

**Texas State University-San Marcos**  
**Department of Computer Science**  
**Thesis Guide**  
**February 7, 2007**

**Thesis Scope.** A thesis in the Department of Computer Science represents a contribution to the literature in computer science or software engineering. As such, it can seek to validate or contradict existing suppositions. It can compare existing methodologies and attempt to identify which one is best (or the circumstances in which one outperforms another). A thesis can even develop a brand new method of solving a problem. A thesis is a scholarly work. A thesis is a formal document describing research that has been performed. The scope of a thesis is in between a programming project and a dissertation.

**Thesis Degree.** There are many reasons to write a thesis as a six-semester hour component of the master's degree. A thesis student is distinguished by learning far more about a specific aspect of computer science or software engineering than a non-thesis student. The knowledge, skills, and understanding of existing results and products acquired in writing a thesis are assets when seeking employment. Demonstrated ability to conduct research, write, organize, and complete a large project are helpful, not only when seeking employment, but also when seeking further education.

**Time Expectations.** Students should be prepared to spend a minimum of one academic year or, more reasonably, one calendar year on the thesis. A minimum of six semester hours of thesis enrollment, CS5399A and CS5399B, is required for the degree. CS5399A is taken first, and CS5399B is taken until the thesis has been completed. As a guideline, the first semester is devoted to background research, experiments and data gathering. In subsequent semesters, data is analyzed, and the thesis itself is written. Thesis projects do not lend themselves to working twice as hard, and one semester is not sufficient time to complete a thesis in the Department of Computer Science. It is the responsibility of the adviser and the committee, and not the calendar, to determine when a thesis is complete.

**Getting Started.** The first step in becoming a thesis student is to read the official Graduate College [Guide to the Preparation of Theses and Dissertations](#). The student should refer to the Graduate College *Guide* for things not covered in the department guide. Students are strongly advised to start early and consult the faculty frequently.

**Thesis Timeline.** A thesis proposal must be written and a thesis committee established prior to enrollment in CS 5399A. Suggestions for finding a topic,

forming a committee and preparing the proposal are given below. The proposal must be submitted to the adviser two weeks before the first class day and to the committee one week before the first class day. The proposal must be signed by the committee members and the department Chair no later than the first class day, at which time a section of CS5399A is opened for registration.

To register for CS5399B in subsequent semesters, the student sends a request to open a section along with their name, Texas State ID, and the name of their adviser to the departmental administrative assistant, who will check for completion of CS5399A before opening the section of CS5399B.

Thesis work proceeds under the direction of the student's thesis committee. It is the responsibility of the student to remain in contact with the thesis committee throughout the conduct of research and the writing of the thesis. It is incumbent on the student to keep the thesis adviser and committee informed of progress. Difficulties should be reported to the thesis adviser immediately. It is the responsibility of the adviser and the committee to determine when a thesis is complete.

The completed, grammatically correct thesis draft must be submitted to the thesis adviser no less than 4 weeks prior to the Graduate College deadline for submission. If the adviser requires revisions, the student will be notified of such within one week.

The revised draft must be submitted to the thesis committee no less than two weeks prior to the Graduate College deadline for submission. If the committee members require revisions, the student will be notified of such within one week.

A thesis defense must be scheduled at least one week prior to the Graduate College deadline for thesis submission. The student must schedule the defense with the computer science department staff no less than one week prior to the defense. The computer science department staff will announce the thesis defense time, date, and location to faculty and students.

**Finding a Topic.** The best thesis topic is one of consuming interest to the student. For that reason, students are encouraged to choose their own area of research. Once an area (or areas) has been selected, the student contacts faculty members who are teaching courses or conducting research in that area or a related area. The faculty should be able to help refine the topic to an appropriate area and scope that can lead to a successful thesis.

Sometimes it is possible to be assigned a thesis topic. The best situation is to be able to leverage a thesis out of work as a research assistant. This way, the student is able to get paid to perform much of the thesis work and there isn't as much of an additional time burden. Naturally, these kinds of research

assistantships are highly prized and hard to get. A student who intends to write a thesis should start looking for a research assistantship as soon as possible.

Thesis topics can be found by talking with faculty members. Most faculty members have ideas for thesis projects that are based on their own research efforts. The faculty member may not have a research assistantship available, but the research ideas are still valid and usually well thought out. So, as always, the student should use the faculty as the valuable resource they are and ask around for project ideas.

**Thesis Committee.** The thesis committee usually consists of three members from the graduate faculty. One member will serve as the thesis adviser. This faculty member should have expertise in the area of the thesis topic and be able to work closely with the student. The other members of the committee should be chosen based on their areas of expertise and their interest in the thesis topic. External committee members are considered on an individual basis. A majority of the committee members will be from the graduate faculty in the Department of Computer Science.

The role of the thesis adviser and the other committee members is to evaluate the student's research and guide the student to the successful completion of the project. Grammar, spelling, and style are the responsibility of the student. When appropriate, a proofreader should be hired to review the thesis for grammar, spelling, and style.

It is the responsibility of the student to remain in contact with the thesis committee throughout the conduct of research and the writing of the thesis. It is incumbent on the student to keep the adviser and committee informed of progress. Difficulties should be reported to the thesis adviser immediately. If the research project needs to be altered from the proposed work, the student must get permission from the committee before proceeding.

**Thesis Proposal.** The thesis proposal is usually a two- or three-page document that explains the proposed research to the committee members, the department Chair and the Graduate College. This document must contain a description of proposed work sufficient to determine its intellectual content and scope and to convince the audience that the proposed research is viable and of interest and value to people in the area. The proposal may include the following sections:

- *Thesis Title* - A brief name for the project.
- *Thesis Statement* - A clear, concise sentence that describes the proposed research.
- *Abstract* - An explanation of the problem or issue being addressed. This should be kept to a clearly written paragraph.
- *Introduction* - Background and motivation for the research. The abstract is

necessarily short, so this section is used to expand the reasons for and the expected results of the research.

- *Preliminary Literature Survey* – A brief description of peer-reviewed literature relevant to the thesis topic. This section should include enough related work to document the importance of the topic.
- *Research Methodology* - A high-level plan of the proposed work, the methodology, the resources needed, and the analyses to be performed.
- *Bibliography* - A list of resources the student can draw on for research. The purpose of this section is to demonstrate to the reader that there is a body of literature related to the topic. This helps to prove that the area of research is active, that there is supporting literature, and that the project is original.

It is possible, even likely, that the research may deviate slightly from the proposed research methodology. This is normal, but these changes must be made with the consent of the thesis committee.

To limit the number of changes that will be necessary, and to prevent problems at the end of the research project, the thesis proposal should be as general as possible with regard to the research methodology. It should not specify platforms, languages, algorithms, or analyses. The proposal should clearly delineate a plan and a methodology but leave as much freedom as possible so that the completed research is consistent with the proposal.

There is a form that must be completed and which will serve as the cover sheet for the thesis proposal. This form must be signed by all of the committee members. It will also indicate which style guide will be used for formatting the thesis document. The student should check the Graduate College *Guide* for styles and comply with the preferences of the thesis adviser.

**Thesis Organization.** Most students, when they begin to write a thesis, create the obligatory cover pages, signature page, and other infrastructure. (The Graduate College *Guide* provides a sample of the signature page). Sometimes the process stalls at this point and the student is unable to write even the first sentence of the first chapter. A technique for dealing with this situation is to work from back to front. The student can write about the thesis research, then provide background information, then discuss related work, and finally write the introduction.

Suggested Chapter Structure:

- *Introduction* - provides the motivation for the thesis work. The following questions should be answered clearly: What work has been done? Why has it been done? What is the importance of the work?
- *Literature Survey* - provides summaries of other relevant research. The student should explain how this research is related to the thesis work and

how it is different, including whether the thesis extends or replaces the previous work.

- *Background Information* - provides coverage of any specific topics that the reader needs to know in order to understand the research. Specific items such as algorithms, languages, or tools used in the research are described in this section.
- *Conducting the Research* – provides a description of the research methodology, the tools used or developed, the data collection process, and results, as appropriate.
- *Analysis of Results* – provides an interpretation of the results of the research.
- *Conclusions and Future Research* – provides conclusions based on research results and information in the literature survey. This chapter describes, in light of the information presented in the thesis, the work that has been done, the motivation for doing the work, and the importance of the work. It explains a vision for the future of the research, including other projects stemming from the research and other avenues of investigation.

**Thesis Defense.** It is the responsibility of the student to bring a comprehensive examination report form and copies of the thesis signature page to the defense. A thesis defense typically lasts one hour. It consists of a public, oral presentation of the research. This presentation usually lasts 30 to 40 minutes. Currently, the trend is to use a PowerPoint slideshow along with a demonstration of any tools created to assist in the research. While this is not a requirement, the format should fit the presentation style and the material.

After the presentation, time is devoted to questions about the research, although some questions may be asked by thesis committee members during the presentation. During the question and answer period, questions will first come from the committee members, often with the adviser going last. Finally, questions will be solicited from the audience which may include other faculty members and students. Members of the thesis committee may ask additional questions during this time or assist with questions or issues brought up by the other attendees.

Once all questions have been addressed, the thesis committee confers in private to discuss the thesis, the presentation, and the way that questions are handled. If the committee is satisfied with the defense and the thesis, the members sign copies of the thesis signature page as well as the form for the previously taken comprehensive examination. The committee then informs the student about the decision.

If the committee is not satisfied with the defense and the thesis, the student is given conditions that must be met for thesis approval. The adviser informs the committee when the conditions have been met, and the committee members review the thesis and, if they concur with the adviser, sign the signature pages.

If the committee approves the thesis, the student submits a copy of the thesis and the committee approved comprehensive examination form and thesis signature page to the department Chair. The thesis is reviewed by the Department of Computer Science Chair who signifies approval by signing the comprehensive examination report form. The department Chair then forwards the material to the Dean of the Graduate College. The thesis is reviewed by the Dean of the Graduate College who signifies approval by signing the copies of the signature page of the thesis. The student should reference the Graduate College *Guide* for details on completing the thesis. An electronic copy of the thesis in pdf or Word format must be submitted to the department. See the Graduate College *Guide* for Graduate College formatting requirements, including requirements for electronic submission.

**Academic Honesty.** Texas State students are expected to adhere to the Texas State Honor Code and the Department of Computer Science policies on academic honesty. Computer science theses will be submitted in electronic form to a plagiarism detection system before the defense. It is the responsibility of the student to submit the thesis and the responsibility of the thesis committee to review the reports.

## **References**

Greg Hall, Dr. Hall's "Unofficial" Guide to Thesis Projects,  
[http://www.cs.txstate.edu/~gh10/Thesis\\_Guide.html](http://www.cs.txstate.edu/~gh10/Thesis_Guide.html)