Dave R.'s Guide to:
Writing Your Thesis or Dissertation

A Basic Survival Manual

By the time you read this you are already or will soon be one of the world's experts on your particular research subject. You may never again achieve the level of mastery you now (or will soon) possess of your newfound area of expertise. This should be a time of professional contentment. Now you are about to show the world what you have learned. At the same time you will be rewarded with an advanced degree. The thesis or dissertation is your vehicle.

Every research advisor has his or her own preferred writing style and research philosophy. In this guide I have applied my own personal preferences to the task of thesis/dissertation writing. The final decision as to style and philosophy generally rests with the student and his/her research advisor. Certain elements of format and timing are fixed by faculty consensus. These can be found in one of several documents:

1. EVE: Information, Procedures and Advising Manual, Environmental Engineering Program
2. CEE: Regulations Governing the M.S. and Ph.D. Programs in the Department of Civil and Environmental Engineering
3. UMass: University of Massachusetts Graduate School Bulletin
4. UMass: Several Documents on Formatting and E-submission for Theses and Dissertations, University of Massachusetts Graduate School [also available in the Office of Degree Requirements, Room 534 Goodell Building]

Types of Documents

MS Thesis vs Project vs Report

Regardless of whether you're working toward an M.S in Environmental Engineering or an M.S. in Civil Engineering you need to write and defend a final document which summarizes your Masters research. If you are pursuing the research option you should prepare either a thesis or a project. The thesis must meet certain graduate school requirements regarding style and timing, whereas the project need only meet the CEE requirements. If you are pursuing the Professional Practice Option you should prepare a report (or engineering report). These three choices are summarized in the CEE Regs. Manual as follows:

> *1. Thesis Option.*
>
> *a. Thesis Outline: A Master's candidate must prepare a Thesis Outline to be approved and signed on the cover sheet (see appendix) by each member of his/her Thesis Committee and the Graduate Program Director. The signed copy of the Thesis Outline must be forwarded to the Graduate School for inclusion in the candidate's file at least four (4) months prior to the scheduled date of the Thesis Defense.*
>
> *b. Master's Thesis: The Master's Thesis must be typed in the format prescribed by the Graduate School. This is given in the publication, Typing Guidelines for Theses and Dissertations, available in the Office of Degree Requirements, Room 534 Goodell. A review copy of the Thesis is to be given to each member of the student's Thesis Committee at least one (1) week prior to the scheduled Master's Examination. A copy must also be made available through the Graduate Program Secretary if requested for review by other members of the Civil and Environmental Engineering Department. The*

original copy of the Thesis requiring the Department Head's signature must be deposited with the Graduate Program Secretary no later than five (5) working days before it is due in the Graduate School. A bound final copy (hard cover not required) of the Thesis is to be deposited with the Graduate Program Secretary for inclusion in the Department's Thesis archives.

2. Project Option.

The format of the Master's Project Report will conform to appropriate report guidelines as designated by the chairperson of the Project Committee. The report must be of high professional quality. A required title page is given in the appendix. An alternative title page may be approved by the chairperson of the Project Committee. A required signature page is given in the appendix. A review copy of the Project Report is to be given to each member of the student's Project Committee at least one (1) week prior to the scheduled project presentation. A copy must also be made available through the Graduate Program Secretary if requested for review by other members of the Civil and Environmental Engineering Department. A bound final copy (hard cover not required) of the Project Report is to be deposited in the Program's Project Report Archives. The final original copy of the Project Report must be signed by the committee and the Graduate Program Director before a grade may be assigned to the project credits. All registered project credits must remain incomplete until the signatures are obtained.

3. Engineering Report Option.

The requirements for an Engineering Report are the same as those for a Project Report.

The PhD

Dissertation Prospectus

Regardless of the layout of the dissertation (see below), Ph.D. students will need to prepare and defend a dissertation prospectus. The prospectus usually takes the following form:

Suggested Chapters/Sections in a Dissertation Prospectus[1]

Section	Median (pages)	Range (pages)
Abstract	1	1
Front Matter[2]	As needed	As needed
Introduction	3	1-5
Objectives	2	1-3
Background	26	20-57
Experimental Plan	23	14-29
Contribution to the Literature	2	2-3
Schedule	1	1
References	6	4-12
Appendices	As needed	As needed

The CEE Regs. Manual says the following regarding the prospectus.

a. Dissertation Prospectus. The Ph.D. candidate must prepare a written Prospectus that includes at least a preliminary literature review and describes the research to be conducted, analyzed

[1] Median and range taken from all treatment-related dissertation prospecti in EVE from 1989 to 1998 (9 total). All based on 1½ line spacing

[2] Table of Contents, table of figures, table of tables.

and presented in the Dissertation. An approved Dissertation Prospectus signed on the cover sheet (see appendix) by each member of the Dissertation Committee and the Graduate Program Director must be submitted to the Graduate School at least seven (7) months prior to the Doctoral Final Oral Examination.

b. Prospectus Presentation. The Ph.D. student should present and defend his/her Dissertation Prospectus within a period of 1 to 6 months after passing the Doctoral Preliminary Comprehensive Examination. The Prospectus Presentation is administered by the student's Dissertation Committee. For informational purposes, the Advisor must request the Graduate Program Secretary to notify the Civil and Environmental Engineering Graduate Faculty at least one (1) week in advance that the Prospectus Presentation has been scheduled. This should be done by E-mail. The format of the Prospectus Presentation generally consists of an oral presentation of the student's proposed doctoral research followed by questions from the Dissertation Committee members, other faculty, and students. At the discretion of the Committee, a portion of the Prospectus Presentation may be closed to all but faculty members. A unanimous vote of the Dissertation Committee is required for the student to defend successfully his/her Dissertation Prospectus. In cases where a student does not receive a unanimous approval, the student will be required to rewrite those sections of the Prospectus or add new sections to the Prospectus to satisfy the objections of the Dissertation Committee. At the discretion of the Dissertation Committee the student will again present and defend the revised Dissertation Prospectus.

The cover sheet of the Prospectus (see appendix) is signed by each member of the Dissertation Committee to indicate their approval. The Graduate Program Director will indicate approval by reviewing the prospectus and signing the cover sheet both of which the Graduate Program Director forwards to the Office of Degree Requirements.

PhD Dissertation: Classical Form or Bundled

Dissertations may be organized in accord with at least two general formats: classical and what I will call bundled. The former resembles the MS thesis organization (presented below). It has a single literature review or background section, a single materials and methods section and a single set of conclusions. The latter is characterized more as a set of separate, but integrated studies. It contains the same information as the classical form, but its grouped according to the various study objectives.

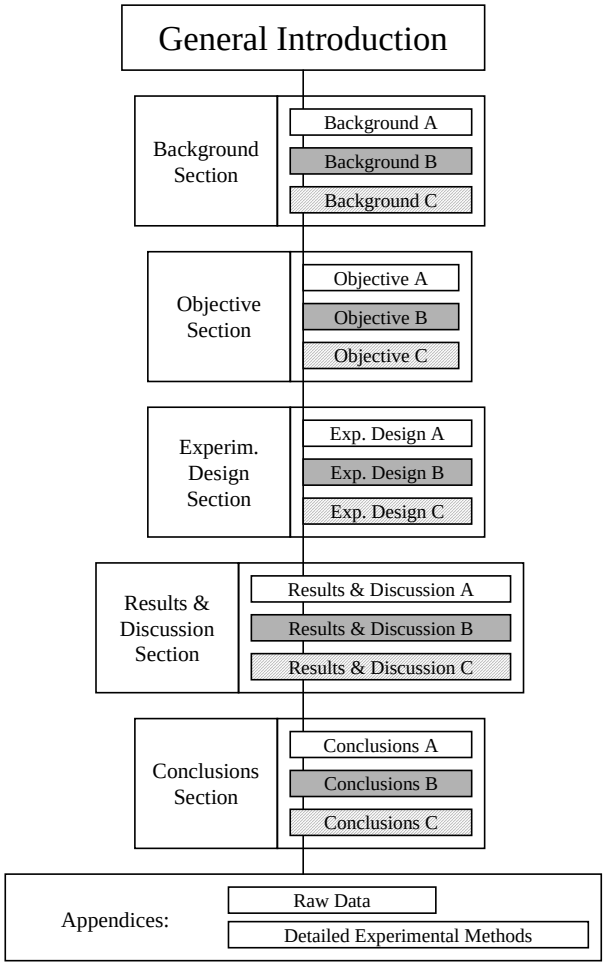
Dissertations have traditionally been prepared as integrated documents in the style of the classical MS thesis. Recently there has been a trend toward preparation of a tightly integrated set of sub-studies. This comes from a recognition that the information in Dissertations is generally disseminated through publication of journal articles and not through the Dissertation itself. Bundled dissertations lend themselves more readily to the preparation of journal articles. The CEE Regs. Manual says the following regarding the dissertation.

7. Dissertation. The Ph.D. Dissertation must be typed in the format prescribed by the Graduate School. The requirements are explained in the publication, Typing Guidelines for Theses and Dissertations, available in the Office of Degree Requirements, Room 534 Goodell Building. Copies of the Dissertation are to be given to each member of the candidate's Dissertation Committee at least one (1) week prior to the scheduled Final Oral Examination. An additional copy is deposited with the Graduate Program Secretary at least one (1) week prior to the scheduled examination for review by Graduate Faculty in the Civil and Environmental Engineering Department who are not members of the candidate's Dissertation Committee. The original copy of the Dissertation requiring the Department Head's signature must be deposited with the Graduate Program Secretary no later than five (5) working days before it is due in the Graduate School. A bound (hard cover not required), final signed copy of the Dissertation is to be deposited with the Graduate Program Secretary for inclusion in the Department's Dissertation Archives by the prescribed deadline.

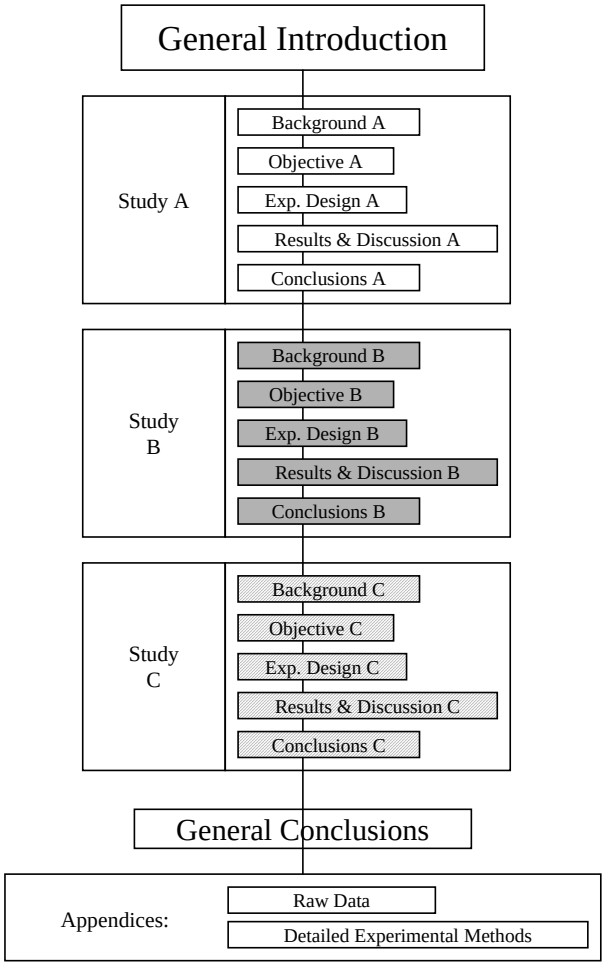
The classical format for a Ph.D. dissertation follows the essentials of the MS Thesis format (see section on organization, below). Differences between the two are in the extent and nature of the work, but not in the style of the presentation.

The bundled approach has been used in for years, especially in the basic sciences. A bundled dissertation may be composed of a series of chapters, each of which is organized much like a thesis in itself. These are of a size and scope that is appropriate for publication as a single article in a scientific journal. Usually there are one or two opening chapters that introduce the common theme of the dissertation as well as the different sub-studies. The individual chapters devoted to each sub-study follow in some logical succession. A final summary chapter then ties the sub-studies together, with a comprehensive set of conclusions (see figure below). One of the intents of this approach is to minimize the time and effort required to craft a publishable paper out of each of the sub-study chapters. The path that is to be taken in preparing one's dissertation (i.e., bundled vs. classical) is to be mutually agreed upon by the PhD student and his/her dissertation advisor early in the writing process.

Some students will have published or submitted for publication one or more papers based on the individual dissertation studies prior to his/her dissertation defense. This is encouraged, but not required. In some disciplines, publication of the sub-studies serves as an affirmation of their acceptability as chapters in the dissertation. This is not, however, the case in our department. The fact that a paper based on one of these sections was accepted (or submitted) to a refereed journal has no bearing on its acceptability in the eyes of the dissertation committee. The two evaluations are entirely independent, even if the text under consideration by the two groups (committee and referees) is essentially the same.



The Classical Format



The Bundled Format

Timing

Students almost always underestimate the time required to write a dissertation or thesis. There is also the perception that the process is nearly complete once a first draft is complete. This is almost never the case.

How long will it take from first draft to final defense?

Most students end up preparing about 3 full drafts prior to submitting their defense draft. For an MS thesis, submission of the first draft should come no later than 6 weeks before the final defense. Here's why so much time is needed. Each draft must be carefully reviewed by your advisor. In addition, you need to spend some time making changes, interpreting your advisors comments, and re-writing sections as needed. On average your advisor will need about 1 week to review an entire thesis draft. This estimate will vary depending on other time demands made on your advisor (from other students, courses, conferences, research reports, etc.) and depending on the state of your draft (i.e., how much work it still needs). Give yourself at least 3 full days on average to make changes and to produce the next draft. If you're taking a reduced course load, this might translate to 5 part-time days. This results in a time period of about 12 days from submission of one draft to submission of the next. Practically speaking, this will probably be longer for your first submission and shorter for the last. Remember also that your final defense draft has to be to your committee at least one week in advance of your defense. Adding all of this up gives us 43 days (3x12 + 7)or about 6 weeks.

Time requirements for writing a PhD dissertation are necessarily longer than for an MS thesis. This is because the dissertation is a longer document, and more importantly, because the dissertation is a more in-depth document taking into account all of the relevant literature. The timing of a final PhD defense is more student-specific than with the MS defense. Commonly, the PhD student and advisor come to an agreement on a general timeframe for the defense. Then the final scheduling of a date comes after a polished and defensible draft is completed, as agreed to by student and advisor. In some cases the entire Dissertation Committee will be consulted on the question of candidate readiness. The candidate may wish to become informed as to the committee's availability for one or more potential defense dates well in advance of a defensible draft, however, the final scheduling of the defense must not come until the document is ready.

You should keep in mind that these estimates are just that, estimates. If you have a writing block, or are not as adept at writing as you would like, you may require a much longer period of time. This may also be true if you're writing during a period when your advisor will be unavailable for extended periods of time (e.g., on vacation, at a conference). On the other hand, if you're a particularly facile writer, you may need less than the proposed time periods.

It is important that you plan your thesis writing time. Submission and review of a thesis/dissertation should not become an emergency. It is never an unexpected or unanticipated event. It must be in your long-term plan from day one. Please keep this in mind when you speak with potential employers.

How can I speed things up?

There are limits to how quickly thesis writing can proceed. Nevertheless, there are certainly ways that it can be accelerated. First, be disciplined in your own writing. Work on it every day. If you have writer's block, just get something down on paper and then work to refine it. Use of detailed outlines is key. These will help to focus your thoughts and greatly improve your paragraph-level organization. It is important that you submit the best draft you can at each stage of the process. Your advisor only has a limited amount of time each week that he/she can devote to reading and revising. The fewer corrections that need to be made the faster this end of the process will be.

You should also be careful in how you craft your paragraphs. They should fall within the purpose and context of your detailed thesis outline. Each should be internally consistent, well organized, and efficiently move along, leading the reader toward the paragraph's intended conclusion. If you have a large number of poorly-developed or ill-focused paragraphs, your advisor may choose to return the draft for revision prior to a complete review. He/she will probably mark up a few paragraphs as examples of how the others should be re-written. To avoid such delays, it is important that you carefully consider the structure and flow of each paragraph before submitting a draft.

How do I begin?

Start with a general outline (see next section on organization). Go over this with your advisor well in advance of starting your first draft. Next develop a detailed outline and review this with your advisor as well. Then begin writing the first draft. Work within the detailed outline you've already developed, and add a new layer of paragraph-level headings. These will help in organizing your thoughts. This most detailed level of outline headings will be removed from your thesis/dissertation for the final and defense copies.

Organization

What do I do about outlines?

There are at least three levels of outlines that you will want to prepare. The **first level outline** should be simply a listing of your chapters with perhaps one level of sub-headings. This should be prepared long before the first draft is submitted. Go over this with your advisor before proceeding further. The **second level outline** should include several sublevels of headings representing all of the major areas within each chapter. Prepare these with the assumption that each will be covered by a single paragraph or a small set of related paragraphs. After you've had a chance to go over this with your advisor, you're ready to begin writing the text. As you write the component paragraphs in your thesis/dissertation, you should prepare an accompanying **third level outline**. This is the second level outline supplemented with a set of paragraph-level headings. These additional headings are only necessary for subsections that contain more than one paragraph. The final copy (and defense copy) should not retain these headings (sometimes referred to as "phantom" headings). However, you will want to keep them in your document until that point. The purpose of this third level outline is to focus your thinking as you write each paragraph and to help you see the interrelationships between your paragraphs. It also helps your advisor understand your purpose in writing any given paragraph. This paragraph-level heading that distinguishes the third-level outline from the second-level outline should consist of a short phrase that describes the unique focus, theme, or purpose of the paragraph below it. Think of it as a rough form of a title given to each paragraph.

Most word processing software has the capability of using multi-level headings in various viewing modes. These can be very useful in working with your outlines. For example, you can prepare your first outline using a set of "Heading 1" and "Heading 2" lines. Then your second level outline might come from adding some "Heading 3" and "Heading 4" lines. Finally you can write your paragraphs in "Normal" or "Body" text within these headings. In this way you can start with an outline and build the thesis text within it. You will also want to add the final paragraph-level of headings (e.g., "Heading 7") as you write each paragraph.

Is there a general chapter-level organization that I should follow?

Nearly all MS theses and reports use the following classical model. Unless these are good reasons to do otherwise, this is probably the way to start your first-level outline.

1. INTRODUCTION

This should include some background information on the significance of the processes or phenomena being studied. Data manipulation may be discussed in a general way. Important mathematical relationships and models may be presented if they are relevant to the exercise. Generally speaking you should be able to condense the necessary material into less than 3 pages.

2. OBJECTIVES or HYPOTHESIS

The research objectives may be stated in a separate section. However, in most cases it is preferable to place these at the end of the introduction or at the end of the Background section. If possible, objectives should be framed as one or more research hypotheses. However,

it is not always possible to construct an hypothesis that cleanly matches the objectives in spirit and scope.

3. BACKGROUND or LITERATURE REVIEW

This should include background information on the significance of the processes or phenomena being studied. Data manipulation may be discussed in a general way. Important mathematical relationships and models may be presented if they are relevant to the research. Generally speaking you should be able to condense the necessary material into less than 30 pages.

4. PROCEDURES or MATERIALS & METHODS

This section should begin with a re-statement of the experimental objectives or hypothesis. One of the first subsections in this chapter should be something like "General Experimental Design". Here you will describe how the experimental objectives were translated into a set of experiments. This includes a presentation of the general types of experiments conducted and why they were conducted. In a subsequent subsection (e.g., "Experimental Procedures") you can present the details of how you conducted these experiments. Finally, analytical methods should be fully documented. This could be done in a separate subsection. You can refer the reader to general references such as Standard Methods for the Examination of Water and Wastewater for details. However, you should always present you general methodology and any analytical details that might represent a departure from the published methods.

5. RESULTS and DATA ANALYSIS

You may or may not wish to combine this section with the Discussion section. Some projects almost require an integrated presentation of results and discussion. However, they should be separated if it can be done without compromising the quality of the presentation.

A small amount of text should accompany the presentation of results to aid the reader. Calculations and data manipulations should be included in this section. You should generally show at least one full example for each type of calculation performed, unless it is so trivial that it can be described in words. If you wish to show calculations for all samples, place this in an appendix.

All important data should be presented here, especially if the data are to be discussed. Other data that need to be available, but not necessarily discussed, should go in an appendix.

6. DISCUSSION

Here is your chance to interpret your data. It may need to be manipulated in some way. Use graphics wherever helpful. Compare your result with those in the open literature as well as those obtained by other UMass students. Explain how your data relate to the research objectives or hypotheses. Present a coherent argument that leads to your ultimate conclusions.

Be careful not to over-emphasize analytical inaccuracies, failures, or unexpected results. These are to be expected whenever performing research. With some research you will be able to check your results based on the known composition of your samples. This may involve some theoretical calculations.

7. CONCLUSIONS or SUMMARY AND CONCLUSIONS

Here is where you summarize the relevant findings and state the certainty with which you hold these findings. You should not present any new thoughts here, nor should you use this section to further your discussion. This should be just a distillation of the conclusion-type statements that you had already made in the discussion section. If this is just to have conclusions, the total length may be as small as 1 page, but more commonly it will be several pages. If you have chosen to present a "summary and conclusions" this section could be as long as 10 pages.

It is often helpful to "walk through" your conclusions, sentence by sentence, and compare with the corresponding text in the discussion section. As you do this, you should ask yourself the following questions:

⇒ Do my conclusions accurately reflect the conclusion-type statements in the discussion?

⇒ Are these conclusions adequately supported by the discussion?

⇒ Have I missed any important conclusions?

⇒ Have I properly emphasized the most important ones, and de-emphasized the lest important?

⇒ Are my conclusions understandable to the casual reader who might not have the time to study the entire thesis?

REFERENCES

List these in alphabetical order based on the last name of the first author. In-text citations should be in the author/date format (e.g., Switzenbaum and Robbins, 1988). If there are more than two authors, use: (Switzenbaum *et al*., 1995). All authors names should appear in the references section. Full citations should always appear in the REFERENCES section. I prefer the following style:

Christman, R.F.; Johnson, J.D.; Norwood, D.L.; Liao, W.T.; Hass, J.R.; Pfaender, F.K.; Webb, M.R., and Bobenrieth, M.J. (1981) *Chlorination of Aquatic Humic Substances.* US Environmental Protection Agency, Washington, DC, Report #EPA-600/S2-81-016.

Edzwald, J.K; Becker, W.C., and Tambini, S.J. (1987) "Organics, Polymers, and Performance in Direct Filtration" *Journal of Environmental Engineering*; 113:1:167-185.

Engerholm, B.A. and Amy, G.L. (1983) "An Empirical Model for Predicting Chloroform Formation From Humic and Fulvic Acids" In *Water Chlorination : Environmental Impact and Health Effects.* Volume 4, Book 1, (Robert L. Jolley, William A. Brungs, Joseph A. Cotruvo, Robert B. Cumming, Jack S. Mattice, and Vivian A. Jacobs, Eds.) Ann Arbor Science Publ, Ann Arbor, MI. p. 243-252.

Gauthier, C.; Prévost, M.; Rompré, A.; Hureiki, L., and Servais, P. (1997). "Amino Acids in Drinking Water: Removal Through Treatment Processes and Influence on Biological Stability" *Proceedings AWWA 1997 Annual Conference*; American Water Works Association, Denver, CO; p. 697-711.

Martin, B. (1995) *La Matiere Organique Naturelle Dissoute des Eaux de Surface: Fractionnement, Caracterisation et reactivite*: Ph.D. Dissertation, Universite de Poitiers, France.

Thurman, E.M. (1985) *Organic Geochemistry of Natural Waters.*: Nijhoff and Junk Publishers, Dordrecht, Netherlands.

Last names come first followed by first and middle initial. All authors are listed in the references section, but use *et al.*, after the first author in in-text citations if there are more than two. Titles of articles are in parentheses. Journal and book titles are in italics. End citations with volume numbers, issue numbers (if used) and inclusive pagination.

Don't hand in a draft with style errors in the references and citations. These can be easily avoided, and their presence suggests a lack of consideration on the part of the author. There is nothing more

discouraging to a reviewer than seeing such errors. Also, make sure that there is a reference for each in-text citation and vice-versa.

APPENDIX

Include important data and graphics that were not extensively discussed in the body of your thesis. Your appendix is the repository of data for future generations of students, so here is where you may wish to record the more tedious details of any methodology you used, especially if it is not otherwise in the published literature.

General Notes On Presentation Of Scientific Studies

Scientific Writing

Direct your writing to the level of a colleague familiar with environmental engineering, but not familiar with the specific technique or process you are discussing. Be precise in your choice of words. Be efficient in your writing, and don't include extraneous material that is unnecessary for the intended purpose. Be careful about making subjective statements or using ambiguous adjectives and adverbs (e.g., good, poor, fair, well).

Organize you paragraphs or sections in a logical fashion. Think about the objective of each paragraph. Compare what you have written with the paragraph-level heading. Is there a consistent and coherent theme? Be sure that the sentences in a given paragraph work toward achieving its objective. Paragraphs containing fewer than 3 sentences generally represent incomplete thoughts. They should either be developed more fully or merged with other paragraphs.

Grammar and syntax are extremely important. In some cases, scientific writing carries special expectations and requirements. Avoid using the active voice with an inanimate object as the subject. For example, don't write, *pH electrodes monitored hydrogen ion activity*. In fact, pH electrodes cannot "do" anything by themselves. You should write, *pH electrodes were used [by you] to monitor hydrogen ion activity*. This latter phrase uses the passive voice and has "you" as the implied subject. Do not begin a sentence with a numeral or an abbreviation. If you must start a sentence with a number, spell it out (e.g., "Five milliliters were added to the ……"). Be attentive to typical grammatical errors:

- Subject:verb agreement (see if the sentence still sounds correct when you remove prepositional phrases and modifiers)
- Proper use of pronouns (ask yourself what each pronoun refers to)
- Proper choice of homophones (affect & effect; principal & principle)

There is often confusion over the usage of *affect* versus *effect*. When you require one of these to serve as a verb, you will most likely want to use *affect*. *Affect* means to produce an effect upon. *Influence* is an appropriate synonym for *affect* when used this way. For example you might write, "changing pH will ***affect*** the production of trihalomethanes". When used as a noun, you will probably want *effect*. An *effect* is something that follows an antecedent, as a cause and *effect*. For example you might write, "the ***effect*** of pH on trihalomethane formation is substantial".

Data Presentation

Use graphs to present data, unless the precise values of the data are important. In general, data from which graphs are prepared need not be presented. However, to facilitate analysis of the data, you should include all data in a series of tables. Much or all of this should be placed in an appendix if the actual numbers are not extensively referenced in your text.

Standard, "xy" graphs should be used whenever possible. The choice of linear, semi-log or full-log will depend on the nature of the data. All linear graphs showing concentrations or doses should start at zero in both "x" and "y". Do not succumb to the temptation of spreading out the data across the entire graph, and in doing so set the origin by the lowest concentration or dose (although some graphics software will "want" you to do it this way). If one of the variables or treatments is not a continuous numerical variable or if in some other way does not lend itself to numerical representation (e.g., a sampling location in a treatment plant), you may use a bar graph to present the data. Be sure to include all important conditions in the legend or on the face of the graph. Also, remember that the independent variable is usually plotted on the x-axis, and the dependent variable falls on the y-axis.

Be certain that graphics can be fully understood by the reader. For example, graphs with multiple lines need to be designed in a way that the meaning of each line is clear. Often this is done though the use of arrows and captions or unique line styles (e.g., dotted, dashed, colors) and a legend. It is not permissible to blame your graphics software/printer if your graphics are ambiguous. Even the most uncooperative computer can be simply turned off in favor of graph paper, a pencil and a ruler. The origin and meaning of all columns and rows in tables should be understandable by the reader. Don't be afraid to use footnotes to help with this.

Resources

There are many excellent books on elements of style that pertain to thesis/dissertation writing.

General Style

1. The Chicago Manual of Style
2. The Allyn & Bacon Handbook, by Rosen & Behrens, Allyn & Bacon, 1992
3. McGraw-Hill Handbook of English, 4th edition, 1978

Scientific Style

1. ACS Style Guide, American Chemical Society
2. Writing for Communication in Science and Medicine, by Lynch and Chapman, Van Nostrand & Reinhold, 1980

Thesis/Dissertations

1. Writing Research Papers, by James D. Lester, Addison Wesley Longman, Inc., 9th ed. 1999.

Oral Defense

The CEE Regs Manual has the following information on oral defenses:

Master's Examination

All Master's candidates must pass an Examination that will consist primarily of, but not necessarily be limited to, presenting and defending the Thesis, Project Report, or Engineering Report. The Examination is conducted by the student's Committee. At the discretion of the Committee, a portion of the Examination may be closed to all but faculty members. Approval by a majority of the members of the Committee is required to pass the examination. The Examination must be announced to the Department faculty at least one (1) week prior to the date it is scheduled (Item 6). E-mail should be used. At its discretion the Program may distribute and/or post seminar announcements as desired or needed.

Doctoral Final Oral Examination

When the Dissertation Committee agrees that the final oral examination may be scheduled the Advisor will notify the Graduate Program Director of the proposed time and place of the examination (Item 12). This should be done by E-mail with a copy to the Graduate Program Secretary. The Graduate Program Director will then notify the Office of Degree Requirements. The Office of Degree Requirements must receive notification of the scheduling of a Final Examination at least three (3) weeks prior to the date of the defense. For informational purposes the Advisor must request the Graduate Program Secretary to notify the Civil and Environmental Engineering Faculty at least one (1) week prior to the scheduled time for the final oral examination. E-mail should be used. At its discretion the Program may distribute and/or post printed seminar announcements as desired or needed.

The Doctoral Final Oral Examination, which constitutes the Dissertation Defense, is conducted by the student's Dissertation Committee. The format of the examination includes a presentation of the Dissertation by the doctoral candidate followed by questions from Committee members and other interested faculty and students. At the discretion of the Dissertation Committee, a portion of the Final Examination may be closed to all but faculty members. A unanimous vote of the Dissertation Committee is required for the student to pass the Final Examination. The Advisor in his/her role as Chairperson of the Dissertation Committee will report the result of the examination to the Graduate Program Director. This should be done by E-mail with copy to Graduate Program Secretary. The result is then forwarded to the Office of Degree Requirements by the Graduate Program Director.

It is the student's responsibility to schedule his/her final oral defense. This is done in consultation with the research advisor and other committee members. In the case of a dissertation committee, this can be a difficult iterative process.

The first choice for a venue is the CEE conference room (Marston 234, also known as the Higgins Room). The departmental secretary maintains a schedule for this room, and must therefore be consulted on its use. If this room is not available, consult the department or program secretaries for alternatives.

The student is also required to have a final version of the course summary form available for inspection by the committee.

Submitting the Final Copy

The number and types of final copies will depend on the type of document. As a general rule the following printed copies must be made:

- Two copies for your advisor (one bound, one unbound)
- One copy for each of your committee members in addition to your advisor
- One copy for the EVE files
- Electronic submission to the UMass Graduate School (thesis & dissertation) or two paper copies (thesis only)
- Additional copies for research sponsor (at project's expense)

All copies except those made for the research sponsor will be the student's responsibility. He/she must arrange for coping and pay for any costs incurred.

Expenses

Although most students are supported on research or teaching assistantships during their graduate studies, the writing of a thesis/dissertation is done at the student's expense. The preparation of a research document is a requirement of the graduate program, much like classroom exams, and homework assignments. Most granting agencies do not pay for students to complete such educational requirements. Consequently, RA stipends do not extend beyond the end of the data-collection and analysis phase of a students' research activities. For students working on laboratory research, this generally corresponds to the time the student finishes his/her last experiment, and precedes the time when intensive thesis writing begins. All incidental expenses related to the writing and reproduction of the thesis are incurred by the student. Exceptions include the reproduction and binding of copies that are to be sent to a research sponsor.

Appendix: Format for Front Material

(Item 1) Signature Cover Sheet for Thesis Outline

TITLE

A Thesis Outline Presented

by

NAME IN FULL

Approved as to style and content by:

Name, Chairperson — Date of Approval

Name, Member

Name, Member

David P. Ahlfeld
Graduate Program Director, MSCE and Ph.D.
Civil and Environmental Engineering Department
or
David P. Ahlfeld
Graduate Program Director, MSEVE
Civil and Environmental Engineering Department

(Item 2) Title Page for Master's Reports

OZONE FLOTATION OF LATEX PARTICLES AS SURROGATES FOR INDICATOR ORGANISMS

A Master's Project Presented

by

Melvin A. Methuselah

Submitted to the Department of Civil and Environmental Engineering of the University of Massachusetts in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN ENVIRONMENTAL ENGINEERING

May 2009

(Item 3) Signature Page for Master's Report

OZONE FLOTATION OF LATEX PARTICLES AS SURROGATES FOR INDICATOR ORGANISMS

A Master's Project Presented

by

Melvin A. Methuselah

Approved as to style and content by:

_____
Name, Chair

_____
Name, Member

_____
Name, Member

_____
David P. Ahlfeld
Graduate Program Director, MSCE and Ph.D.
Civil and Environmental Engineering Department
or
David P. Alhfeld
Graduate Program Director, MSEVE
Civil and Environmental Engineering Department

(Item 4) A Dissertation Prospectus Signature Sheet

TITLE

A Dissertation Prospectus Presented

by

NAME IN FULL

Approved as to style and content by:

_____ _____

Name, Chairperson (Date of Approval)

_____

Name, Member

_____

Name, Member

_____

David P. Ahlfeld
Graduate Program Director, MSCE and Ph.D.
Department of Civil and Environmental Engineering