Texas A&M University - Commerce  
Department of Biological and Environmental Sciences  
Masters Thesis Guidelines

General
The following guidelines are to be followed by all Masters students in the Department of Biological and Environmental Sciences (BESC). While other guidelines may be used, adherence to these guidelines will ensure that the thesis conforms to standards appropriate to the biological and environmental sciences and that are acceptable to the Graduate School and Thesis and Dissertation Services (TDS). Students should contact their research advisors if they have any questions.

Proposal
All students writing a thesis must submit a thesis proposal to the Graduate School at least one semester prior to graduation. This proposal, to be completed in consultation with the major advisor, must be approved by all members of the thesis committee, the Department Head of BESC, the Dean of Science and Engineering, and the Dean of the Graduate School. The thesis proposal form is available from the Graduate School.

Human Subjects Protection

If you have questions concerning compliance, contact your major advisor or Chair of the Institutional Review Board (IRB).

Care and Treatment of Animals used in Research
All students using live animals in their research must have an approved protocol on file with the Institutional Animal Care and Use Committee (IACUC) prior to starting their research. Students must be aware of and agree to comply with all local, state, and federal regulations. Students must be aware that the Department of BESC adheres to the guidelines set forth in the National Institutes of Health’s publication number 92-23, “Guide for the Care and Use of Laboratory Animals” and follows A&M-Commerce Rule 15.99.07.R1, Use of Vertebrate Animals A copy of the rule is available at [http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/15ResearchPrograms/15.99.07.R1.pdf](http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/15ResearchPrograms/15.99.07.R1.pdf).


Failure to ensure adequate care and minimization of suffering to research animals will result in immediate termination of that research. Questions about compliance should be addressed to the major advisor.
Use of Biohazardous Agents

All students using biohazardous agents in their research must have an approved protocol on file with the Institutional Biosafety Committee (IBC) prior to starting their research. Students must be aware of and agree to comply with all local, state, and federal regulations. Students must be aware that the Department of BESC adheres to the A&M-Commerce Rule 15.99.06.R1, “Use of Biohazards in Research Teaching and Testing”. A copy of the rule is available at http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/15ResearchPrograms/15.99.06.R1.pdf.

Questions about compliance should be addressed to the major advisor.

Preparation of Thesis

Text must be 12-point, Times New Roman, and double-spaced throughout, including figures and tables. All headings should be in bold font. Major headings should be centered and all capitalized. Minor headings are left justified and only the first letter is capitalized. An extra space is left between major headings and the first paragraph following the major heading. No extra spaces should occur between paragraphs or after minor headings. Margins should be 1” on top, bottom, left and right sides. The only exception is the Abstract where the top margin must be 2.5”. All pages must be numbered at the top right side. The Title Page and the Signature Page have no page numbers. However, the pages following the Signature Page will begin with the number “iii” and use the same Roman numeral format ending with the List of Figures (lower case Roman numerals iii, iv, v, vi, etc.). Pages in the main body of the thesis (Introduction, Methods, Results, Discussion, Literature Cited, Appendices, Vita) should be numbered using Arabic numerals (1, 2, etc.).

Common names for organisms may be used, but the Latin name (genus and species) must be specified at their first mention. Latin names must be in italics. Use standard scientific abbreviations for units of measure. Do not use footnotes in the body of the thesis. Do not use direct quotes.

Organization of Sections

As per the graduate school guidelines use the following arrangement of materials.

1) Title Page 
2) Signature Page 
3) Copyright Page (if copyrighting) 
4) Abstract 
5) Acknowledgments (if applicable) 
6) Table of Contents 
7) List of Tables (if applicable) 
8) List of Figures (if applicable) 
9) Body 
10) Literature Cited 
11) Appendix (if applicable) 
12) Vita 

Note that sections 1 through 8 use lower case Roman numeral page numbers. All other sections use regular page numbering.
Major Headings:
TITLE of the thesis on the Title Page
TITLE of the thesis on the Signature Page
Headings ABSTRACT, ACKNOWLEDGMENTS, TABLE OF CONTENTS, LIST OF FIGURES, LIST OF TABLES on the preliminary pages
INTRODUCTION
METHODS
RESULTS
DISCUSSION
LITERATURE CITED
APPENDIX designations and titles
VITA on the Vita page. (See the Office of Thesis and Dissertation Services for formatting)

Note that INTRODUCTION, METHODS, RESULTS, DISCUSSION, all form the body of the thesis (section 9 in the preceding list under Organization of Sections).

The rules for major headings are:
- All must be centered at the top of a new page and in ALL CAPITAL letters.
- The headings must be placed one inch from the top of the page.
- Each line of the title must be shorter than the one above it.
- The font must be the same size as the body text.
- Major headings may not be in italic type.
- No punctuation after a major heading.
- All major headings must be handled consistently.
- Major headings over one line are double-spaced between the lines.

Subheadings:
Subheadings may be used throughout the thesis when appropriate.
- Use the same font size for all subheadings.
- Use consistent capitalization for each level of subheading.
- The style used for subheadings must clearly show their various levels.
- Maintain consistency in vertical spacing around major headings and subheadings.
- Subheadings and subsections do not need to begin on a new page.
- Subheadings near the bottom of a page must have at least two lines of text under it.
- Subheadings cannot be centered and have all capital letters.

Figures and Tables
Color is acceptable in figures, but black and white is preferred for line and bar graphs. The minimum size for letters and numbers is 7 point type, but fonts equal to or larger than 11 point are preferred with the exception of footnotes. All lettering must be of publishable quality; this requirement includes scanned images. Images must be clear and without blurred or dark areas.

All Figures and Tables in result section are placed on a separate page from the text and accompanied by an appropriate figure caption or table header. Figure captions always go below
the figure and do not have to be double spaced. Figures and tables are placed in the thesis on the page immediately following their first mention in the body of the thesis.

Note that all drawings, figures, graphs, maps, etc. are referred to as Figure 1, Figure 2, etc. in the text and in the figure caption. **DO NOT** use any other terminology (i.e. Graph 1, Map 1, Chart 1, Picture 1, Drawing 1, etc.). Figures should be quality graphic images. Graphs must be computer generated and of at least 300 dpi density. Make sure the fonts on the figure are in Times New Roman.

Tables must be put on the page immediately following their first mention in the text (same rule applies to figures). The text in the table header and column headings do not have to be double spaced. Similarly, the text in any given cell of the table does not have to be double spaced if the text must be wrapped within that cell. However, the rows themselves must by double spaced. An example is provided below (see Table 1).

Note that all tables have a table header. The table header should clearly explain the purpose of the table. Horizontal lines should separate the table header and major column headings from the body of the table. **Do not use vertical lines in tables.** Do not put a box around the table. Space the columns evenly. Left column must be left justified if it is a text column, otherwise all columns must be centered below the column heading. Align characters and decimal places. Use footnotes on tables where appropriate. Make sure the font in the table is Times New Roman, 12 point, and double-spaced.

Tables or figures longer than one page have the complete header and the number on the first page. Subsequent pages have the table or figure number and the word “Continued” plus the complete header. For example, the second page of a long table should have the following format:

---

Table 2 Continued. The fledging success of swallows nesting in culverts and bridges in northeast Texas between 1998 and 2002.

<table>
<thead>
<tr>
<th></th>
<th>Bridges (mean ± std. dev)</th>
<th>Culverts (mean ± std. dev)</th>
<th>Kruskal-Wallis Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001 first broods</td>
<td>4.25 ± 0.23</td>
<td>5.23 ± 1.25</td>
<td>6.55</td>
<td>0.010</td>
</tr>
<tr>
<td>2001 second broods</td>
<td>3.61 ± 0.33</td>
<td>4.77 ± 0.56</td>
<td>1.12</td>
<td>0.320</td>
</tr>
<tr>
<td>2002 first broods</td>
<td>5.01 ± 0.25</td>
<td>5.11 ± 0.66</td>
<td>0.69</td>
<td>0.864</td>
</tr>
<tr>
<td>2002 second broods</td>
<td>2.69 ± 0.52</td>
<td>3.50 ± 0.97</td>
<td>1.35</td>
<td>0.264</td>
</tr>
</tbody>
</table>
---
If the table or figure is placed lengthwise (landscape position), the top of the table or figure must be at the left-hand, “binding” side of the page and facing in the same direction as the figure or table. The page number stays in regular (portrait) position. Use a text box and rotate it 90 degrees.

Below are examples of an appropriately formatted figure and table. Note that each is on a separate page. Note also that the table contains an appropriately formatted footnotes. Tables are the only place in the thesis where footnotes are allowed. These footnotes can be either numerals or letters.

Notice also that both the table and the figure are placed at the top of the page, so that in each case they maintain a 1” top margin.

Examples of title page, signature page, copyright page, abstract, list of tables, list of figures and vita are found in the TDS website and should be followed precisely. The table of contents should differ because the biology department does not follow the same format with regard to sections as the graduate school. An example of a the format for a table of contents is on page 8 of this document.

APPENDICES

Use appendices only if necessary to include important data not included in the body of the thesis. In Biology, appendices are treated in the same way as tables and come directly after the Literature Cited section. Appendices should be numbered separately from other tables, but the general format of appendices is the same.

There should be a title page with the word APPENDICES centered on the page and directly following the LITERATURE CITED section.

Appendices then follow after that title page and are formatted like normal tables. DO NOT CAPITALIZE the table headings. For multiple page appendices the table heading on subsequent pages should follow the following format:

Appendix 1 Continued. Cell lines used in this study along with their sources.

<table>
<thead>
<tr>
<th>Cell Line</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCE C/D-1b (CRL-2048™)</td>
<td>ATCC</td>
</tr>
<tr>
<td>ZF4 (CRL-2050™)</td>
<td>ATCC</td>
</tr>
<tr>
<td>jb6 rt101</td>
<td>Thermo Fisher Scientific</td>
</tr>
</tbody>
</table>

Page numbering in appendices continues from the literature cited section.
Table 1. Summary of the best fit logistic regression model based on AICc. This procedure was used to predict the survival of monarch eggs or larvae based on the abundance of arthropod groups found on control host plants where the proportion of predators to non-predators was low. Concordance of this model was 31.6%.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr &gt; ChiS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>-1.2480</td>
<td>0.2236</td>
<td>31.1489</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>RIFA(^a)</td>
<td>1</td>
<td>-3.6684</td>
<td>2.4628</td>
<td>2.2188</td>
<td>0.1363</td>
</tr>
</tbody>
</table>

\(^a\)Parameter confidence interval approaches infinity and is overestimated.
Figure 1. Control host plants upon which monarch larvae survived to the third instar had fewer predators relative to the total number of arthropods on the plant than did host plants upon which monarch larvae failed to reach the third instar. Kruskal-Wallis ANOVA, Chi-square Approximation, $X^2 = 6.7482, df = 1, p = 0.0094$. Numbers over bars are sample sizes.
# TABLE OF CONTENTS

LIST OF TABLES ...................................................................................................................... #

LIST OF FIGURES .................................................................................................................. #

INTRODUCTION ...................................................................................................................... #

Subsection (if applicable) ................................................ .................................................. #

Subsection (if applicable) ................................................ .................................................. #

METHODS .............................................................................................................................. #

Subsection (if applicable) ................................................ .................................................. #

Subsection (if applicable) ................................................ .................................................. #

RESULTS .................................................................................................................................. #

Subsection (if applicable) ................................................ .................................................. #

Subsection (if applicable) ................................................ .................................................. #

DISCUSSION .......................................................................................................................... #

Subsection (if applicable) ................................................ .................................................. #

Subsection (if applicable) ................................................ .................................................. #

LITERATURE CITED .............................................................................................................. #

APPENDICES ......................................................................................................................... #

Appendix # ......................................................................................................................... #

Appendix # ......................................................................................................................... #

VITA ........................................................................................................................................ #
REFERENCES CITED IN THE BODY OF YOUR PAPER

Cite all references in text by author and year. If more than one citation then they should be in chronological (not alphabetical) order:

Jones (1971)
Jones (1971, 1975)
(Jones 1971)
(Jones 1971, 1975)
(Jones 1971, Smith 1973, Davis 1975)

If two authors for the paper:

Smith and Davis (1985) or (Smith and Davis 1985)

If more than two authors, use:

Jones et al. (1976) or (Jones et al. 1976).

Citations of publications by the same author(s) in the same year should be designated alphabetically:

(Smith 1979a, 1979b).

LITERATURE CITED SECTION:

Journal abbreviations in the Literature Cited section should follow those listed in Biological Journals and Abbreviations which can be found here:

https://home.ncifcrf.gov/research/bja/

Be certain that all citations in the text are included in the Literature Cited section and vice versa. Consecutively-paged journal volumes and other serials should be cited by volume, number and pagination. Serials with more than one number and that are not consecutively paged should be cited by number as well (Smithson. Misc. Coll., 37(3):1-30). Citations use hanging paragraph format as shown below.

In your Literature Cited section, alphabetize entries according to the last name of the first author of each work cited. If you have multiple sources from the same author(s), arrange by year (earlier first); if you have multiple sources from the same author(s), in the same year, add a lower case letter to identify each when citing in the text and when making the bibliographical entry (Jones 1983a; Jones 1983b). If you have multiple papers using the same first author but different second authors, then they a listed after any single author papers by that author and in alphabetical order of the second authors and date (and so on if there are many multi-author papers by the same first author).
The following are examples of a variety of citations:

JOURNALS ARTICLES:


BOOKS:


CHAPTER IN A BOOK:

ABSTRACT
The abstract should start on the page following the signature sheet. The abstract should follow the graduate school guidelines.

ACKNOWLEDGMENTS
Acknowledgments should follow the graduate school guidelines.

TABLE OF CONTENTS
The Table of should follow the graduate school guidelines.

LIST OF TABLES
The list of tables should follow the graduate school guidelines.

LIST OF FIGURES
The list of figures should follow the graduate school guidelines.

INTRODUCTION
The introduction starts on a new page after the last page of the list of figures. The heading, INTRODUCTION, is centered a the top of the page. Arabic numbers (e.g. 1, 2, 3, etc.) are now used for page numbers, starting with 1. The page numbers continue and are numbered consecutively through all subsequent sections to the end of the Vita. The page number for the first page of each major section, all other pages are numbered in the upper right cornter of the page (except figure pages which are unnumbered).

The introduction should normally start with a literature review). This should lead into a description of the purpose or objectives for the current study, significance, and the hypotheses to be tested.

MATERIALS AND METHODS
The methods section starts on a new page after the last page of the introduction. The heading, MATERIALS AND METHODS, is centered a the top of the page. This section should describe all of the methods used to collect and analyze the data. Enough detail must be provided that anyone reading the methods should be able to replicate the study. Describe any apparatus that was used and provide a figure if appropriate. Describe what was measured and how it was measured. For field studies there should be a description of the study areas used. For lab studies, the source of materials must be identified. Be sure to identify the make and model number of important pieces of equipment and the suppliers of critical reagents.

RESULTS
The results section starts on a new page after the last page of the methods section. The heading, RESULTS, is centered a the top of the page. This section should describe the results of the study. For most projects the data are presented as figures and tables. The text of the results section should describe the important trends and/or features shown by the figures and tables. Do not simply reiterate all the details of the table or figure. Provide statistical analyses whenever appropriate.
DISCUSSION

The discussion starts on a new page after the last page of the results section. This section describes the implications of the results relative to the existing literature. Provide interpretation of the results and support these statements with corroborative evidence from current literature. The final paragraphs should provide a brief summary and possible future directions for research.

LITERATURE CITED

The literature cited starts on a new page after the last page of the discussion. The heading, LITERATURE CITED, should be centered and in upper case. The literature cited must be in alphabetical order and modeled after that used by a prominent biological journal using author surname alphabetized citation lists (e.g. Ecology). See the examples below:


AVOID citing web pages. However if a journal article is downloaded from a web source, then the journal URL should follow the citation:


Submission of Thesis

Revise and proofread your thesis before turning it in to your thesis committee members. All theses must be submitted to your committee members for review at least 1 month before the Graduate School Submission Deadline as published on the graduate school website. Students will not be allowed to schedule an oral defense until AFTER their committee has viewed their thesis.

The Graduate School will only accept theses that have been approved by the student’s committee and are in final form. One copy of the thesis must be submitted to the Graduate School by the deadline. The Graduates School has specific guidelines for thesis submission and these guidelines should be followed exactly as stated on the Graduate School website.