



Department of Computer Science

Master's Project and Thesis Guidelines

Fall 2003 Edition

**California State University, Fullerton
Fullerton, CA 92834-6870**

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Revised Fall 2003
by Allen D. Holliday

Introduction

Every student in the Master of Science in Computer Science program at California State University, Fullerton must complete a computer science project or write a thesis. This booklet describes the process that you must follow when completing a project or thesis. Much of the process is the same for either project or thesis; where there are differences, they are clearly identified.

The following two paragraphs are taken from the University's 2001–2003 Catalog's *Theses and Projects* section.

“A thesis is defined as the written product of a systematic study of a significant problem. It identifies the problem, states the major assumptions, explains the significance of the undertaking, sets forth the sources for and methods of gathering information, analyzes the data, and offers a conclusion or recommendation. The finished product evidences originality, critical and independent thinking, appropriate organization and format, and thorough documentation. Normally, an oral defense of the thesis is required.”

“A project is a significant undertaking appropriate to the fine and applied arts or to professional fields. It also evidences originality and independent thinking, appropriate form and organization, and a rationale. It is described and summarized in a written abstract that includes the project's significance, objectives, methodology and a conclusion or recommendation. An oral defense of the project may be required.”

You may refer to this Catalog section for more information about the University's general regulations, format guidelines and style manuals, deadlines and final procedure. This section may be found on the University's website at:

http://www.fullerton.edu/catalog/graduate_regulations/theseproj.asp

A project involves the analysis of a computer science problem and the solution of that problem. The analysis and solution show that you have mastered the knowledge and skills of computer science, which you have gained from the courses you have taken and the activities you have performed throughout the master's degree program in computer science.

A thesis involves the study of a significant area of computer science. It shows your ability to think critically and independently, and to develop original ideas from your research.

Most projects involve the development of a software product, although a research project can also be done. A thesis usually covers a more intensive research topic; it has more formal documentation requirements and involves a more rigorous approval process.

When you are deciding between a project or a thesis, remember that they are more than a requirement for the Master's degree, they are also something you can use when you apply for a job or to a graduate school.

Prerequisites

You must register in CPSC 597 Project or CPSC 598 Thesis to complete this requirement for your degree. To enroll in either class, you must have Classified Standing (see the Graduate Handbook's *Classification* section for the description of this term.) You must file an approved proposal in the Computer Science department office no later than the last day of instruction of the semester before you plan to register in CPSC 597 or CPSC 598.

There may be a different deadline for a project proposal if you will be participating in a project group, where a number of students will work on different parts of a common problem. A thesis is never a group effort.

Subject Categories

A project or thesis involves the systematic creation and execution of a plan for addressing a significant computer science problem. You demonstrate the skills and knowledge that you have acquired by finding a solution to the problem you chose, or by conducting research into a significant area of computer science.

Computer science projects can come from either of these categories:

1. Software Development.
2. Research Project

Development Project

A development project produces a working implementation of a problem solution. You use software engineering techniques and computer science principles to develop software by:

1. analyzing and specifying requirements.
2. designing a software solution to the requirements specification.
3. implementing the design in computer programs.
4. testing and integrating the programs.
5. writing the required documents.
6. demonstrating the project.
7. delivering the software program and documents.

Examples of software development projects are: software development aids, user interface tools, Internet applications, and various business or scientific application programs. Some development projects may interact with a special hardware environment. Examples are: program debuggers, device drivers, network systems, code generators and linkage editors.

Research Project

In a research project, you investigate a computer science problem or topic by:

1. analyzing the problem or topic.
2. conducting extensive research.
3. summarizing your findings from your research investigation.
4. recommending additional research on the topic.
5. drawing conclusions from your research.

6. documenting the results of the study.
7. presenting your results (optional).

Research projects may or may not include software development; such software is normally experimental and is not expected to be production quality.

Before you chose a research project, you must work closely with your faculty advisor to make sure that the requirements are clearly defined and that a quality final report can be delivered.

Thesis

A thesis is an endeavor of more significance and difficulty than a research project. It involves:

1. analyzing the problem or topic.
2. conducting extensive research.
3. summarizing your findings from your research investigation.
4. recommending additional research on the topic.
5. drawing conclusions and making recommendations.
6. documenting the results of your research.
7. defending your conclusions and recommendations.

Proposing A Project Or Thesis

You must prepare a proposal for your project or thesis, and have it approved before you may enroll in CPSC 597 or CPSC 598.

The project must demonstrate your understanding of computer science principles and practices, and prove your ability to:

1. Identify a computer science problem.
2. Perform an analysis of the problem.
3. Postulate a solution.
4. Investigate current research to support your solution.
5. Solve the problem.
6. Test the solution.
7. Document the results.
8. Demonstrate your program or present your results.
9. Deliver the final product.

The thesis must demonstrate your understanding of computer science principles and practices, and prove your ability to:

1. Identify a significant computer science topic.
2. Perform extensive research in the topic's subject area.
3. Analyze the results of that research.
4. Form conclusions and develop recommendations.
5. Document the results of your research in the required form.
6. Present and defend your results.

Select Topic or Problem

You should start thinking about a computer science problem early in your degree program. The graduate classes you take, especially the CPSC 589 Seminar, provide an opportunity to explore interesting areas of computer science. By the time you finish this course, you should have identified one or more problems of interest.

The Computer Science Department's Graduate Handbook contains a list of faculty interests, which may suggest project topics and identify potential advisors. You should discuss possible topics and problems with faculty members. If you cannot think of a topic or problem, these faculty members may suggest some.

Select Advisor and Reviewer / Committee

Project

You must have a faculty advisor and a faculty reviewer for your project. They should be full-time faculty members and have an interest in the problem area that you select. They review the project proposal, observe the demonstration or presentation, and evaluate the final report.

You and your advisor should maintain a close working relationship throughout your project. You should meet regularly and often, usually every two weeks or so.

You will see your reviewer primarily at the beginning and end of your project. The reviewer's responsibility is evaluation of final products, although you may ask him or her to comment on draft versions.

Thesis

You must have a committee of three faculty members to supervise and review your thesis. They should be full-time faculty members and have an interest in the problem area that you select. They review the proposal, observe and evaluate your defense. The chair of this committee will be your thesis advisor.

You and your advisor should maintain a close working relationship throughout your thesis. You should meet regularly and often, usually every two weeks or so.

You will see your reviewers primarily at the beginning and end of your thesis. Each reviewer's responsibility is evaluation of final products, although you may ask him or her to comment on draft versions.

Prepare Proposal

You must write a proposal for your project or thesis before it can be approved by the Computer Science Department. See Appendix B Proposal Cover Page and Appendix C Project / Thesis Proposal for information on format and organization.

Objectives

State clearly what is to be accomplished and why it is significant enough for a master's project or thesis.

Activities

Describe in detail how the objectives will be achieved. Describe the development phases and the tasks that will be performed.

Include charts, graphics and project models, if they will show your activities more clearly.

Environment

Describe the computers, programming languages, and software tools that will be used for your development or research.

Reports and Products

Project

Define clearly what the final products of the project will be. Identify what you will deliver to your advisor for demonstration and what you will deliver to the Computer Science Department when your project is completed. Possible deliverables include:

1. Final report (required for all projects).
2. Source code.
3. User's manuals.

Appendices E and F provide sample tables of contents for the required project reports.

Thesis

The thesis format and content is described in a manual available from the Office of Graduate Studies. You should get a copy as soon as possible and become familiar with its requirements.

Schedule

The schedule is a significant part of the project or thesis proposal. It defines what you're going to do and when you're planning to do it. You should consider how long each activity will take, which activities must precede others, and how much overlap is possible or desirable. The schedule identifies tasks to be performed, milestones to be met, and the estimated number of hours for each task.

You should work closely with your advisor to develop the schedule. It will help you define the scope of your project and establish a baseline for measuring progress.

A project or thesis should be sized so that they will require 150–200 hours of effort.. Your schedule should be for a one-semester project; however, completing within one year is acceptable. This allows for unforeseen difficulties.

Project

Allow enough time for analysis and design. One of the most common scheduling errors in development projects is having an analysis and design phase that is too short, and a coding and integration phase that is too long and drawn-out because of the inadequate analysis and design.

An example project schedule is provided in Appendix D.

Thesis

The University Catalog's *Theses and Projects* section has a detailed description of the preparation and approval process. Be sure you are familiar with the deadlines that are given in this section. Allow enough time for your advisor, your committee, and the university thesis reader (from the Office of Graduate Studies) to read, comment, and approve your thesis. Be prepared to modify your thesis in response to their comments and resubmit the updated version.

Submit Proposal

When you, your advisor, and your reviewer or committee agree that the proposal is complete, attach it to a completed Project / Thesis Definition form (see Appendix A), and submit it to the Computer Science Office for final approval.

Performing The Work

Progress Reports

Make periodic progress reports to your advisor; every two weeks is recommended. Compare your actual progress with your schedule and discuss any problems with your advisor. Adjust your schedule if necessary.

Draft Documents

Create draft versions of the required documents and submit them to your advisor for review. Incorporate comments when preparing the final documents.

Demonstration / Presentation

Project

Demonstrate the final project to your advisor and your reviewer. For research projects, an oral presentation will substitute for the demonstration.

Thesis

Present your results to your committee and defend your conclusions and recommendations.

Final Submission

Project

When your demonstration or presentation has been approved by your faculty advisor and faculty reviewer, submit the final report.

The report must include an abstract—a short, one-paragraph summary of the topic and results, which may be posted on the Computer Science Department's website. It must also include a list of keywords that can be used in a database to help faculty and students locate projects addressing specific topics.

The report and program source listings must be submitted on CD-ROM. The report must be a Word file or a PDF file. The program source files may come from the development system that you used, but they should be text files that can be read by simple text editors. The following paragraph styles are required:

- For body text: Times New Roman, 11 point, spacing at least 13 points, space after 6 points. Do not use double carriage returns between paragraphs.
- For headings: Helvetica, 11 point, bold, space before 12 points, space after 3 points

Three printed copies must be submitted. One will be returned to you, one will be retained by your advisor, and one will be filed by the department.

The printed copies of the final report must be on 8½ × 11 paper and bound using VeloBind, available from Kinko's. Multiple binders are acceptable for very large reports. Coil binding, comb binding, fabric binding, and loose-leaf ring binders are not acceptable.

Thesis

The University Catalog's *Theses and Projects* section has a detailed description of the requirements for approval signatures, reading by the Office of Graduate Studies, and binding and microfilming. Contact the Office of Graduate Studies to make sure you know all of the requirements for submitting a thesis and getting it approved.

Final Evaluation

Your grade on your project is based on your advisor's and reviewer's assessment of:

1. The quality of the final report.
2. The quality of the product developed.
3. The thoroughness of the individual tasks that you performed.

**Appendix A:
Project / Thesis Definition Form**



Department of Computer Science

CPSC 597 / 598 PROJECT / THESIS DEFINITION

To the graduate student:
1. Complete a project proposal, following the department guidelines.
2. Have this form signed by your advisor and reviewer / committee.
3. Submit it with the proposal attached, to the Department of Computer Science.

Project checkbox

Thesis checkbox

Please print or type.

Student Name: Student ID:

Address: Street City Zip Code

Home Phone Work Phone

Units Semester

Are you a Classified graduate student?

Yes checkbox

No checkbox

Is this a group project?

Yes checkbox

No checkbox

Proposal Date:

Completion Deadline:

Tentative Title:

We recommend that this proposal be approved:

Faculty Advisor Printed name Signature Date

Faculty Reviewer Printed name Signature Date

Faculty Reviewer Printed name Signature Date

**Appendix B:
Proposal Cover Page**



Department of Computer Science

Graduate Project / Thesis Proposal

Project / Thesis Title (type)

Student Name (type)

Advisor's Name (type)

Reviewer's Name (type)

Reviewer's Name (type)

Appendix C: Project / Thesis Proposal

A sample table of contents and outline for the proposal is shown below.

Cover Page (see Appendix B)

Table of Contents (including Tables, Figures, and Appendices)

1. Introduction
2. Objectives
3. Activities
4. Research / Development Environment
5. Reports and Products
6. Schedule
7. References
8. Appendices (as needed, for supporting documentation)

Appendix D: Example Schedule

Example Project Schedule

| 2003 | February | | | | March | | | | April | | | | May | | | | | Summary | |
|---------------------|----------|----|----|----|-------|----|----|----|-------|----|----|----|-----|----|----|----|---|------------|---------|
| Tasks: | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | Hours | Percent |
| Requirements | 12 | 12 | 8 | 6 | | | | | | | | | | | | | | 38 | 17.9% |
| Design | | | 4 | 6 | 12 | 8 | | | | | | | | | | | | 30 | 14.2% |
| Code & Unit Test | | | | | 4 | 8 | 12 | 6 | | | | | | | | | | 30 | 14.2% |
| Integrate & Test | | | | | | | 4 | 6 | 12 | 12 | 12 | 12 | 8 | | | | | 66 | 31.1% |
| Write User's Manual | | | | | | | | | | | | | 6 | 8 | | | | 14 | 6.6% |
| Write Final Report | | | | | | | | | | | | | | 6 | 12 | 12 | | 30 | 14.2% |
| Demonstrate | | | | | | | | | | | | | | | | | 4 | 4 | 1.9% |
| Hours | 12 | 12 | 12 | 12 | 16 | 16 | 16 | 12 | 12 | 12 | 12 | 12 | 14 | 14 | 12 | 12 | 4 | 212 | 100.0% |

Appendix E: Development Project Report

A sample table of contents for the final report for a development project is shown below.

Approval Cover Page (see Appendix G)

Abstract

Keyword List

Table of Contents (including Tables, Figures, and Appendices)

1. Introduction

a. Description of the Problem

b. Project Objectives

c. Development Environment (software and hardware)

d. Operational Environment (software and hardware)

2. Requirements Description (external functions and interfaces)

3. Design Description (architecture, internal functions and interfaces)

4. Implementation (organization of source file structure, reference list of files)

5. Test and Integration (plan and results)

6. Installation Instructions

7. Operating Instructions

8. Recommendations for Enhancements

9. Bibliography (citing all references used)

Appendix F:

Research Project Report

A sample table of contents for the final report for a research project is shown below.

Approval Cover Page (see Appendix G)

Abstract

Keyword List

Table of contents (including Tables, Figures, and Appendices)

1.0: Introduction

1.1: Definition of the Problem

1.2: Objectives of the Study

1.3: Significance of the Problem

1.4: Review of Significant Research

1.5: Assumptions and Limitations

2.0: Research Approach or Methodology

2.1: Research Results

2.2: Analysis of the Results

3.0: Summary and Conclusions

4.0: Bibliography (citing all references used)

**Appendix G:
Approval Cover Page**



Department of Computer Science

This project has been satisfactorily demonstrated and is of suitable form.

This project report is acceptable in partial completion of the requirements for the Master of Science degree in Computer Science.

Project Title (type)

Student Name (type)

Advisor's Name (type)

Advisor's signature

Date

Reviewer's name

Reviewer's signature

Date