Graduate Handbook

for the Computer Science Department
at Brigham Young University

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1 MS Program

1.1 Mission Statement

Students should be exposed to and participate in leading-edge research. Depending on their long-range objectives, students should also do one or more of the following:

- Develop skills for critical thinking and for analyzing results.
- Learn to write technically and articulately.
- Evolve research ideas and produce research results.
- Learn about group development and be technically capable of leading a development team.
- Demonstrate ability to develop software for industrial-size problems.

1.2 Thesis or Project

Students may pursue an MS using either the thesis or project option.

The thesis option involves completing 8 courses and defending the research contribution in a written thesis. The project option involves completing 11 courses (including CS 698R) and presenting the results of a project. Completing a thesis may require several semesters of effort. The project is contained in a single semester during which the student takes CS 698R.

2 General Requirements for All MS Programs

2.1 MS Coursework Requirements

The thesis option requires 24 credits and the project option requires 30 credits subject to the requirements below:

- Take at least one course from three of the breadth groups listed below.
- All courses must be at the 400-level or above, including at least 4 500- or 600-level CS courses and no more than 3 400-level CS courses (excluding CS 404, 405, 497R & online classes).
- Graduate Studies and the CS Department do not accept online courses to count towards the Program of Study.
- Up to 4 500- or 600-level courses, that are relevant to your CS research, may come from outside the CS department.
- Only one CS 697R may be used. A CS 697R proposal form must be completed, signed and emailed to the Graduate Academic Advisor **by the first day of classes** in the semester/term you intend to take the course.

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- Complete any background courses specified in the admission letter. This might include CS 240 or CS 312, or both.
- If your undergraduate degree was obtained from BYU and you took up to 3 400+ level courses (excluding CS 404, 405, 497R & online classes) (9 credit hours) that did not count towards your undergraduate degree that you would like to count towards your Program of Study, please contact your college's academic advisor and have them contact the CS Department Graduate Academic Advisor (graduate@cs.byu.edu) with the information regarding those courses.

In addition to the credit and course requirements listed above,

- For the thesis option, complete an additional 6 hours or more of CS 699R. Note that the CS 699R credits are Pass/Fail. Students are given a temporary grade of T until they successfully defend their thesis, at which point all of the T's are changed to P's. Students can take as many as they want in a semester, but they only need 6 total, and 2 of those need to be taken while defending their thesis. Students may consider using 2 credits if they plan to work in a research lab in Spring/Summer terms.
- For the project option, complete an additional 3 hours of CS 698R. Note that CS 698R includes a proposal which must be completed **by the first day of classes** in the semester in which CS 698R is taken. See the Project Requirements section for details.

Fill out your program of study in the BYU GradProg system. This should be completed by the end of the first semester in the program.

2.2 Breadth Groups

All MS students must complete one course from three of the following four groups (shown on the next page). This provides students with a broad experience in computer science topics. The content of different offerings of CS 501R, 601R, and 704R varies from semester to semester. Specific instances of these classes are listed in the groups below. If one of these classes is not yet listed in a group please contact the Graduate Coordinator.

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Group 1 - Networking, Security, and Computational Science	**Group 2 - Graphics, Vision, and HCI**
CS 418 - Bioinformatics (not currently taught) CS 460 - Computer Communications and Networking CS 462 - Large-scale Distributed System Design CS 465 - Computer Security CS 484 - Parallel Processing CS 660 - Computer Networks CS 665 - Advanced Computer Security CS 684 - Big Data Systems (not currently taught) CS 401R - Winter 2021 and Winter 2022, Seamons CS 601R - Winter 2021 and Winter 2022, Snell CS 501R - Snell	CS 450 - Introduction to Digital Signal and Image Processing CS 455 - Computer Graphics CS 456 - Introduction to User Interface Software CS 557 - Computer Aided Geometric Design (no longer taught) CS 650R - Computer Vision (all sections) CS 655 - Advanced Computer Graphics CS 656 - Interactive Software Systems CSANM 459R - Interactive Animation Technology (with prior approval from the graduate committee) CS 401R - Winter 2024 Page CS 401R - Winter 2024 Hughes CS 556 - Research Methods CS 601R - Fall 2021, Fall 2022 M. Jones CS 601R - Winter 2022, Winter 2024 Page CS 704R - Winter 2023 & Fall 2024 Page
Group 3 - Machine Learning and Artificial Intelligence	**Group 4 - Computer and Information Theory, Software Engineering, Verification**
CS 470 - Introduction to Artificial Intelligence CS 472 - Introduction to Machine Learning CS 474 - Introduction to Deep Learning CS 476 - Topics in Data Mining CS 575 - Intro to Network Science CS 670 - Multi-Agent Systems CS 673 - Computational Creativity CS 674 - Advanced Deep Learning CS 676 - Advanced Topics in Data Mining CS 677 - Bayesian Methods in Computer Science CS 678 - Advanced Neural Networks (not currently taught) CS 704R - Fall 2020 Morse CS 704R - Fall 2020 Clement CS 501R - Winter 2021 and Winter 2022 Goodrich CS 501R - Fall 2023 Snell CS 401R - Winter 2021 and Winter 2022 Richardson	CS 412 - Linear Programming and Convex Optimization CS 428 - Software Engineering CS 431 - Algorithmic Languages and Compilers CS 452 - Database Modeling Concepts CS 453 - Fundamentals of Information Retrieval CS 486 - Verification and Validation CS 513 - Robust Controls CS 580 - Theory of Predictive Modeling CS 611 - Advanced Computer Theory CS 613 - Robust Control CS 653 - Information Retrieval CS 686 - Advanced Model Checking CS 430 - Formal Verification CS 601R - Programming Languages (Germane) CS 601R - Fall 2023 Grimsman

CS 401R - Winter 2022 Fulda CS 601R - Winter 2021 and Winter 2023 Fulda CS 601R - Winter 2023, Winter 2024, Richardson CS 704R - Winter 2022 Fulda	

2.3 MS Progress Review

The progress of every MS student is reviewed two times each year during February and September. Students will be notified in advance of each review and should create or update their online Graduate Profile prior to the review date. The student is expected to meet the following requirements.

1. Timely Completion of Background Courses. Students should complete background courses in the first year of the degree program. Students must earn a B- or better in each background course.
2. Early Submission of a Program of Study. Students should submit their Program of Study using GradProg by the end of their first semester in the program.
3. Adequate GPA Achievement. Students must maintain a 3.0 GPA on all courses on the student's program of study.
4. Limited Course Repeats. A student may have a total of two repeats, at the most, during their graduate program. Only one of those repeats may be used for a background course.
5. Steady Completion of Coursework. After being in the program for one year, a graduate student must have successfully completed a minimum of 9 MS coursework credit hours (excluding CS 699R thesis credit hours). This minimum enrollment of 9 coursework credit hours in the three semesters preceding the semester of evaluation must be maintained throughout the graduate program (Spring/Summer together are considered to be one semester) until all coursework is complete. This course-completion rate is a strict minimum. It is expected that most students will progress at a much faster rate.
6. Duration of MS Degree Program. All students should complete the MS degree requirements (courses, thesis proposal, thesis/project, and thesis defense/project presentation) within three years from the time of admission.
7. Progress on Thesis or Project. Students are expected to make timely progress on their thesis or project as described in the MS Project Requirements and MS Thesis Requirements.

If a graduate student fails to meet any of the above requirements, the student will be notified in writing of any action taken and of any action the student should take. The student will also be given a Warning, or be placed on Marginal status. Failure to satisfactorily perform according to the written requests in a previous evaluation will result in a student being placed on

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Unsatisfactory status. Being placed on Unsatisfactory status means they will be dropped from the program.

Students may be dropped at any time as determined by their Committee, the Graduate Committee and the Department Chair.

2.4 Application for Graduation

If students miss the graduation deadlines for any given semester they must register for at least 2 hours or pay the equivalent minimum registration fee and will graduate the following semester. Please contact the Graduate Academic Advisor with questions about these deadlines. You can apply online at the Graduate Studies website.

Students cannot apply for MS graduation unless they have (a) completed all of their coursework with a cumulative GPA of 3.0 or higher, (b) successfully proposed their thesis, and (c) have a current ecclesiastical endorsement.

If a student does not successfully meet all the graduation requirements for the semester in which they applied to graduate, the student needs to contact the Graduate Academic Advisor to have their name removed from the graduation queue. They will need to reapply for graduation at a later date. There is no fee for graduate students to apply for graduation.

The University requires all students to register for at least 2 credit hours during the semester in which they complete the submission of their electronic thesis (ETD) or project.

MS Project Requirements

Requirements specific to the MS Project program are given below. These requirements are in addition to the general MS in CS Requirements. Requirements specific to the MS Project program do not apply to the MS Thesis program.

The MS Project itself is completed during a single semester. Before that semester, the student completes and turns in a 698R Proposal Form. During the semester, the student completes CS 698R. At the end of the semester, the student presents the project to a faculty committee.

3.1 MS Project Coursework Requirements

The thesis option requires 24 credits and the project option requires 30 credits subject to the requirements below:

- Take at least one course from three of the breadth groups listed below.
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- All courses must be at the 400-level or above, including at least 4 500- or 600-level CS courses and no more than 3 400-level CS courses (excluding CS 404, 405, 497R & online classes).
- Graduate Studies does not accept online courses to count towards the Program of Study.
- Up to 4 500- or 600-level courses, that are relevant to your CS research, may come from outside the CS department.
- Only one CS 697R may be used. A CS 697R proposal form must be completed, signed and turned into the Graduate Academic Advisor **by the first day of classes in the semester/term you intend to take the course**.
- Complete any background courses specified in the admission letter. This might include CS 240 or CS 312, or both
- For the project option, complete an additional 3 hours of CS 698R. Note that CS 698R includes a proposal which **must be completed by the first day of classes** in the semester in which CS 698R is taken. See the Project Requirements section for details.

Fill out your program of study at Graduate Progress. This should be completed by the end of the first semester in the program.

4 MS Thesis Requirements

Requirements specific to the MS Thesis program are given below. These requirements are in addition to the general MS in CS Requirements. Requirements specific to the MS Thesis program do not apply to the MS Project program.

4.1 MS Committee and Program of Study

With the help of the advisor, Thesis Option students select faculty members to serve as 2nd and 3rd members on the student's MS committee. The student will then complete the "Committee" milestone and invite committee members in the Graduate Progress system.

The advisor and the student select courses for their program of study and complete the "Program of Study" milestone on Graduate Progress. The Program of Study will consist of 8 graduate-level courses.

The thesis option requires 24 credits and the project option requires 30 credits subject to the requirements below:

- Take at least one course from three of the breadth groups listed below.
- All courses must be at the 400-level or above, including at least 4 500- or 600-level CS courses and no more than 3 400-level CS courses (excluding CS 404, 405, 497R & online classes).

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- Graduate Studies does not accept online courses to count towards the Program of Study.
- Up to 4 500- or 600-level courses, that are relevant to your CS research, may come from outside the CS department.
- Only one CS 697R may be used. A CS 697R proposal form must be completed, signed and turned into the Graduate Academic Advisor **by the first day of classes in the semester/term you intend to take the course**.
- Complete any background courses specified in the admission letter. This might include CS 240 or CS 312, or both
- For the thesis option, complete an additional 6 hours or more of CS 699R. Note that the CS 699R credits are Pass/Fail. Students are given a temporary grade of T until they successfully defend their thesis, at which point all of the T's are changed to P's. Students can take as many as they want in a semester, but they only need 6 total, and 2 of those need to be taken while defending their thesis. Students may consider using 2 credits if they plan to work in a research lab in Spring/Summer terms.

4.2 Thesis Proposal

Students must pass their thesis proposal presentation by the end of the 4th semester after admittance. Spring and Summer terms together count as one semester.

Once a thesis topic has been firmly established, the student should submit a thesis proposal. The thesis proposal consists of two components – the thesis proposal document and the thesis proposal presentation. First, the student prepares the written thesis proposal document, as described below. Once the student's first two committee members have approved the document, the student gives the proposal to the third committee member and schedules the time for the formal presentation of the thesis proposal. No completed thesis can be defended without first having the proposal presented and approved.

Completing the thesis proposal involves two parts: the written proposal and the proposal presentation.

4.2.1 Part 1: The written proposal

The thesis proposal document should be submitted to the committee as soon as possible and must be defended by the end of the 4th semester after the student begins the program. The thesis cannot be defended before the thesis proposal has been presented and approved.

The document must be 4 to 5 single-spaced pages, not including the bibliography.

4.2.2 Part 2: Thesis proposal presentation

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The proposal presentation is a 12-15 minute oral presentation in a public meeting involving the thesis committee and others who may wish to attend. There will be time for questions and the committee will meet in private to reach a decision on the proposal. The timeline for scheduling the presentation is given below.

In the presentation, a simple restatement of the proposal document is not what is wanted. The central ideas of the document should be presented, but this should be augmented by examples and explanations. Ideally, the presentation will have been practiced in front of an audience that can help the student improve the presentation. Part of what should be learned is how to make good presentations.

Before scheduling the presentation

- Create and write up the proposal under the supervision of your advisor.
- Get verbal agreement from your advisor and committee members that the proposal is now in final form.
- Arrange for a date, time, and place to present your proposal. Make sure all three members of your committee can attend. Your faculty advisor or the Graduate Academic Advisor can help you schedule a room. Reserve one hour for the proposal; your presentation should not extend beyond 15 minutes, but additional time will be needed for questions from the audience and your committee.
- Fill out the top part of the Thesis Proposal Scheduling Form and get committee signatures on the bottom part. (Email the form to the Graduate Academic Advisor.)

At least one week prior to the proposal presentation

- **Give the completed Dissertation Proposal Scheduling Form, as well as a copy of the abstract (formatted in Word), to the Graduate Academic Advisor (graduate@cs.byu.edu).**

Day of proposal presentation

- The presentation meeting begins with a 12-15 minute oral presentation of the thesis proposal.
- The student answers committee member's questions on such areas as method, significance, organization, and literature search.
- After the presentation, the student and public leave the room while the committee comes to a decision.
- The committee decision may range from unqualified acceptance to unqualified rejection. Unqualified rejections are extremely rare.
- If the proposal is not accepted, the student works with the committee to get the proposal into an acceptable form.
- Signatures of the members of your committee will be recorded in the "Prospectus Milestone" of BYU's GradProg system.

- Update class standing on your graduate profile on the CS website from "MS" to "MS Proposed."

4.3 Applying to the BYU Computer Science PhD Program

If you are a current MS student considering applying to the PhD program, please discuss this with the Graduate Academic Advisor (graduate@cs.byu.edu) as soon as possible, no later than the beginning of the semester in which you would like to defend. The application for current students is internal, and the Graduate Academic Advisor can instruct you on how to begin that process.

4.4 The Thesis Document

The MS thesis should make a research contribution to the field of Computer Science. When completed, other computer scientists working in the same or related areas should find that the thesis makes a contribution to that field–even if the contribution is small. The thesis should demonstrate creativity and originality. It should require a thorough search of existing literature in the student's area of research and exhibit the use of skills and techniques acquired during the student's Computer Science graduate education. It is recommended, but not required, that the student make an effort to publish the thesis in the Computer Science literature. In many cases, several MS theses or chapters in a dissertation will be combined to make a single publishable contribution.

4.5 Formatting the thesis

There are two options for formatting a thesis: paper-based and traditional. The paper-based format is for theses that are or are part of a submitted manuscript or a published paper. The traditional format is for all other theses. See Thesis and Dissertation Formatting requirements.

4.6 Thesis Defense

4.6.1 Oral Presentation and Defense

The audience for the presentation is CS faculty members who may not be acquainted with the topic.

The presentation should be polished. Ideally, it will have been practiced in front of an audience that can help the student improve the presentation.

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The defense of the thesis is open to the public. For the defense, a student must prepare and make a polished presentation, which should last about 25 minutes. After a short introductory overview of the research for the benefit of those not familiar with the work, the presentation should focus on the technical details of the research. At the conclusion of the presentation questions may be asked by the audience and committee relating to the methods and evaluation techniques used to complete the thesis work; when complete the audience will be excused. The committee may ask the student further questions. When the committee is satisfied, the student being examined will be asked to leave the room.

4.6.2 Examination Results

At this point the examining committee decides on a result. The possible results are:

- Pass
- Pass with qualifications - Revision to thesis or strengthening of course knowledge are examples of why this would be selected.
- Recess - Substantial revision of thesis and/or course knowledge preparation. A minimum of one month must pass before a subsequent defense can take place.
- Fail - Fail the oral exam and be terminated from the graduate program.

The advisor also serves as the examination chair. The examination chair will conduct a vote and assist the students in getting the appropriate signatures via the Graduate Progress system.

For any questions about these forms, contact the Graduate Academic Advisor.

4.7 Thesis Defense Scheduling Instructions

Before Scheduling:

- Schedule an appointment with the Graduate Academic Advisor (graduate@cs.byu.edu) at the beginning of the semester in which you would like to defend.
- Create and write up the thesis under the supervision of your advisor.
- Get verbal agreement from your advisor that the thesis is in final form and give a copy to your second committee member. The second committee member is very likely to suggest changes.
- Get verbal agreement from your advisor and second committee member that the thesis is now in final form.
- Apply for graduation.
- Be registered for at least 2 credit hours (either 2 hours of 699R or a class that is on your program of study)
- Check your Graduate Progress Report (in myBYU) for any deficient courses.
- Submit a Program of Study Change Form if necessary.

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- **Check and meet Graduation Deadlines- The department deadline to hold a final oral exam is one week prior to the Graduate Studies deadline. Department deadlines supersede university deadlines.**

Approximately 1 Month Prior to the Defense:

- In the "Ready for Defense" milestone in Graduate Progress, submit "Ready for Defense Approval" requests to committee members and upload your thesis.
- Obtain a copy of the Defense Scheduling Form.
- Arrange for a date, time, and place to present your defense. Make sure that all three members of your committee can attend and collect their signatures. (Keep in mind that it may take more time than anticipated to gather the necessary signatures due to travel, illness or time off). Electronic signatures are acceptable for this form. The Graduate Academic Advisor can help you schedule a room. Reserve two hours for the defense.

No Later Than 3 Weeks Before the Defense **(earlier is better)**:

- **Submit the completed Defense Scheduling Form to the Graduate Academic Advisor at least 3 weeks before the actual day you defend.**
- Provide a copy of your thesis for your third committee member.
- After submitting your thesis, the Graduate Academic Advisor will give feedback on any necessary changes to the formatting.

Defense Day or After:

- Committee Members enter the results in the Thesis Defense milestone in Graduate Progress.
- Finish any required revisions of the thesis.
- After the committee approves the defense in Graduate Progress, upload the final version of the ETD and finalize details under "ETD" milestone of Graduate Progress.
- Invite the faculty on your committee take the department survey.

5 Thesis and Dissertation Formatting Requirements

Papers and manuscripts can be used largely as-is as chapters in a thesis or dissertation in the CS graduate program. This approach to formatting encourages the preparation of publishable work in a publishable form and reduces the effort required to meet thesis or dissertation formatting requirements. To maintain consistency, the University requires a specific format for the title page and other front matter and also requires pdfs to contain embedded fonts. Theses and dissertations generated by CS students should satisfy all University requirements.

The difference between a paper and a manuscript is that a paper has been published (or accepted for publication) and a manuscript has not. For clarity in the following details, the term

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"thesis" to refer to a dissertation or a thesis unless the difference is significant. Similarly, the term "paper" refers to a paper or a manuscript.

These requirements specify how theses should be formatted. They do not specify the content that should appear in a paper or thesis. Content is determined by the student and thesis committee working together.

We have created an Overleaf project containing an example thesis prepared using these formatting requirements. The example thesis contains an introductory chapter in the traditional chapter format, a chapter containing a published paper, a chapter containing a manuscript (in the example, for illustration purposes it's a manuscript for the published paper. This would likely not occur in an actual thesis.), and a concluding chapter in the traditional style. The manuscript chapter is formatted to allow it to be shared between two students both of whom included the same manuscript in their theses.

5.1 Tip: Use the Overleaf Example

Details are spelled out below but it is very likely that **the easiest way to correctly format your thesis is to copy the Overleaf example thesis project and start with that**. The example thesis project meets all of the following requirements. If your thesis is a paper based thesis, you will only need the papers in pdf files (even if they were generated using Word or other tools).

5.2 Title Page, Front Matter and Fonts

University guidelines specify the format of the title page, abstract page, acknowledgments page, and signature page (bound copies only).

- LaTeX template for producing a correctly formatted title page, abstract and introductory pages: Template Download Page. This was used to prepared the sample thesis above.
- Sample preliminary pages: Sample Title Page and Sample Abstract and Introductory Pages
- Grad Studies ETD Instructions
- Additional ETD Formatting Resources from Grad Studies

All fonts in the final thesis pdf must be embedded.

5.3 Three Kinds of Chapters

All chapters must be in one of the following three formats. A single thesis may include any combination of these formats. Details about each format are given in the sections that follow. An example of a thesis that contains each of these kinds of chapters is available as a sharelatex project example given above.

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- A chapter containing the camera-ready accepted paper with the student as a primary author. Minor modifications, such as to fix a last minute typo for example, are allowed. The bibliography should be included as part of the paper as it would normally appear in a paper. Also, the student and advisor may choose to include supplemental material in an appendix to the thesis. Details below.
- A chapter containing a manuscript that has been or could be submitted for publication with the student as a primary author. The student should remove elements (such as line numbers) included only for peer review, should de-anonymize the manuscript and remove all references to the venue. The bibliography should be included as part of the manuscript as it would normally appear in the manuscript. Supplemental material can be added to an appendix. See details below.
- A traditional thesis chapter in the old format, but with single line spacing rather than double line spacing. This could be useful, for example, as an introductory chapter for dissertation that contains several papers. Many committees may require such an introductory chapter, but a student, advisor or committee may choose to include a chapter in this format for other reasons. Bibliographies for traditional chapters should be included at the end of that chapter or at the end of the thesis. Note that works cited in several chapters will be contained in several bibliographies.

If more than one student is a primary author on a paper or manuscript, it may make sense for more than one student to include the paper or manuscript as a chapter. This kind of collaboration is encouraged but several additional conditions must be met to include a paper or manuscript in two theses. See details below.

5.3.1 Chapter Containing a Paper

An accepted or published paper with the student as the primary author can be used as a chapter in the format it was submitted for publication. The bibliography is included as-is for the original paper. “Accepted” means accepted after a peer review process by a program committee or journal editorial board. The final camera ready pdf of the paper can be included as-is (with minor modifications) in the thesis. A chapter containing an accepted paper must include

1. a complete citation to the paper
2. the statement "I hereby confirm that the use of this article is compliant with all publishing agreements."
3. a chapter title with is same title as the paper itself

Formatting additional material: Some students may choose to include additional material in the thesis beyond what was included in the paper. In that case, the student should add the additional material in an addendum or appendix at the end of the paper in the same format as the paper or in the traditional BYU CS thesis style. The addendum or appendix should indicate that this material does not appear in the publication.

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Publishing agreements: You can review publishing agreements with the ACM and IEEE. We believe this use of the accepted paper in a thesis is consistent with the most variations of publishing agreements.

Minor changes: Minor formatting and other minor changes to the paper are allowed. For example, the student might not yet have the DOI for the paper when they defend the thesis.

"Accept with revisions" or shepherding: Articles accepted with revisions or in shepherding on the date of the thesis defense should also be included as manuscript chapters.

Pre-prints: Articles published by arXiv or similar pre-print sites do not count as accepted papers and should be included as manuscript chapters.

5.3.2 Chapter Containing a Manuscript

A manuscript with the student as a primary author that has not yet been accepted for publication can be included in a *format suitable for submission to peer review*---with several modifications listed below. The bibliography is included in the chapter as part of the final manuscript.

1. **Remove elements used only for review.** This includes line numbers in the margins and paper/submission identifiers.
2. **Remove anonymization.** All author names should be included. The inclusion of references to the author's prior work, suitable acknowledgments, and other elements are appropriate to include if they would normally be included in the published paper but have been removed or anonymized for double-blind review.
3. **Remove all references to the venue** that the manuscript has been (or might be) submitted to for peer review. This avoids creating the appearance that a manuscript has been accepted when it has not been (if the manuscript has been accepted, use the "accepted paper" option above).

A manuscript chapter must include the following elements:

1. The statement "This manuscript has not yet been accepted for publication" Do not include the names of venues to which you have or plan to submit the manuscript for review.
2. A chapter title with the phrase "In preparation:" prepended in front of the full title of the manuscript.

5.3.3 Traditional Chapter

Other kinds of chapters such as Introductory or Conclusion chapters are optional (and allowed) but should be formatted in the traditional BYU CS thesis style with **single** line spacing, one inch margins, and a Times font in 11 or 12 pt. These are the same formatting requirements

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as generated by the CS thesis and dissertation latex class. If the chapter cites other work, the bibliography for that chapter should be included at the end of the chapter or at the end of the thesis. A thesis may consist entirely of traditional chapters.

5.4 Sharing a paper across several theses

In collaborative work, more than one student might be a primary author on a paper or manuscript (both are hereafter referred to as a “paper” for clarity). In this case, it might make sense for two or more students to include the exact same paper as a chapter in their thesis (recall that the term "thesis" refers to both a thesis and a dissertation). Our intent is to make this kind of sharing clear and explicit across all theses that might share a paper. And to make that sharing clear before any of the students defend.

Sharing a paper as a chapter among primary authors is encouraged under the following conditions:

1. The writing and research in each students’ complete thesis stands on its own. There will be references and connections to the other primary authors’ work, but the writing and research claimed by each student, in addition to other chapters that might appear in the thesis, stands on its own. And,
2. Each chapter in every student thesis that contains a shared paper includes the statement “<Other student names> and I are primary authors of this paper. We have agreed that each of us will include this paper in our thesis (or dissertation).” And,
3. Each chapter in every student thesis that contains that paper includes identical summary statements that describe each students’ contribution to both the research and the writing.

It would also be wise to involve the thesis committee early in plans for sharing papers as chapters in theses and in plans for presenting the work at the defense. These plans might, for example, include an introductory chapter that clearly defines the research and writing completed by the student.

5.5 Frequently Asked Questions

Question: What's the easiest way to include my paper as a chapter in my thesis?

Answer: Find a pdf file containing your paper. In the latex document for your thesis, use the pdfpages package and include the paper with the command

\includepdf[pages=-,pagecommand={}]{name-of-pdf.pdf}

Papers included in the chapters of the sample thesis in OverLeaf use this command.

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Question: I'm working on a dissertation not a thesis, what are the formatting requirements for a dissertation?

Answer: In this document the term "thesis" is used to refer to both a thesis and a dissertation unless the difference is significant. The formatting requirements for a thesis and a dissertation are the same.

Question: What if a student uses a manuscript as a chapter in their thesis, graduates and then the manuscript is rejected after the defense?

Answer: Nothing. The student defended their work as a research contribution, the committee voted to pass the student and the student is done regardless of what a program committee or journal editor decides to do with the work.

Question: What if... Student A uses a manuscript as a chapter in their thesis, defends and graduates. Student A's manuscript is eventually rejected in peer review. Later, Student B continues that same line of work, carries out additional research, and revises (not rewrites, but revises) the original manuscript for resubmission. Can Student B include the revised manuscript in their thesis even though Student A didn't include a statement about sharing the manuscript as per the requirements for sharing a manuscript as listed above?

Answer: Yes, Student B can include the revised manuscript because it is not a verbatim copy of the same manuscript included by Student A. Student B should describe what parts of the work and writing belong to Student B and which parts were generated by Student A. The thesis committee will need to decide whether or not Student B's work (along with any other work included in the thesis) is sufficient as a thesis.

Question: Where does the bibliography go in my thesis?

Answer: Each paper or manuscript chapter includes it's own bibliography. Traditional chapters can include a bibliography after each chapter or the thesis may include a complete bibliography for the traditional chapters (but not the paper or manuscript chapters) at the end of the thesis. In latex, most authors find it easiest to include the bibliography for traditional chapters at the end of the thesis rather than at the end of each chapter. This is what is done in the sample thesis in OverLeaf.

Question: If I include the bibliography for each paper at the end of each chapter, I'll end up citing the same paper more than once. Is that ok?

Answer: Yes. Include each paper as-is as a chapter (following the guidelines above) including the bibliography.

Question: I've got a manuscript that's nearly ready for submission for peer review. It just needs some more editing and formatting adjustments. Can I use that as-is right now as a chapter in my thesis?

Answer: No. Manuscript chapters **must** be in a format suitable for peer review (with some modifications as described above). A manuscript that is not quite ready for peer review and will be included as a chapter in a thesis should be formatted as a traditional chapter.

Question: This document seems to assume I'm going to prepare my thesis in Latex. But I'm going to use Word (or something else). How do I prepare my thesis in the right format using Word instead of Latex?

Answer: You will need to work with your advisor to figure out how to meet formatting requirements. The department has decided to focus it's support on Latex as a tool for formatting theses. You are free to use any tool you want, but you and your advisor will need to figure out how to meet formatting requirements. The Latex skills required to meet the formatting requirements are not advanced. For example, you might use Word to prepare your papers and manuscripts but if you can convert them to a pdf, which you likely will do anyway for peer review and publication, then you can include those pdfs in your thesis in Latex with minimal effort.

6 PhD Program

6.1 PhD Mission Statement

PhD students in the Computer Science Department are prepared to be technical problem solvers, are competent in the state of the art, and have mastered a particular aspect of Computer Science. Students should be able to:

- Generate new ideas,
- Convince others that their ideas are worth pursuing,
- Do the necessary research to demonstrate that their ideas are viable, and
- Communicate the results of their research in peer reviewed scientific venues.

6.2 PhD Requirement to Earn an MS

Students entering the PhD program must complete a Master's degree in Computer Science or a closely related field as partial fulfillment of the requirements for the PhD. Students entering the PhD program without an MS in Computer Science or a closely related field will be required to complete an MS degree as part of their PhD program. Under the direction of the student's advisor, and with the approval of the student's PhD dissertation committee, the Master's thesis defense can be used to fulfill the paper requirement of the qualifying process.

Overviews of the PhD program requirements:

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- PhD Program---For students without an MS in CS
- PhD Program---For students admitted with an MS in CS

Requirements for the MS and MS thesis can be found in section 2 and section 4 of this handbook.

6.3 Graduate Progress System

BYU Graduate Studies requirements will be completed in the Graduate Progress system. This includes forming the Committee, completing the Program of Study, setting up proposals and defenses, and submitting the final ETD. To use the system, log in using your BYU NetID and login information. Milestones have been laid out to assist students in navigating the requirements. Additional department processes may require forms to be filled out, which can be found in the Common Graduate Forms section.

6.4 PhD Committee and Program of Study

With the help of the student's advisor, the student selects faculty members to serve as the 2nd, 3rd and 4th committee members. This should be submitted under the "Committee" milestone in Graduate Progress. A graduate student should submit a Program of Study via Graduate Progress by the end of their first semester of study. This can be found under the "Program of Study" milestone. Courses counted towards the MS degree do not need to be on the PhD Program of Study. In Graduate Progress, the Program of Study requires 18 coursework credits and 18 dissertation (799R) credits to be listed.

6.5 PhD Coursework Requirements

The table below reflects those hours that can be used to fulfill PhD course requirements. Specific courses depend on approval of the student's committee.

Courses	**Condition**	**Credit Hours**
Minimum Hours of graded coursework	Total includes up to 30 MS hours. ~~The 48 hour total must include CS 611~~ In September 2022, the CS faculty voted to replace the 611 requirement with the requirement that PhD students have background equivalent to CS 252. If you were admitted before Winter 2023, you may choose to complete CS 611 or obtain a background equivalent to CS 252. Many students will have taken a class like CS 252 before enrolling in the program.	48
Below 400 level	Not allowed for PhD study lists.	0

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697R	If 697R credits are transferred from an MS	3 or less
	If no 697R credits are transferred from an MS	0
699R (thesis)	If transferred from an MS	6
	If not transferred from an MS	0
799R (dissertation)		18 minimum
Total hours		66 or more.

Note that if an MS has been completed and if the 30 MS hours have been accepted as transfer credit, then only 18 hours of additional coursework remain.

Additional Information for PhD Coursework Requirements:

- Students should be able to take advantage of all new courses introduced into the graduate curriculum. Thus, there should be no restriction on the number of CS601R courses allowed.
- PhD students are allowed to take up to 6 credit hours of 697R in place of regular course work. If 697R was taken as an MS student and the MS credit, including the 697R, is transferred and counted towards the PhD degree requirements, then these students are limited to 3 credit hours of 697R. If no 697R credit was transferred or counted towards the PhD degree requirements, then students can take the full 6 credit hours of 697R. Approval must be obtained by the first day of classes of the term/semester that you intend to take the course.
- PhD students can only have 400-level credit that is transferred from an MS program.
- Graduate Studies does not accept online courses to count towards the Program of Study.
- Classes on the study list can be counted only in 3 credit hour increments. For example, 3 or 6 credit hours of CS 697R can be counted but 1 or 2 or 5 credit hours of CS 697R can not be included on the study study list. Exceptions are rare and must be approved in advance.

NOTE: If you were accepted on or before Winter 2016, you must complete the Breadth Requirement. Please see the MS handbook for details. As indicated above, you must take CS 611, which satisfies one of breadth groups.

6.6 Residency Requirement

PhD students are expected to be resident for the full duration of their PhD program.

Performing research of sufficient quality to merit a doctoral degree takes considerable time, effort, and personal investment. Residency is intended to help students make consistent

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progress in such research by keeping students (a) engaged with their faculty advisers, (b) progressing on solving doctoral-level research problems, and (c) contributing to the lab and department community of scholars. Simply put, students who are resident are much more likely to produce high quality research and graduate in a timely manner, while contributing to the mission of the BYU CS department.

Resident means being present during most business hours, and does not mean working 40 hours/week (usually it is more) or registering for some number of credit hours.

Petitions for exception to the residency requirement must be made in advance to the student's doctoral committee and must demonstrate how the absence from campus is (a) required for health or unusual personal reason or (b) will help the student make progress toward their doctoral degree. Other reasons for exception and exceptions lasting longer than 6 months will rarely be granted. Once the doctoral committee has approved the petition, it should be submitted to the graduate coordinator for final approval.

The University requires PhD students to register for at least two consecutive 6-hour semesters on the BYU Campus.

6.7 Teaching Requirement

A PhD student must teach at least one Computer Science course. Coordinate with your faculty advisor to make a request for teaching by indicating your desires for teaching, both the semester and course. **These requests should be made well in advance** because the department plans teaching assignments in January for the following academic year. Teaching requests for a given academic year should be submitted during Fall semester of the prior academic year, which is eighteen months in advance for those planning to teach in Spring or Summer term. In order to receive an add-code for CS 795R: Teaching Practicum, email the Graduate Academic Advisor.

This gives the student an opportunity to improve teaching and communication skills. In addition, this requirement provides the student an opportunity to see how he/she likes teaching and the possibility of an academic career.

6.8 PhD Progress Review

The graduate faculty of the department evaluate the progress of every PhD student two times per year during February and September. The date, time and place will be announced several weeks in advance. All faculty members are invited to attend, and those with PhD students are required to attend. The progress of a student can be declared as satisfactory, warning, marginal, or unsatisfactory. After each review, a letter will be sent to each PhD student. The letter to those students in warning, marginal or unsatisfactory status will indicate what possible steps the

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department will take as a result. Examples of possible department actions include, but are not limited to, requiring the student to write a letter of explanation to the department explaining warning, marginal or unsatisfactory performance, suspending financial support, or immediately terminating the student's PhD program.

Our objective is to make sure that students are on track, to provide encouragement when it might be needed, to make sure no one "falls between the cracks," and to guide anyone who is not likely to succeed in our program to something better suited for them.

In preparation for the progress review, PhD students create or update their online Graduate Profile at cs.byu.edu (by logging in and going to "My Dashboard"). The profile provides an indication of each student's progress in the program goals for accomplishing significant milestones. The Graduate Academic Advisor will remind students shortly before the scheduled date of the Progress Review. At this time, students must also check their Progress Report in the Graduate Progress system for any errors. This can be found under the Progress Report tab at the top.

Students may be dropped at any time as determined by their Committee, the Graduate Committee, and the Department Chair.

6.9 Annual Committee Meeting

Following the PhD Qualifying Process, PhD students meet with their PhD committee annually to review progress and receive input. The student is responsible for organizing this meeting.

Regular contact between the PhD student and their graduate committee helps the faculty contribute effectively to the education and professional preparation of the student. Ideally, the student should meet with their full committee, but meeting with three members is acceptable. Committee members may participate remotely. During these meetings, the student presents a 15-minute accounting of their progress. The graduate committee tracks the time since the last meeting as part of the PhD review. The dissertation proposal may be used to satisfy this requirement during the year it is held.

6.10 PhD Qualifying Process

The primary purpose of the PhD qualifying process is to determine if a student has the skills necessary to continue towards a PhD degree. Secondary purposes include a demonstration of (a) breadth of knowledge at the graduate level and (b) ability to think, learn, and work independently and the ability to write and present clearly. Students entering the PhD program with a Master's degree should complete their qualifying process within one year after entering the program. Students entering the PhD program with a Bachelor's degree should complete their qualifying process within one year after completing their Master's degree.

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A student may use their MS thesis defense to qualify for the PhD. If a student chooses to do so, the student will need to make sure that a complete PhD Committee is in place (see above) prior to the thesis defense, and that all members of the PhD Committee are in attendance. The earliest a student can qualify is at the time of their MS thesis defense.

6.10.1 Ability to Think-Learn-Work-Write-Present

Under the direction of the student's PhD advisor, a student must produce a research paper suitable for submission for publication and defend the contents of the paper in a public presentation.

To be "suitable for submission for publication," the research paper must be a full-length manuscript (not an abstract or extended abstract) and either should have been submitted for publication or should be in a form ready to submit for review to an identified journal or conference.

Turning an MS thesis into a paper under the direction of the student's PhD advisor is a typical way to satisfy this requirement. In this case, the thesis defense can also serve as the public presentation for the PhD qualifying process, but only if the student has (1) completed the breadth courses, (2) turned the thesis into a paper for submission, and (3) invited the PhD committee to attend the MS thesis defense.

Based on the paper and presentation (as well as other interactions between the student and members of the student's PhD committee), the student receives an assessment of independent ability on each of five criteria: Think/Learn/Work/Write/Present. Each committee member makes an assessment for each of the criteria on a scale of 1 (worst) to 5 (best), or N/A when a committee member has had insufficient evidence to make a determination. The score for each of these criteria and the overall score are averaged, with N/A's omitted, for the final score.

Scale: 1 (poor), 2 (inadequate), 3 (marginal), 4 (adequate), 5 (good).

Further explanation of Think/Learn/Work/Write/Present:
Think: be able to independently reason out, conceive of, and envision key problems and ideas.
Learn: be able to independently ascertain, discover, and understand significant thoughts explained in the literature and in presentations.
Work: demonstrate persistence in producing results, both independently and under direction.
Write: have a good command of the English language; clearly organize and articulate thoughts and ideas; show reasoning and analysis skills in the flow of discourse.
Present: be able to clearly organize and explain ideas, motivate the work in a convincing way, explain its significance, and respond articulately and knowledgeably to questions.

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6.10.2 Grading

There are three cases.

1. A student passes if the student's average grade for the four breadth courses is 3.7 or better and the student scores an average of 4.0 or better on the ability assessment. A student who passes advances to PhD candidacy.
2. A student fails if any one of the following happens: (1) the public presentation does not take place within 12 months after enrollment in the PhD program; (2) the average breadth-course grade is less than 3.4; or (3) the average ability assessment score is less than 3.0.
3. A student who neither passes nor fails is considered to be marginal. For marginal students, a determination of pass or fail takes into account other evidence. Positive examples: (1) the paper, or other papers, have not only been submitted but have also been published or accepted for publication in top quality journals or conferences; (2) grades in all other courses are straight A's. Negative examples: (1) the student unnecessarily procrastinated working on the paper; (2) other grades are below average for graduate courses. Taking these other factors into consideration, the committee must decide whether to pass or fail the student.

A student who fails once may pass and be advanced to PhD candidacy by rectifying problems before the end of the 24th month after enrollment in the PhD program. A student who fails to rectify problems by the end of the 24th month will be dropped from the PhD program.

To rectify problems with breadth courses, for example, a student may take another course or two and use a different set of four courses to satisfy the breadth requirement. To rectify problems with producing a suitable research paper, for example, a student may prepare another paper for publication.

6.10.3 Scheduling

Students who completed an MS in CS (or closely related field) before admission schedule the qualifying exam when their paper manuscript is ready. Students who are using their MS thesis defense as their PhD qualifying exam should schedule the qualifying exam as part of the MS thesis defense **and they have completed the breadth coursework for the MS**. Scheduling the qualifying exam involves scheduling a time for the public presentation of the paper with their committee. This is done according to the instructions on the PhD Qualifying Process Form by talking with all four committee members to find a day and time that they are all available and having them sign the qualifying process form, schedule a room (with the help of your faculty advisor or the Graduate Academic Advisor) for the agreed upon date and time, and finally emailing the completed form to the Graduate Academic Advisor, which should be completed **at least one week prior to the scheduled date.** (You're not officially scheduled until this form has been submitted.)

Remember that the presentation should not be scheduled sooner than one week after all committee members have received a copy of the research paper. All members of the student's

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PhD committee must be present. The student should schedule one hour for the meeting: 25 minutes for the public presentation, 5 minutes for public questions, and up to 30 minutes for the non-public assessment.

6.10.4 Qualifying Process Paperwork

The faculty committee must complete the PhD Qualifying Process Forms and submit the first page to the Graduate Academic Advisor (graduate@cs.byu.edu) following the Qualifying Process in order for the requirement to be officially signed off in the Graduate Studies system. These forms can be found here.

6.11 PhD Dissertation Proposal

The dissertation proposal comprises a document and an oral presentation. The proposal presents a problem, discusses closely related work and the broader research area, and describes a research agenda to solve the problem and evaluate the solution. The proposal must explain the importance of the research problem and the research agenda to those who are not experts in the field.

The document must be at most 15 single-spaced pages, exclusive of the title page, abstract and references. The text must be single-spaced with 11 pt. Times Roman or LaTeX default (Computer Modern) font and have one-inch margins in a single-column format. A very useful LaTeX template can be found at our Template Download page.

The presentation will occur during a 2 hour meeting block. The public presentation and questioning will last for a maximum of 1.5 hours. Following the public presentation, faculty will have 30 minutes to conduct private questioning of the student and to arrive at a decision. Questions by the committee must test the student's knowledge in both the general research area as well as the details of the proposed research.

6.11.1 Dissertation Proposal Best Practices

The following are best practices guidelines for the dissertation proposal. Their purpose is to provide useful, detailed guidance to students and advisors on creating a successful proposal, while allowing flexibility to accommodate individual needs and preferences.

6.11.1.1 Proposal Document Guidelines

The dissertation proposal should include a discussion of both the broad research area and the narrow research problem. To illustrate this, consider the picture shown at right. Your field is very broadly defined (e.g., graphics, machine learning, security, networking). The area in which you work is somewhat narrower, and considers a set of problems within your field (e.g.,

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Decentralized Authentication). Finally, your dissertation topic is very narrowly focused on a particular problem within your area (e.g., Convenient Decentralized Authentication using Passwords). The dissertation proposal should cover the 20 most important research papers in your area when discussing the area background. It should then separately cover the most directly related research papers specific to the problem you are trying to solve. In most cases there will be only a small overlap between these two sets of related work.

The audience for the proposal should typically be the fourth and fifth committee members. Someone who reads the area background of your dissertation proposal should be able to understand at a high level the entire research area, in preparation for understanding the problem background and research agenda. The proposal should have a teaching style, using figures and wording that explain the area to a non-expert. The proposal should also provide a synthesis of the research; it should not just restate the abstract of each paper you cover.

In addition to discussing the broad research area, the dissertation proposal should answer the following questions as they relate to your proposed dissertation problem:

1. What problem do you want to solve?
2. Who cares about this problem and why?
3. What have others done to solve this problem and why is this inadequate?
4. What is your proposed solution to this problem?
5. How can you demonstrate that this is a good solution?

These questions serve as a useful model for real research papers and grant proposals. Ideally, portions of your proposal can be incorporated into future papers and proposals. Although reviewers for conference papers and proposal panels often comprise experts from your research area (the blue area in the graphic), members of your dissertation committee will be outside your research area. One of your goals in writing your proposal is to bridge that chasm as needed in order to make your proposal accessible to your committee.

The following is an example outline of a dissertation proposal. Students should work with their advisor to determine the specific section structure and length of their proposal. For example, the broader research area discussion could be part of the Introduction, placed in the Related Work section, or even included as an Appendix.

Abstract: 1 to 2 paragraphs summarizing the proposal.
Introduction: 1-2 pages answering questions 1 and 2 above.
Related Work: 1-2 pages answering question 3 above.
Thesis statement: 1-2 sentences stating what is to be demonstrated in your dissertation.
Project Description: 6-8 pages answering question 4 above.
Validation: 1-2 pages answering question 5 above.
Dissertation Schedule: about 1/2 page specifying dates for completion of major milestones, including potential papers and their submission dates.

Appendix: Research Area Overview: about 3 pages. (Omit if the research area overview in included elsewhere, and add about 3 pages to the length of the section in which the overview is included---e.g., in the Introduction or Related Work.)
Bibliography: references for all work cited.

The following discussion provides additional detail on the content of the dissertation proposal.

Abstract – This section provides a short summary of the proposal. As part of the dissertation scheduling process, the title and abstract need to be emailed to the Graduate Academic Advisor.

Introduction - This section provides the reader with enough information to understand and appreciate the thesis statement. This includes giving the motivation for the research, defining terms and formulating the problem. Often, subsections labeled “Background” and “Motivation” will be included in this section. This section typically provides answers to the questions “What problem do you want to solve?” and “Who cares about this problem and why?” The Background subsection could contain the area overview discussing the broader research area.

Related Work – This section contains a survey of the literature directly related to the problem you are trying to solve (i.e., thesis statement) and should demonstrate to your readers that you understand the context of your work. This is a place for you to position your contribution to your specific research area relative to other work that has been done, and to state how your work builds on the previous work. In most cases there will be only a small overlap between the papers discussed in this section and the papers related to the broader research area. This section answers the question “What have others done to solve the problem and why is this inadequate?” The area overview could be included in the Related Work section, but, in this case, add subsections (e.g., “Research-Related Work” and “Research Area Overview”) to distinguish the type of related work.

Thesis statement – A clear and concise statement of what is to be demonstrated or developed in your dissertation work. A good thesis statement makes a specific claim that your readers care about. Ideally, your introduction will give your readers the background they need to understand your thesis statement and to conclude that it matters.

The following are examples of good thesis statements from proposals in the BYU Computer Science department:

- Extending neural networks through classification-based training will provide more accurate solutions, while at the same time avoiding the main pitfalls of back propagation networks.
- It is possible to build a semantic annotation system that is resilient to variety in web page layouts, has a faster execution speed, and has better accuracy on a large number of web pages than current semantic annotation standards.

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- Machine learning techniques can be used in a behavioral animation system to produce cognitive models that are quick to execute, that allow virtual characters to adapt due to interaction with human users, and that can be programmed in significantly less time than current systems.

Project Description – This section describes your preliminary ideas on how you might solve the problem and the anticipated contribution your research will make to the field of Computer Science. This section should convince your committee that you are qualified to pursue the research and have high potential to eventually be able to objectively and convincingly defend your thesis statement. This section answers the question “What is your proposed solution to this problem?”

Validation – This section describes the methods you will use to validate your proposed solution. This section answers the question “How can you demonstrate that this is a good solution?”

Dissertation Schedule – This section contains a proposed schedule for the completion of your dissertation work. The schedule should include deadlines for submission of the dissertation to your advisor, submission of the dissertation to your committee members and the dissertation defense. In addition, this section contains the titles of three or more papers that will be published from this work, along with potential submission dates and venues. You may also include other appropriate research milestones.

The Department requires that you allow at least three weeks between the time you schedule the defense and the time you actually defend the dissertation. In order to schedule your final dissertation defense, your first three committee members must have read and approved the dissertation. In order to allow sufficient time, you should plan on approximately eight to ten weeks between the time you first give your completed dissertation to your advisor and the time you defend. This time is an approximate time; work with your advisor and committee to determine the actual amount of time that will be required.

Bibliography - This section contains references for cited work. References should be complete and written in a uniform style, consistent with your particular sub-area of computer science. Current journals in the student’s area can be consulted to determine appropriate reference styles.

6.11.1.2 Proposal Presentation Guidelines

The presentation should address both the broad research area and the narrow research problem. Since both parts have equal importance, a suggested agenda is as follows. The student first gives a 25-minute presentation on the broad research area, with 20 minutes for questions. The student then gives a 25-minute presentation on the narrow research problem, with 20 minutes for questions.

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The student and advisor are responsible to establish a clear agenda with the committee at the beginning of the presentation in terms of the anticipated length of the presentation and any preferences for when questions are handled. The student and advisor are responsible to manage the time effectively so that both parts are sufficiently addressed.

The primary purpose of the dissertation proposal is to determine whether a student has established an appropriate research agenda for PhD research. Secondary purposes include showing that the student can think/learn/work independently as a researcher and can present persuasively.

The presentation of the proposed dissertation research should augment the written proposal. The presentation should be polished and practiced. The purpose is to convince the committee that the research topic is important, that the research methods are sound, and that the proposed research can be successfully completed. In short, the proposal should convince the committee that the dissertation, when complete, will make a substantial contribution to the field of Computer Science. The presentation is public, but the committee meets privately before finalizing the results.

6.11.2 Committee Approval

The result is pass/fail and will be given to the student immediately following the committee consultation. As discussed, judgment will be based on the perceived suitability of the dissertation and preparation of the student. If passed, the student should proceed with the dissertation. University policy states that if two committee members vote to recess or fail, then the examination is recessed or failed. If failed, the student will be asked to overcome the perceived deficiencies and reschedule the proposal. Failure, repeated failures, and delayed rescheduling are all subject to discussion and action during subsequent PhD progress reviews.

Since two committee members are sufficient to fail a student, the student should be sure to teach the material in a style that is approachable to all committee members. It may be helpful to receive feedback on the proposal from the fourth and fifth committee members before scheduling the presentation.

A passed dissertation proposal is not a contract with the student that if the stated work is accomplished as proposed, final passing is guaranteed. Because of the longer term and dynamic nature of dissertation research, final passing of the dissertation rests with the committee at the dissertation defense.

6.11.3 Scheduling the Proposal

Before Scheduling:

- Create and write up the proposal under the supervision of your advisor.
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- Once the dissertation proposal has been read and approved by the first three members of the dissertation committee, the student can then schedule the dissertation proposal presentation.
- Provide copies of your dissertation to your remaining committee member(s).
- Arrange for a date, time, and place to present your proposal. Make sure all four/five members of your committee can attend. Your faculty advisor or the Graduate Academic Advisor can help you schedule the CS Conference Room or the Summit Room. Reserve two hours for the proposal.
- Fill out the top part of the Dissertation Proposal Scheduling Form and get committee signatures on the bottom part. (This step is not completed on Graduate Progress. The "Prospectus Milestone" will be completed after the proposal.)

At Least 1 Week Prior to the Proposal:

- Email the completed Dissertation Proposal Scheduling Form, as well as a copy of the abstract (formatted in Word), to the Graduate Academic Advisor (graduate@cs.byu.edu).

Proposal Day:

- After successfully proposing your dissertation, the members of your committee will give their approval in Graduate Progress in the "Prospectus Milestone."

6.12 PhD Dissertation

6.12.1 Style Guidelines

See Section 5 Thesis and Dissertation Formatting Requirements

6.12.2 Dissertation Defense Overview

Audience: CS faculty and CS graduate students. Do not assume that either the faculty or the graduate students are knowledgeable in your specialty research area.

General Comments: The presentation should be similar to one that would be made in a graduate colloquium. Again, the presentation will have ideally been practiced in front of an audience, and feedback for improving the presentation will have been taken into consideration.

The defense is open to the public and consists of a 30 - 40 minute presentation of the candidate's research followed by questions from the audience. At the end of this public part of the defense, everyone except the committee is excused. After the committee makes a preliminary assessment and decides on further questions, if any, the candidate returns to answer the questions of the committee. Afterwards, the candidate is again excused, and the committee votes.

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The committee may vote to pass, pass with qualifications, recess, or fail. If two or more examiners vote to recess, the examination is recessed. A second and final examination is rescheduled, but not sooner than one month after the recessed examination. A second examination cannot be recessed. If two or more examiners vote to fail for either the first or second examination, the candidate fails and the graduate degree program of the student is terminated. If fewer than two vote to recess or fail, a majority vote decides between pass and pass with qualifications.

The dissertation defense should be modeled after a graduate colloquium because this can help prepare students that need to give a presentation on their dissertation research during the job interviewing process.

In general, no dissertation should be scheduled for defense that is not of sufficient quality to pass the examination. This places the main burden of PhD quality assurance on the graduate advisor and the second and third members of the student's PhD committee.

6.12.3 Dissertation Defense Instructions

Before Scheduling:

- Reach out to the Graduate Academic Advisor (graduate@cs.byu.edu) at the beginning of the semester in which you hope to defend your dissertation.
- Create and write up the dissertation under the supervision of your advisor.
- Get verbal agreement from your advisor that the dissertation is in final form.
- Get verbal agreement from your advisor and second and third committee members that the dissertation is now in final form.
- Apply for graduation.
- Be registered for at least 2 credit hours (either 2 hours of 799R or a class that is on your Program of Study).
- Check your Graduate Progress Report (in myBYU). Submit a Program of Study Change Form if necessary.
- **Check and meet Graduation Deadlines- The department deadline to hold a final oral exam is one week prior to the Graduate Studies deadline. Department deadlines supersede university deadlines.**

Approximately 1 Month Prior to the Defense:

- In the "Ready for Defense" milestone in Graduate Progress, submit "Ready for Defense Approval" requests to committee members and upload your thesis.
- Obtain a copy of the Defense Scheduling Form.
- Arrange for a date, time, and place to present your defense. Make sure that all four/five members of your committee can attend and collect their signatures on the Defense Scheduling Form. (Keep in mind that it may take more time than anticipated to gather the necessary signatures due to travel, illness, or time off). Your faculty advisor or the
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Graduate Academic Advisor can help you schedule a room. Reserve two hours for the defense.

No Later Than 3 Weeks Before the Defense (earlier is better):

- **Email an electronic copy of your dissertation (PDF) and your abstract (formatted in Word) to the Graduate Academic Advisor (graduate@cs.byu.edu). Email the completed Defense Scheduling Form (with all of the signatures) to the Graduate Academic Advisor. These steps must be finished 3 weeks (or more) before the actual day you defend.**
- Provide copies of your dissertation for each member of your committee.
- After submitting your dissertation, the Graduate Academic Advisor will give feedback on any necessary changes to the formatting.

Defense day or after:

- Finish any required revisions of the dissertation.
- After the committee approves the defense in Graduate Progress, upload the final version of the ETD and finalize details under "ETD" milestone of Graduate Progress.
- Invite members of your committee to take the department survey.

6.13 Application for Graduation

Applications for Graduation must be submitted by the university deadlines for graduate students. Please contact the Graduate Academic Advisor with questions about these deadlines. You can apply online at the Graduate Studies website.

Students cannot apply for PhD graduation unless they have (a) completed all their coursework, (b) successfully completed qualifying process, (c) successfully proposed their dissertation, (d) satisfied their teaching requirement, and (e) satisfied their residency requirement, and (f) have a GPA of 3.0 or higher, and (g) have a current ecclesiastical endorsement.

If they did not successfully meet all the graduation requirements for the semester in which they applied to graduate, the student needs to contact the Graduate Academic Advisor to have their name withdrawn from the graduation queue, and they will need to reapply for graduation at a later date. There is no fee for graduate students to apply for graduation.

The University requires all students to register for at least 2 credit hours during the semester in which they complete the submission of their electronic thesis or dissertation (ETD). **If students miss the graduation deadlines for any given semester they must register for at least 2 hours or pay the equivalent minimum registration fee and will graduate the following semester.**

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