the completed

project. The capstone thesis is subject to revision until it meets the highest standards, as defined by the team of readers.

The capstone thesis should include 35–50 double-spaced pages with additional pages of appropriate supporting materials in appendices. The capstone thesis answers basis questions relating to the capstone project: Why? (Introduction), Who? (Literature Review) How? (Methods) What? (Results) And, so what? (Conclusions) The thesis should adhere to the format described in on the following pages.

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## **ARRANGEMENT OF THE MASTER'S THESIS IN PREDICTIVE ANALYTICS**

Each thesis should be arranged in the following order. Specific information about each section is on the following pages. Italicized pages are optional.

- Title Page
- *Copyright Page (optional)*
- Abstract
- *Acknowledgment page (optional)*
- *Preface (optional)*
- *List of abbreviations (optional)*
- *Glossary (optional)*
- *Nomenclature (optional)*
- *Dedication (optional)*
- Table of Contents
- Lists of Tables, Illustrations, Figures, or Graphs
- *Introduction*
- Text body (divided into chapters following a logical outline)
- Tables, Illustrations, Figures, Graphs: If not incorporated into the main body of the text, these items should immediately follow the text, not at the end of chapters.
- References
- *Appendices (optional)*
- *Vita (optional)*

## **FORMATTING AND LAYOUT REQUIREMENTS**

### **PAGE SIZE**

- Page size should be 8.50 x 11.00, standard US Letter size.

### **MARGINS**

- 1 inch on all sides, including page numbers.
- Page numbers should be at least 1" from the top and right-hand edges of the page, as appears in this document.

### **SPACING**

- The preliminary pages and text must be double-spaced.
- Under certain conditions, quotations may be single spaced, if recommended by an approved style manual.
- Table of Contents and lists with lengthy entries may be single-spaced with a double space between entries.
- References may be single-spaced, with a double space between entries.

### **PAGINATION**

- Every page in a thesis is numbered, except the title page.
- Page numbering will begin on the second page with Arabic numeral 2 in the upper right-hand corner of the page, as appears in this document.
- On pages of the thesis that are formatted with landscape orientation, the page number must appear in the upper right-hand corner if the page were rotated to portrait orientation. For additional help on how to do this, please see: <http://support.microsoft.com/?kbid=211930>.

### **ENGLISH**

- The thesis should be written in English
- Foreign language quotations may be included in the thesis, with English translations provided in footnotes

### **APPROVED STYLE MANUALS**

- Citations and the references should conform to the style defined either in the current edition of the *Publication Manual of the American Psychological Association* or in the current edition of *The Chicago Manual of Style*.
- English grammar, spelling, and punctuation should conform to standards set by the current editions of *The Chicago Manual of Style*, and *Merriam-Webster's Collegiate Dictionary*.

## **CONTENTS**

### **TITLE PAGE**

The title page should conform to the sample below, following the instructions on the next page.

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[Title of the Thesis Goes Here]

By

[Full Name]

Thesis Project  
Submitted in partial fulfillment of the  
Requirements for the degree of

MASTER OF SCIENCE IN PREDICTIVE ANALYTICS

[Month, Year]

(first reader name), First Reader

(second reader name), Second Reader

**THESIS TITLE GUIDELINES.** Thesis documents are a valuable resource for other scholars only if they can be easily located. Modern retrieval systems generally use the words in the title to locate a document. It is essential that the title be an accurate and meaningful description of the content and that obscure references be avoided. Please use these guidelines when formulating a thesis title:

**CASE.** The first and last words and all nouns, pronouns, adjectives, verbs, and adverbs (if, because, as, that) are capitalized. Articles (a, an, the), coordinating conjunctions (and, but, or, for, nor), and prepositions, regardless of length, are lowercased unless they are the first or last word of the title or subtitle. Only acronyms should be set in full capitals.

Examples:

Power and Consumer Behavior

Outpatient Treatment for Children: Organizational Practices as Predictors of Recovery

A Comparison of the Methodologies for Determining Achievement in High School

**HYPHENATION.** Consult the dictionary as to whether a word is hyphenated. In general, do not hyphenate words beginning with the prefixes co, non, pre, post, or re unless there is a possibility of confusion (co-op, post-master's) or the root word begins with a capital letter (post-Renaissance). Hyphenate words beginning with the prefix self.

Hyphenate compounds used as adjectives (decision-making) but not as nouns (decision maker). Part-time and full-time are always hyphenated. When more than one prefix is joined to a base word, hyphenate the prefixes standing alone (micro- and macroeconomics). Do not hyphenate fundraising, freelance, yearlong, health care, African American, Asian American.

Examples:

Great Nonfiction Works of the Nineteenth Century (Instead of: Great Non-fiction Works of the 19th Century)

**SPELLING AND GRAMMAR.** Thesis titles should be spell-checked and dictionary spelling of words should be used. Use "and" rather than "&," and spell out names of centuries and other numbers usually spelled out in text.

Example:

The Labour Party in Perspective and Twelve Years Later

**SPECIAL CHARACTERS.** No special characters should appear in the thesis title. Terms or phrases that include special characters should instead be written out.

Examples:

Evaluation of DNA Hybridization and Cleavage Capabilities of Peptide Nucleic Acid-Titanium Dioxide

(instead of: Evaluation of DNA Hybridization and Cleavage Capabilities of PNA-TiO<sub>2</sub>)

The Role of TGF-beta Variants in Cancer (instead of: The Role of TGF-β Variants in Cancer)

**ITALICIZATION.** Italics should only be used in a thesis title when referring to the title of a published work, foreign language words, gene names, scientific names as appropriate, or other words that are usually italicized.

Examples:

Techniques in *Drosophila* Circadian Biology

Mechanisms of Differentiated Cell Function in vitro

**APOSTROPHES.** Do not use to form plurals (it should be 1940s, not 1940's) unless it would be confusing without (thus A's and B's, not As and Bs; p's, not ps). Possessives of singular nouns ending in s are formed by adding 's (e.g., Russ's dog).

**COPYRIGHT PAGE.** If you choose to copyright your manuscript, a copyright notice must appear on a separate page following the title page. It should read as follows:

© Copyright by (your  
name) 20\_\_\_\_\_ All Rights Reserved

### **ABSTRACT**

- Inclusion of the abstract within the preliminary pages of the thesis is required.
- The text of the abstract should be no longer than 350 words – one page maximum.
- The abstract should provide an accurate summary of the contents of the thesis, including a statement of the problem, the procedures or methods used, the results, and the conclusions.
- Mathematical formulas, photographs, diagrams, and other illustrative materials should not be included in the abstract.
- There should be a one-inch margin at the top of the page and at the left- and right-hand sides
- At the top of the abstract page, centered and in capital letters is the word ABSTRACT
- Two spaces down from the word ABSTRACT in capital and lowercase letters is the title of the thesis exactly as it appears on the title page of the thesis
- Two spaces down from the title of the thesis is the author's name in capital and lowercase letters exactly as it appears on the title page of the thesis

### **OPTIONAL PREFATORY PAGES**

- Acknowledgments
- Preface
- List of abbreviations
- Glossary
- Nomenclature
- Dedication

### **TABLE OF CONTENTS**

- The format of the table of contents should conform to the guidelines in an approved style manual.
- It is important that the table of contents accurately reflect the outline and organization of the manuscript.

### **LISTS OF TABLES, ILLUSTRATIONS, FIGURES, OR GRAPHS**

- These lists should reproduce the specific titles and page locations of all illustrative materials.



## INTRODUCTION

- The introduction should provide an overview of the thesis and the research problem that is being addressed. Show how this is an integrative work that applies the concepts, theories, and interdisciplinary curriculum of predictive analytics. It should also indicate how the research and argument presented will contribute to scholarship in the field. The introduction may be divided into two sections as shown here:
- **Statement of the Problem.** What is the issue or topic you are exploring?
- **Justification.** Explain why this topic is important and worthy of study.

## BODY OF THE TEXT

- Chapters should follow a logical outline, with a clear distinction between chapters, main heads within chapters, and subordinate heads within the main heads.
- The outline and organization of the main body of the text should be accurately reflected in the table of contents.
- All non-textual elements (e.g., tables, graphs, and images) must be described in the text.
- The body of the text is often divided into four sections as described here: Review of the Literature, Methods, Results, and Conclusions.
- **Review of the Literature.** Through a review of the literature germane to your topic, answer questions and provide guidance on the importance of previous or related research. In the literature review, which is expected to be between 5 to 15 pages of the thesis, students should read and synthesize no fewer than seven pieces of scholarly literature related to the topic. Scholarly literature is defined as refereed research journals, publications and Web sites maintained by scholarly institutions. We recommend research pieces published in journals or recent books that provide theory as well as practical application. A synthesis of the literature should take the form of a scholarly review of the issues presented across the readings directly related to the topic or project. At least two references should be to works published within the last ten years. Your literature review should demonstrate an understanding of multiple perspectives on the research topic. You should strive to have a balance of articles, some which support your analytical approach and others that offer contrasting evidence and perspectives. Taken together, the introduction, statement of problem, justification, and literature review answer the question “Why?” They explain why you did this research.
- **Methods.** This section should contain a description of the methods used in executing the project. These include underlying statistical theory and methods, measurement techniques, database and data management tools, algorithms, and software systems. The methods section answers the question “How?” It tells how the research was conducted.
- **Results.** Here we describe the project analysis and findings. This is the heart of your project or thesis. Your goal is to interpret, analyze, and report on the data you have researched. This is best done in a narrative format that methodically addresses your research question or questions with supporting tables, charts, and graphs, when appropriate. Present your findings and analyses in a manner that will permit the reader to understand what you found in your investigation. Discuss, analyze, and interpret your findings. Relate this back to your literature review and be mindful to discuss how your findings or conclusions are consistent with or contradictory to previous published research or theories on the topic. The results section answers the question “What?” What were the findings of your research?
- **Conclusions.** Prepare a summary in the form of a critical analysis of the project's significance and the implications of your conclusions as they relate to the topic and to the broader field of predictive analytics. The conclusions section answers the question “So what?” It explains why this research is worthwhile

**TABLES, ILLUSTRATIONS, FIGURES, GRAPHS**

- If not incorporated into the main body of the text, these items should immediately follow the text, not at the end of chapters.
- Margin requirements must be met on all pages that contain charts, graphs, tables, or illustrations. If the title, legend, or description of an illustration is too long to be placed on the same page with the illustration, it must be placed on a separate numbered page preceding the illustration.

**REFERENCES**

- Every citation in the text must be associated with reference material in the references.
- These references should be included at the end of the text. They should not be placed at the bottom of pages or at the end of each chapter.
- The format for references must conform to the guidelines in an approved style manual. If you are not familiar with academic writing style, consult with a reference librarian to obtain manuals and guide sheets. Request help at the School of Continuing Studies Writing Place for further guidance on referencing. Northwestern provides free downloads of EndNote, a useful referencing application, through NUIT.

**APPENDICES (optional)**

- The format for the appendices must conform to the guidelines in an approved style manual.
- Attach, as needed, any appendices or supporting documentation such as annotated bibliographies, original source materials, charts, graphs, photocopied work samples, or other data sources.

**VITA (optional)**

- Each copy of the thesis may include a brief vita containing the author's name, place of birth, education, relevant professional experience, and publications. The vita page is numbered.

## **COMMON THESIS FORMATTING PITFALLS CHECKLIST**

There are several common formatting problems that require resubmission and re-review of the thesis. Please check this list to ensure your thesis is correctly formatted:

- Are your margins correctly sized (including page numbers) such that there is 1 inch on all sides?
- Are your pages numbered starting on the 2nd page with the number 2 (NOT roman numeral) in the upper right-hand corner of the page?
- Are your page numbers properly placed in the upper right-hand corner of the page, 1 inch from the top and 1 inch from the right edge of the page?
- Are all of your pages numbered, except for the title page?
- On pages with landscape formatting, does the page number appear in the upper right-hand corner if the page were rotated to portrait orientation?
- Is your page size 8.50 x 11.00 (regular US letter size)?
- Does your title page include the correct date? The date should be the month and year you will receive the degree, for example: December 2014
- Are your pages ordered properly, with the title page first, followed by the copyright page (if you are including one), then the abstract page?
- Is your abstract 350 words or less (one page)?