SCHOOL OF ENGINEERING AND APPLIED SCIENCES
ONLINE PROGRAMS

DOCTOR OF PHILOSOPHY (Ph.D.)
STUDENT GUIDELINES
## Table of Contents

1. Registration .................................................. 3
2. The Classroom Stage ........................................... 3
3. The Research Stage ............................................ 4
   3.1 Doctoral Research Advisors ............................... 4
   3.2 Doctoral Research Meetings .............................. 4
   3.3 Research Submissions ..................................... 5
4. The Program Milestones ....................................... 5
   4.1 Milestone 1—Grade-Point Average ....................... 5
   4.2 Milestone 2—Conference Presentation .................. 5
   4.3 Milestone 3—Journal Article ............................ 5
   4.4 Milestone 4—Final Examination ......................... 6
   4.5 A Note on Academic Integrity ........................... 6
5. Graduation Clearance ......................................... 7
   5.1 Walk-through Policy ...................................... 7
   5.2 Diploma Mailing Information ............................ 7
6. Commencement ................................................ 8
7. Administration ............................................... 8

Appendix A: Dissertation Format Guidelines .................. 9
Appendix B: Acceptable Refereed Professional Journals .... 27
Doctor of Philosophy Program Overview

The online Doctor of Philosophy (Ph.D.) program consists of a minimum of 54 credit hours divided into two stages. The first stage comprises a classroom experience of eight graduate-level, three-credit-hour courses culminating in the student’s acceptance into an appropriate engineering professional conference. The second stage comprises an independent research effort of at least 30 semester hours of dissertation research culminating in the dissertation defense. The program is marked by four milestone accomplishments that must be completed by specific deadlines in keeping with the accelerated nature of the program. After completing the course work with a minimum 3.4 GPA (Milestone 1) and presenting at an engineering conference (Milestone 2), the student writes a journal article that is accepted for publication in an approved journal (Milestone 3) and student defends an original dissertation (Milestone 4) in Systems Engineering, which focuses on innovation in the theories that govern the structure, operation, and management of technical and scientific organizations. The article must be accepted for publication by an approved professional journal before the dissertation may be defended.

1. Registration

The student must maintain continuous enrollment throughout the off-campus doctoral program. Semester enrollment information is distributed by the SEAS Online Programs office via email before the start of each semester, and registration is processed directly by the office on the date listed in that email assuming that the student has maintained academic and financial obligations to the University.

Registration holds are placed on student accounts with outstanding balances. Our office cannot process registration when there is a registration hold on the account. For this reason, students must make payment on time each semester. Late payment of tuition is grounds for possible removal from the doctoral cohort. Withdrawal and tuition refund policy information can be found online at http://emse.offcampus.gwu.edu/about-us/policies-procedures/.

2. The Classroom Stage

a. Continuous enrollment/Leaves of absence: Doctoral curriculum are determined by the faculty, and course information is provided to students by email from the SEAS Online Programs Office before the start of each semester. Students are registered as members of a cohort. This means that all courses are taken in lock step throughout the program. Transfer of credit and leaves of absence are not permitted.
b. Grading: The following grading system is used for graduate students: A, Excellent; B, Good; C, Satisfactory; F, Fail; other grades that may be assigned are A−, B+, B−, C+, C−. Grades in this course will be based on a standard curve relative to the class average.

Courses in which the student earns grades below B- are not included in the total credit-hour requirement for the degree; they are, however, computed in the grade-point average (GPA). Students who receive a grade below B- in one of the classroom courses will be required to take
an additional course after the end of the classroom stage of the program to satisfy degree requirements and be eligible to move on to the research stage. Any student who receives a grade of F will be barred from further enrollment in the program. Doctor of Philosophy students must complete the classroom stage with a GPA of 3.4 / 4.0 or better. (Milestone 1).

3. The Research Stage

Research credit hours/semesters are used to search the literature and conduct research to be developed into program deliverables:

Research stage requirements: minimum 30 credit hours of EMSE 8999-Dissertation Research; developing an abstract and/or paper to present before a professional conference, submit an original research article and gain acceptance to an approved academic journal for publication, and write and defend a dissertation. No fewer than 30 credit hours of EMSE 8999 will satisfy the requirements for the Ph.D. Extensions may be granted on a case by case basis dependent on the student’s satisfactory achievement toward the program milestones.

Students will be registered for a minimum of six credit hours in each Fall and Spring semester and three credit hours in Summer. During approved extension semesters, students will be registered for three credit hours each semester at the current tuition rate in effect at that time.

3.1 Doctoral Research Advisors

Doctoral research advisors are assigned to each student by the program faculty upon entrance to the research phase. Students are expected to work with their assigned advisor team for the remainder of the program.

3.2 Research Meetings and Feedback

Meetings are scheduled approximately every four weeks between the student and their assigned advisor following successful completion of the classroom phase (milestone 1).

Attendance at each meeting is required and students are expected to be available for all scheduled doctoral research meetings. Students are permitted up to 2 unexcused absences. Meetings are announced by email in advance. Students are responsible for submitting slides covering research progress to the SEAS Online Programs office by the deadline provided in the meeting announcement. Slides must be submitted for all meetings, even if the student will be absent.

Students will receive feedback from the advisors after each advising meeting, and one summary report at the end of each semester. Student progress will be noted as one of the following:

- **Red** – Student is making insufficient progress
- **Yellow** – Student has made some progress, but is in danger of not meeting milestone timelines
- **Green** – Student is making sufficient progress toward milestone completion
If the advisors have determined that the student made insufficient progress (Red) in a semester, the student may be dismissed from the program.

3.3 Research Submissions

All abstracts, conference papers, and journal articles must be forwarded to the program advisors for review and approval before they are submitted to a conference or journal. The SEAS Online Programs office must be copied (at seasdoc@gwu.edu) on all your submissions and other correspondence with conferences, journals, or related entities. All final advisor-approved papers must be sent to our office at seasdoc@gwu.edu for academic integrity review prior to submission. *See 4.5 “A Note on Academic Integrity”

4. The Program Milestones

Ph.D. students in the Research Stage are registered for EMSE 8999 and will complete Milestones 2, 3, and 4, described in detail below.

Students can expect to complete the off-campus Ph.D. program within three years.

4.1 Milestone 1—Grade-Point Average

Students must complete the required courses with a final grade-point average (GPA) of 3.4 / 4.0 or better for the Ph.D.

4.2 Milestone 2—Conference Presentation

The candidate is expected to present results of the research, subject to the advisor’s approval, at an engineering professional conference, such as INCOSE’s. The approved presentation must be submitted to the conference within 3 months after completing Milestone 1. The paper must be presented at the conference no later than 12 months after completion of Milestone 1. Most engineering professional conferences are announced on the World-Wide Web. Credit must be given in the publication to the fact that the material is abstracted, summarized, or developed from a dissertation submitted to the George Washington University in partial fulfillment of the requirements for the Doctor of Philosophy degree.

4.3 Milestone 3—Journal Article

The candidate must submit an approved research article embodying the results of an extended original study to an approved, refereed scholarly journal within the first 18 months after completing Milestone 1. Credit must be given in the publication to the fact that the material is abstracted, summarized, or developed from a dissertation submitted to the George Washington University in partial fulfillment of the requirements for the Doctor of Philosophy degree. Before the student defends the dissertation, this original article must be accepted for publication. Students will be provided a list of SEAS Online Programs’ approved journals (*Appendix B*). Requests to submit to journals not on this list must be approved by the program faculty.

Within 90 days after submission to an approved journal, students must submit a draft of their dissertation to their program advisors for review. Once the journal article submission has been accepted for publication, the final dissertation needs to be ready to defend within 30 days. If revisions to the submission are requested from the publication, students must submit their revised
version, approved by their advisors, within 30 days.

All reviewer comments received by the student should be forwarded immediately to the advisors and the SEAS Online Programs office, within 48 hours of receipt. Rejection of two journal articles may be cause for dismissal from program.

4.4 Milestone 4—Dissertation and Defense: Final Examination

Upon successful completion of all prior requirements, the student must submit their final dissertation approved by their advisors, to the SEAS Online Program office. Below are guidelines and instructions for the dissertation defense (Final Examination).

- Refer to Appendix A of this document for dissertation format guidelines.
- Upon receipt of your dissertation, the SEAS Online Programs Office will submit the final paper for Academic Integrity Review. If it does not meet the Academic Integrity Review requirements, you will be notified. If it meets the Academic Integrity Review requirements, the final examination will be scheduled and details will be announced via email. At that time, all graduation paperwork and committee information will be provided.
- Membership of the committee of examiners will be determined by the SEAS Online Programs Office.
- Submission of the dissertation paper to committee members may be electronic via email or in print (based on committee member preference). If hard copies of the dissertation are requested, they should be printed double-sided.
- When the Final Examination committee is convinced of the quality and originality of the candidate’s contribution to knowledge as well as his or her mastery of the scholarship and research techniques in the field, the committee recommends the candidate for the degree of Doctor of Philosophy.
- Submission and graduation deadlines are as follows:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Submit approved paper to SEAS Online Programs</th>
<th>Final Exam &amp; Upload to ETD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>January 31</td>
<td>April 1</td>
</tr>
<tr>
<td>Summer</td>
<td>June 30</td>
<td>August 15</td>
</tr>
<tr>
<td>Fall</td>
<td>December 1</td>
<td>January 15</td>
</tr>
</tbody>
</table>

4.5 A Note on Academic Integrity

All student papers (conference papers, journal articles, dissertations and praxis) must pass the Academic Integrity Review (AIR) prior to submission. It is expected that all submissions use proper citation and pass the academic integrity review without issue. If a submission fails the
AIR, the SEAS Online Programs office will provide a courtesy report to the student so that appropriate updates can be made. Submissions with Academic Integrity concerns that do not pass the review on the third attempt may be forwarded to the Academic Integrity Review Board for additional evaluation.

Papers should be approved by the advisors prior to submission for AIR. Once the advisors have approved the final version of a paper, the item should be forwarded to seasdoc@gwu.edu, with a request for AIR evaluation. It is the responsibility of the student to submit these items to the SEAS Online Programs office for AIR prior to submission to a conference or journal. An email confirmation will be sent once the item has passed and is approved for submission. The GW Code of Academic Integrity may be viewed at http://www.gwu.edu/~ntegrity/.

In the performance of the dissertation research and in any published and public results, the candidate must obey GW policies regarding research misconduct and the use of copyrighted material. Details are available at: http://my.gwu.edu/files/policies/ResearchMisconductPolicy.pdf; http://library.gwu.edu/etd/copyright

5. Graduation Clearance

After a successful dissertation defense the SEAS Online Programs Office assembles all necessary documentation for graduation clearance.

Degrees are conferred in January, May, and August. To be recommended by the faculty for graduation, a student must have met the admission requirements of the school in which registered; completed satisfactorily the scholarship, curriculum, and other requirements for the degree; filed an application for graduation by the date requested by the SEAS Online Programs Office; and be free from all indebtedness to the University. Enrollment is required for the semester at the close of which the degree is to be conferred, and all degree requirements must be completed by the last day of final examinations for that semester.

5.1 Walk-through Policy

Doctoral candidates who have not successfully defended their dissertations may not participate in either the May commencement or the hooding ceremony.

5.2 Diploma Mailing Information

Diplomas are mailed 12-14 weeks following the date of degree conferral, barring unforeseen circumstances. Diplomas will be mailed to the Diploma Address in the record. The candidate is responsible for entering this address in the GWeb information system and for making any necessary updates. Instructions are included on the Application for Graduation. This address must be entered BEFORE submitting the application for graduation.

If the diploma is not received 12-14 weeks after your graduation date, the online transcript should be checked to see if the degree was conferred. If it was conferred, the missing diploma needs to be reported to the Registrar’s Graduation Services Office within six months. After that time a fee will be charged for a replacement diploma. Also check to see if there are any financial
holds on the account. A diploma will only be sent if the balance owed is less than $500. If the degree was not conferred, check with the SEAS Online Programs Office.

6. Commencement

Participation in the annual commencement ceremonies held in May is open to students who have applied to graduate in the current spring semester or who graduated the preceding fall or summer semester.

Doctoral candidates who have not successfully defended their dissertations and completed their ETD Approval form by 1 April may not participate in either the May commencement or the hooding ceremony. The commencement program does not include names and dissertation titles of doctoral candidates who have not successfully defended their dissertation by the end of March.

Students who apply to graduate after the published deadlines are not guaranteed commencement materials and may not be listed in the commencement program.

Students can find more information about University Commencement online at https://commencement.gwu.edu/

7. Administration

The SEAS Online Program staff is responsible for monitoring and tracking student progress. For this reason, all communication related to the Online Ph.D. program must involve the SEAS Online Programs Office (seasdoc@gwu.edu). Relevant communications comprise of advisor/student interaction, journal and conference submissions, research inquiries, and all other program-related information. Additionally, students are expected to keep the SEAS Online Programs Office informed of their current contact information, such as email address, home address, and telephone numbers, including cell phone number.

The University policies and regulations can be found in the George Washington University Bulletin (online at http://www.gwu.edu/~bulletin/).
Appendix A to the SEAS Online Program Ph.D. Student Guidelines Dissertation Format Guidelines

(Adapted from the “SEAS Doctoral Student Handbook – August 2015”)

For any questions on dissertation format, please contact:

Marilyn Shazier-Shields at 202-994-8323 or by email at mshazier@gwu.edu

A.1 General Considerations and Requirements
   A.1.1 Electronic Submission Requirements
   A.1.2 Length
   A.1.3 Margins
   A.1.4 Type Size and Spacing
   A.1.5 Page Numbering

A.2 Front Matter
   A.2.1 Title Page
   A.2.2 Certification Page
   A.2.3 Copyright Page
   A.2.4 Dedication Page
   A.2.5 Acknowledgement Page
   A.2.6 Abstract
   A.2.7 Table of Contents
   A.2.8 List of Figures
   A.2.9 List of Tables
   A.2.10 List of Symbols
   A.2.11 List of Acronyms
   A.2.12 Glossary of Terms

A.3 Main Text
   A.3.1 Organization
   A.3.2 Graphics
      A.3.2.1 Figures & Tables
      A.3.2.2 Labeling Graphics
      A.3.2.3 Sideways & Larger Graphics
      A.3.2.4 Equations
   A.3.3 Footnotes or Endnotes
   A.3.4 Lists
   A.3.5 References
      A.3.5.1 Marking Citations in the Text
      A.3.5.2 The Reference Section
   A.3.6 Appendixes
A.1 General Considerations and Requirements

A.1.1 Electronic Submission Requirement

The University requires that all dissertations be submitted electronically. Paper dissertations will not be accepted. The major advantage with electronic dissertations is that you can include more information and more types of information. You can include color photos, video and sound clips, and active web links. Anything that can be embedded in a web page can be put in a dissertation.

When instructed to do so by the SEAS Online Programs Office, go to the ProQuest ETD website: http://www.etdadmin.com/. Create an account and upload your dissertation. The submission deadlines are:

- Completing Fall–Deadline is January 15 of the following year
- Completing Spring–Deadline is April 1
- Completing Summer–Deadline is August 15

The ETD submission must be in PDF format. There are instructions on the ETD site for converting text to PDF. A fee is required to cover the expenses of handling and storing the dissertation.

The dissertation copyright is governed by http://www.gwu.edu/~psc/graduate/UMI_Dissertation_Copyright.pdf.

If you have any questions about the ETD website, please contact Marilyn Shazier-Shields, or the Gelman Library dissertation administrator Valerie Emerson (etds@gwu.edu or 202-994-2041).

A.1.2 Length

The entire dissertation should be no longer than 250 pages.

A.1.3 Margins

Margin requirements will be enforced without exception. The right and left margins should be one and one-quarter inches to allow for binding. Even though dissertations will be electronic, UMI still requires the 1.25” margins so they can print them out and bind them if a hard copy is requested. Top and bottom margins should each be one inch. All text and graphics (except page numbers) must fit inside those margins. Material outside the margins will affect the readability and appearance of the document.

A.1.4 Type Size and Spacing

Type size should be between 10 and 12 points. A 12-point Times New Roman or a 12-point Courier are good examples of acceptable type fonts. Decorative and ornate fonts are not accepted. If you are in doubt about whether the type font you want to use is acceptable, please ask before writing your entire dissertation in it. It is permissible to mix type fonts within the dissertation, as suggested in the Figures and Tables section.
All text material should be double-spaced, with long quotations and notes single-spaced. To avoid confusion about when a new paragraph starts, because the text is all double spaced, start each paragraph in the main text portion with a ¼ inch indentation.

**A.1.5 Page Numbering**

All pages except the title page must be numbered. Page numbers are centered in the lower (footer) area of each page.

Front matter pages (see next section) are numbered using small Roman numerals. The title page is considered to be page “i” but is not numbered. Start numbering with “ii” on the next page.

Main text pages are numbered with Arabic numerals, starting over with “1” on the first page of Chapter One. Numbering continues through to the end of the dissertation, including the Reference section and any appendixes.

*Nota Bene.* Although this guide provides instructions and examples for using *Word* to write the dissertation, the use of *LaTeX* is encouraged. You will find it easier to produce complex equations in *LaTeX*, which also has a superior ability to create lists of tables and figures, as well as tables of contents. Please consult your advisor(s) about the best tool to use before you start writing.

**A.2 Front Matter**

The front matter includes all material before the main text. Pages are numbered with small Roman numerals. Not all these pages are required, but if included, they should be in this order:

- Title page (required)
- Certification page (required)
- Copyright page (optional)
- Dedication page (optional)
- Acknowledgment page (optional)
- Abstract (required)
- Table of Contents (required)
- List of Figures (required if you have any figures)
- List of Tables (required if you have any tables)
- List of Acronyms (optional)
- List of Symbols (optional)
- Glossary of Terms (optional)

All the front matter pages, except for the title page, certification page, and copyright page, have the name of the page centered and in bold at the top of the first page of that section, in the same manner as the chapter title pages.

**A.2.1 Title Page (required)**

See the sample title page at the end of this document. Center all lines. Start with the dissertation title, in initial caps. Then single space blocks of information and double space
between each group of information. Do not list all your committee members, just your advocate(s). If you have two or more advocates, list them with the first advocate first, regardless of alphabetical order. Try to center the text vertically on the page. This page is not numbered.

One of only three completion dates may appear on the Title Page regardless of the actual date of your defense. If you are completing your doctorate in Summer semester, the date will be August 31 of that year. If you are completing in Fall semester, the date will be January 31 of the following year. If you are completing in Spring semester, the date will be the date of the GW commencement ceremony.

A.2.2 Certification Page (required)

The Certification Page is an official statement that your dissertation has been accepted and you have completed all requirements for your doctorate. Please see the sample page at the end of this guide. This is where you can put the actual date of your defense. This will always be page ii. Committee members do not sign this page.

A.2.3 Copyright Page (optional)

As the author of a dissertation, you own the copyright to your work. If you are concerned that someone may infringe on your intellectual work, you can pay a fee and register your copyright. Here is what registering the copyright accomplishes:

1. A registered copyright serves as *prima facie* evidence of copyright validity and is a prerequisite for filing an infringement action against someone in court.
2. A copyright owner can recover statutory damages and attorney’s fees only if the work is registered prior to infringement or within three months of publication.
3. If the infringement occurred prior to registration, the copyright owner can still file an action, but it is limited to actual damages and injunctive relief. In other words, you could register the copyright after you find out about the infringement and still take action against the violator.
4. By paying the registration fee to ProQuest, you are paying ProQuest to register the copyright on your behalf. Alternatively, you can register the copyright on your own now or later.

As this suggests, registering the copyright might not be necessary in many cases; however, if your work has the potential to make money (e.g., through book royalties or a patent), it is probably wise to register the copyright. Whether or not you formally copyright your work, you can have a copyright page. Copyright next should read “Copyright © (year) by (student’s name). All rights reserved.” Text should be single spaced and centered vertically and horizontally on the page. The year of copyright should match the year of completion on the Title Page. If you have a copyright page, it will be numbered iii.

If your work could lead you to seek a patent for an invention or discovery, you have the option when you register on the ETD website to delay making your work public to give yourself time to
file for a patent. Once you make your invention or discovery public, you may lose your
opportunity for a patent after a certain time.

If you developed a patentable invention with University funds or facilities, please also
understand that you have a responsibility to disclose this to the University (the Associate Vice
President for Research and Graduate Studies or the Medical Center Office of Research). For
more information, please visit the website of the Office of Sponsored Research.

A.2.4 Dedication Page (optional)

If you wish to dedicate your dissertation to a particular person, institution, or anything else, this
is where you do it. Write about to whom you wish to dedicate it and why. If you have a copyright
page, this will be numbered iv. If you do not have a copyright page, this will be page iii.

A.2.5 Acknowledgment Page (optional)

Writing a dissertation is a huge effort and is rarely done without help. This page is for you to
formally thank all the people who have helped you on your path to completion of your
dissertation. Be generous with your thanks.

A.2.6 Abstract (required)

The abstract is a one- or two-page (absolutely no longer than two) summary of your research in
terms that a general audience would be able to understand. Think about how you would explain
your research to a first-year engineering undergraduate. Do not cite references in the abstract.
The title of the dissertation should be written after the page header:

Abstract of
2 blank line spaces.
Title of Dissertation
   (single spaced if more than one line)
2 blank line spaces.
Abstract text starts on this line.

A.2.7 Table of Contents (required)

The title page, the certification page, and the copyright page are not listed in the table of
contents. All other front matter pages, if used, and every numbered organizational subdivision
within the main text, the reference pages, and any appendixes, must be listed along with the page
number that each starts on.

Refer to the section on organization under Main Text, below, for the organizational scheme. All
the organizational subdivisions should be listed by number, followed by the subdivision title,
then a line of dots out to the right margin where you put the page number. Page numbers can be
easily lined up by using a right justified tab.
It will help you and your readers to follow your organization if you indent subheaders ¼ inch in the table of contents. See the example page at the end of this document.

It is important that if the descriptive title of a section is very long, the text does not overflow into the page number column. Start a new line instead. Continuation lines should be indented ¼ inch from the start of the previous line to avoid confusion with the next organizational entry. See the example page at the end of this document.

Word and LaTeX have a function that will automatically build a table of contents as you mark the headers.

**A.2.8 List of Figures (required if you have any figures)**

If you have any figures, you must list them by number and label, and page number. See the section on figures and tables for more information.

**A.2.9 List of Tables (required if you have any tables)**

If you have tables, you must list them by number and label, and page number. See the section on figures and tables for more information.

**A.2.10 List of Symbols (optional)**

If you use a large number of symbols and variables in equations, your readers may find it helpful if you list their meanings. One method of listing symbols is to list Roman alphabet symbols, followed by a list of Greek alphabet symbols, followed by a list of other symbols.

**A.2.11 List of Acronyms (optional)**

Keep in mind that your dissertation will be read by people both within and outside your particular area of expertise. If you use many acronyms, even though you spell them out the first time you use them (see section on Main Text) it is good to have one central location where all acronyms are explained so the reader does not have to hunt through the text looking for a particular acronym’s first use.

**A.2.12 Glossary of Terms (optional)**

Not all terms are clear to all readers. Many terms that seem common may actually be used in a particular way, or have a specific meaning within your discipline, that differs from common usage. Explaining your more esoteric terms in one central place may be helpful.

**A.3 Main Text**

Main Text sections must be placed in this order:

- Main text of dissertation (required)
- References (required)
- Appendixes (optional)
The most important thing to bear in mind when writing the text of your dissertation is that a variety of people will be reading it in the future. In the immediate sense, you are writing for your advisor(s) and your examining committee. You can assume that your committee is familiar with your subject material, your methods, and your results; however, after your doctoral defense is complete, your dissertation will be published and will be available for reading by anyone who troubles to look it up. You can assume that those readers will have the technical background necessary to grasp your points; however, you should also assume that they may not have the narrow expertise and familiarity with your particular research that will allow them to read about your work on the same level that you and your committee do. Therefore, as you write, you should explain some of the more esoteric details.

A good test is to have a classmate read your text. He or she will have technical knowledge equivalent to yours, but may not have the specialized knowledge you have in your particular area. If that reader does not immediately understand certain parts, perhaps those parts should be rewritten to provide more explanation.

Another important consideration is that future readers probably will not read your dissertation from beginning to end; thus, they may skip your introduction and literature review chapters and go straight to how you performed your experiment. You can help this type of reader by spelling out acronyms, and otherwise explaining new concepts the first time they are used in each chapter, even if you have already done so in previous chapters.

A.3.1 Organization

Dissertations are organized into numbered chapters; each chapter is divided into numbered sections; sections may be divided into numbered sub-sections; etc., down as many levels as you need. Just remember that if you have a section “X.1,” you must always have a section “X.2.” In other words, do not subdivide a section into only one dependent part; you must always have at least two. See the example headings below.

In general, your first chapter will introduce your research problem. State the problem; briefly state the history of the problem and where research into it stands at present. Briefly state what you propose to do, how, and why. The last section of your first chapter may be a brief chapter-by-chapter overview of the entire dissertation. You may want to write the introduction chapter last so you can accurately “predict” what you will say in later chapters.

The second chapter is usually a literature review. Describe in detail the research that has been done on your problem, how it has influenced subsequent research, and how and why past research has led to your present situation.

In the third chapter, present your new contribution to the research, and explain the theory of how and why your research works, and how it will solve the problem stated in the introduction.

In the fourth chapter, go over your research step by step. Explain how and why you set up your experiment to obtain your results.
In the fifth chapter, relate what happened when you actually ran your experiment and describe your results. Mention any problems you encountered while running the experiment and how you overcame them.

The sixth chapter is for your conclusions. Were you right or wrong in your approach to your experiment? What went particularly well or badly? How might you have done things differently? What further research might be done to follow up on your results?

This is not the only acceptable organization, but it is the most common. You may need a totally different organizational approach because of your particular type of research. Just be sure to talk with your advisor(s) about how to organize your dissertation before you start writing.

At each organizational level you need to give a short descriptive title of what you are writing about in that section. This will also be put in the table of contents. Put your section headers in bold. Start your second-level headers (X.X) flush with the left margin. Indent each successive level (X.X.X, etc.) an additional ¼ inch (two additional dots on the measurement bar at the top of your Word window). Note that your text always starts with only a ¼-inch indentation, and it always starts on the next line (accounting for the fact that everything is double spaced) after the header. You should double space before a new header (see example below).
Chapter 1. Introduction

This is an example of organizational headers. Start each new chapter on a new page. Chapter headings will be centered, in bold, and in all caps or initial caps.

Leave a space after the chapter heading before starting the text; that is different from the lower-level headings. After second and lower level headings, start the text on the next line. You do not have to have text immediately following a chapter heading; you can go right in to the next sub-heading; however, after lower level headings, you should have text before the next lower heading level.

1.1 Second-Level Header

Text.

1.1.1 Third Level Header

Text.

1.1.1.1 Fourth Level Header

Text.

1.1.1.1.1 Fifth Level Header

Text.

Notice that even though the header keeps moving over with each lower level, the text always starts in the same place.
A.3.2 Graphics

A graphic is anything that is not text, plus the labeling for the graphic. Common graphics include tables, figures (graphs, photographs, drawings, charts, and so forth), and equations. Every graphic must have a label so it can be referred to in the text.

The best way to incorporate graphics into your dissertation is to mention or explain them before they appear in the text. If you place the graphic before mentioning it in the text, the reader will wonder what the graphic is about and it will interrupt the flow of reading. If possible, your first mention of the graphic should be on the same page as the graphic so the reader can read the textual description and look at the graphic without having to turn any pages.

A.3.2.1 Figures and Tables

Two types of graphics must be labeled and listed in the front matter: figures and tables. A figure is every kind of graphic except tables and equations, including graphs, photographs, drawings, clip art, and anything else that is not text. A table is a display of data in an array of columns and rows. Use the Table pull-down in Word to create one.

If at all possible, make your tables and figures fit completely on one page. That way the reader can see all the data at once without having to turn pages. You can turn a graphic sideways, as discussed below, to make it fit. If it is not possible to fit a graphic on one page and it continues onto the next page, you will need to label the continued graphic at the top of the following page so the reader knows it is a continuation of a previous graphic and not a new graphic. Label continuations exactly the same way as the main graphic, but write Table 2-1 (cont.) and the title at the top of the next page so readers know the graphic is a continuation and they should look at the previous page(s) to see the start. If a table must be continued on the next page, be sure to label the vertical data columns again at the top of the new page so readers know what those columns mean. Again, remember that future readers may not start reading at the beginning of your dissertation, and may not have read the previous pages.

A.3.2.2 Labeling Graphics

All graphics must be labeled. Tables are labeled on top of the table. Figures are labeled below the figure. You should use slightly smaller type and a different type font in the label so the reader knows it is a label and not regular text. For example, if you use 12-point Times New Roman for your main text, make your labels 10-point Arial.

Keep graphic titles short and to the point. Titles will be listed in the front matter and a graphic title that is five lines long is not helpful. You can put a short title on the label and then put more information below the graphic, and as part of it, to explain what’s going on (see example below).

Tables and figures are numbered sequentially within each chapter. All tables are numbered starting with 1 and figures are numbered separately starting with 1; thus, in Chapter 2 you may have Table 2-1, Table 2-2, etc., and Figure 2-1, Figure 2-2, etc.
Example:

Text text text text text text text text text. In Figure 2-1, we see three SEAS doctoral candidates in a blinding snow blizzard, walking to their lab in Staughton Hall.

<table>
<thead>
<tr>
<th></th>
<th>Jan 08</th>
<th>Feb 08</th>
<th>Mar 08</th>
<th>Apr 08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data 1</td>
<td>blah</td>
<td>blah</td>
<td>blah</td>
<td>blah</td>
</tr>
<tr>
<td>Data 2</td>
<td>blah</td>
<td>blah</td>
<td>blah</td>
<td>blah</td>
</tr>
<tr>
<td>Data 3</td>
<td>blah</td>
<td>blah</td>
<td>blah</td>
<td>blah</td>
</tr>
</tbody>
</table>

Figure 2-1: Three SEAS doctoral candidates in a blizzard

This is an example of further explaining what is happening in the graphic. This text is considered part of the graphic, not of the main text. It is not part of the graphic label that goes in the List of Figures.

In Table 2-1 below, we demonstrate the method used to label tables:

Table 2-1: This is the Label

As in the table of contents, you must make sure that the text of your graphics titles does not get into the page number column. Start a new line before it gets there.

Graphs should have all data lines labeled either with a key at the bottom of the graph or with a label pointing to the proper data line. Ideally, multiple lines on your graphs will be in different colors so readers can readily tell which line is which.

A.3.2.3 Sideways and Larger Graphics

If you need to present a graphic sideways on the page because it will not fit the regular way (i.e., in landscape view instead of portrait view), the page number still needs to be oriented in portrait view. Just be sure that the graphic is turned 90° counterclockwise so that the top of the graphic is on the binding (left) side of the page.

If a graphic needs to be larger than one standard page, yet all on one page, contact Marilyn Shazier-Shields, 202-994-8323, to figure something out. Don’t just do it on your own and assume that it will be acceptable.
A.3.2.4 Equations

It is likely that you will include equations in your dissertation. If you are using LaTeX to write your equations, they should be centered in the line. If the equation is longer than one line, continue it on the next line, and on subsequent lines.

If you are using Word to write your equations, centering them may be a problem. If you are unable to center them, they should start flush with the left margin. In any case, equations should be written in italic type. If the equation runs longer than one line, continue it on the next line, but indent ½ inch.

Each full equation—not each equation line—should be labeled flush with the right margin by a number within parentheses. Number your equations sequentially within each chapter. Thus you might have equations numbered (1.1), (1.2), (2.1), (2.2), and so on.

Example in Word:

\[ 1 + 2 = 3 \quad (1.1) \]

You may need to explain any symbols used in your equations. Do that in the text immediately following the equation, and in the List of Symbols section, if you have one.

A.3.3 Footnotes or Endnotes

Footnotes or endnotes are used to provide a short explanation of a point within your dissertation that does not really merit discussion in the main text. Notes should not be used primarily to cite references, although there may be citations within a note.

A.3.4 Lists

If you list more than three items in a sentence, consider using a bulleted list rather than a long series of commas to make for easier reading. For example:

- Item one.
- Item two is a longer item, so if it goes longer than one line, you should start the second and subsequent lines even with the text at the beginning of the bullet.
- Bullets should be indented ¼ inch and the text starts ¼ inch beyond that.
  - You can have sublists within bullets.
  - Use a different kind of bullet like this hollow one.
  - Indent it so the bullet is even with the start of the higher level text and if the line is so long it wraps to the next line, make sure it starts even with the text at the start of the bullet.
  - And so on.
  - For as many levels as you need.
  - As with the main text organization, if you have one “sub-bullet”, you must have at least two.
The same applies to numbered lists. Instead of changing the shape of the bullet, alternate numbers and lower case letter for each level. The idea is to ensure readers can tell at a glance what level in the organization they are on.

The difference between bulleted and numbered lists is that bulleted items can be in any order. You can switch the text in bullet one and bullet two and it makes no difference. Numbered lists must be in that order; for instance, a list of sequential steps in an operation or a list of priorities would be numbered rather than bulleted.

A.3.5 References
Citing sources is probably the most difficult and time-consuming part of writing a dissertation; however, it is essential that you properly cite everything that is not your own work to avoid any possibility of plagiarism.

The SEAS faculty has agreed that any style guide may be used to cite references, as long as it is in common usage within your discipline. The SEAS-OP Office prefers The Chicago Manual of Style.

A.3.5.1 Marking Citations in the Text
The author and year citation method used by The Chicago Manual of Style marks cited passages with the first author’s last name and the year of publication, like this: (Martin 2007); if needed, the year is followed by page numbers, like this: (Martin 2007, 99-100). Cited works are listed in the Reference section alphabetically by the first author’s last name.

A.3.5.2 The Reference Section
As you review the instructions below, you may refer for examples to The Chicago Manual of Style, latest edition, or to http://www.chicagomanualofstyle.org/tools_citationguide.html. Information in a reference entry is separated by periods. Titles are capitalized like headlines (except for titles in a foreign language).

Entries for books and monographs should include the following information:

- last and first names of the first author, followed by first and last names of other authors (only the first author’s name is inverted [last name first])
- year of publication
- full title of the book or monograph in italics
- city of publication
- publisher

Reference to journal articles and papers in serial publications should include:

- last and first names of the first author, followed by first and last names of other authors
- year of publication
- full title of the cited article within “quotation marks”
- name of the journal in which article appears in italics
- volume number (if any) (do not include the abbreviation, "Vol.")
• issue number (if any) in parentheses (do not include the abbreviation, "No.")
• inclusive page numbers of the article cited (do include "pp.")

Reference to individual conference papers, papers in compiled conference proceedings, or any other collection of works by numerous authors should include:

• last and first names of the first author, followed by first and last names of other authors
• year of publication
• full title of the cited paper in “quotation marks”
• name of conference at which paper was presented
• location (city and state or city and country) of conference
• dates of the conference

Entries for conference papers published in proceedings are listed like chapters in books, and for conference papers published in journals like articles.

Reference to dissertations, theses, and technical reports should include:

• last and first names of the first author, followed by first and last names of other authors
• year of publication
• full title in “quotation marks”
• report number (if any)
• city of publication (if any)
• publisher or institution name

Reference to web pages should include:

• last and first names of the first author, followed by first and last names of other authors, if known; if unknown, list the organization that owns the web site as the author
• title (if any) of the web page in “quotation marks”
• date of the latest update to the site at the time you got your information from it
• web address

Web sites, by their nature, are subject to change without the author having to give notice that there has been a change. It is good practice at the time you access the site to print out the material that you will use as your reference and write the current date on the page. You may find that by the time your dissertation is finished, your material on the web is different or may have disappeared entirely. Your committee members may need to see the material that was current when you referenced it to help them evaluate your dissertation.

A.3.6 Appendixes
Appendixes are for supplementary material that supports the subject of your dissertation but is either not important enough to include in the main text or is of a bulky, hard-to-read nature. Examples include long tables or figures of raw data results, background material, computer programs, samples of surveys, copies of letters or other documentation received, and the like.

[22]
You do not have to double-space the text in appendixes.

Appendixes are differentiated by letter, so the first one will be Appendix A, then Appendix B, and so forth.

Appendix pages are numbered continuously with the rest of the main text. Graphics are numbered A-1, A-2, B-1, B-2, etc.
This Is a Sample Title Page for a Dissertation

by Your Full Name

B.S. in Mechanical Engineering, May 2000, Iowa State University

A Dissertation submitted to

The Faculty of
The School of Engineering and Applied Science
of The George Washington University
in partial satisfaction of the requirements
for the degree of Doctor of Philosophy

January 31, 2014

Dissertation directed by

Shahram Sarkani
Professor of Engineering Management and Systems Engineering
and
Thomas Andrew Mazzuchi
Professor of Engineering Management and Systems Engineering
The School of Engineering and Applied Science of The George Washington University certifies that [your full name] has passed the Final Examination for the degree of Doctor of Philosophy as of [date of dissertation defense]. This is the final and approved form of the dissertation.

[Title of dissertation: The style used for the title here should match the style on the title page]

[Student’s name]

Dissertation Research Committee:

[dissertation director’s full name, professorial title, and the label Dissertation Director—use Graduate Bulletin for correct listings]

[if a co-director: his/her full name, title, and the label Co-Director]

[committee member’s full name, title, Committee Member]

[committee member’s full name, title, Committee Member]

[committee member’s full name, title, Committee Member]
Table of Contents

Dedication ....................................................................................... iii
Acknowledgments ........................................................................ iv
Abstract ........................................................................................ v
Table of Contents .......................................................................... vii
List of Figures ................................................................................ x
List of Tables ................................................................................ xi
List of Acronyms ............................................................................. xiii
List of Symbols ............................................................................... xiv
Glossary of Terms .......................................................................... xv
Chapter 1 - Introduction ................................................................. 1
  1.1 Section Title ............................................................................ 1
  1.2 Section Title ............................................................................ 2
    1.2.1 Section Title ....................................................................... 3
    1.2.2 Example of a Section Title that is So Long that You Will Have to
    Wrap it into the Next Line, Indenting it ¼ Inch, and Being Careful Not to
    Let the Text Spill into the Column where the Page Numbers Go ........ 4
  1.3 Summary of Dissertation Organization ..................................... 5
Chapter 2 – Literature Review ......................................................... 6
  2.1 Section Title ............................................................................ 6
    2.1.1 Section Title ....................................................................... 7
      2.1.1.1 Section Title ................................................................. 8
[… more chapters …]
References ..................................................................................... 105
Appendix A – Sample Survey ......................................................... 112
Appendix B – Survey Data ............................................................... 120
Appendix B to the SEAS Online Programs Ph.D. Student Guidelines

Targeted Refereed Professional Journals

Approved Refereed Professional Journals for Ph.D. Student Publication

2016

Listed below according to field of study are the professional journals in which Ph.D. candidates in Systems Engineering or in Engineering Management may seek publication. Journal titles are followed by the name of the publisher (in parentheses), and then by the journal’s impact factor as of the date of the list. This list is reviewed regularly by the SEAS Online Programs faculty. Submission to a journal not on this list is prohibited. This list has been developed by the faculty and your research topic must be appropriate for publication in one of these journals.

1. ACM Transactions on Information Systems (Association for Computing Machinery) – 0.977
2. ACM Transactions on Intelligent Systems and Technology (Association for Computing Machinery) – 2.414
3. ACM Transactions on Modeling and Computer Simulation (Association for Computing Machinery) – 0.556
4. ACM Transactions on Privacy and System Security (formerly ACM Transactions on Information and System Security) (Association for Computing Machinery) – 0.759
5. ASCE Journal of Management in Engineering (American Society of Civil Engineers) – 1.840
6. ASEM Engineering Management Journal (Taylor & Francis) – 0.468
7. Business & Information Systems Engineering (Springer) – 2.059
8. Complex and Intelligent Systems (Springer)
11. Decision Analysis (Institute for Operations Research and the Management Sciences) – 1.132
12. Disaster Prevention and Management (Emerald Group) – 0.987
13. Disasters (Wiley) – 1.08
15. Expert Systems with Applications (Elsevier) – 2.981
17. IEEE Security & Privacy (Institute of Electrical and Electronics Engineers) – 0.902
18. IEEE Systems Journal (Institute of Electrical and Electronics Engineers) – 2.114
19. IEEE Transactions on Engineering Management (Institute of Electrical and Electronics Engineers) – 1.454
20 IEEE Transactions on Systems, Man, and Cybernetics: Systems (Institute of Electrical and Electronics Engineers) – 1.598
21 Information and Software Technology (Elsevier) - 1.569
22 Information Systems Journal (Wiley) - 2.522
23 Information Systems Research (Institute for Operations Research and the Management Sciences) - 3.047
24 International Journal of Logistics Management (Emerald Group) - 0.917
25 International Journal of Logistics Research and Applications (Taylor & Francis) - .933
26 International Journal of Project Management (Elsevier) - 2.885
27 Journal of Engineering and Technology Management (Elsevier) - 1.474
28 Journal of Engineering Design (Taylor & Francis) – 1.946
29 Journal of Enterprise Transformation (Taylor & Francis)
30 Journal of Knowledge Management (Emerald) - 1.689
31 Journal of Project Management (Wiley) - 1.143
32 Journal of Risk and Uncertainty (Springer) – 1.426
33 Journal of Technology Transfer (Springer) - 2.213
34 Journal of the Operational Research Society (Springer) - 1.225
35 Military Operations Research (Military Operations Research Society) - 0.312
36 MIS Quarterly (Management Information Systems Research Center, Carlson School of Management, University of Minnesota)- 5.384
37 Quality and Reliability Engineering International Journal (Wiley) – 1.457
38 Reliability Engineering & System Safety (Elsevier) – 2.498
39 Requirements Engineering (Springer) – 1.105
40 Risk Analysis (Wiley) - 2.225
41 Risk Management Journal (Springer) – 0.458
42 Safety Science (Elsevier) – 2.157
43 SIAM Journal on Applied Mathematics (Society for Industrial and Applied Mathematics) - 1.510
44 Software and Systems Modeling (Springer) – 0.990
45 Strategic Management Journal (Wiley) – 3.380
46 Systems Engineering (Wiley) – 0.956

9.15.16