

# **GUIDELINES FOR THE MASTER'S CLOSURE EXERCISE**

**Computer Science Department  
University of Illinois at Springfield**

August 2006

## **ABSTRACT**

**All computer science graduate students must complete a substantial research effort as part of their master's degree requirements. A large component of the work is the research process and the report that describes the work and results. Your ability to communicate well is one of several indicators of your qualifications as a computer professional. This document describes the research process and serves as a demonstration of the proper format and style for the report. Expectations related to the quality of your work are also outlined.**



## TABLE OF CONTENTS

<b>Abstract</b> .....	ii
<b>INTRODUCTION</b> .....	1
Selecting a Project Advisor and Topic .....	1
Selecting a Closure Committee .....	2
Course Requirements .....	2
Time Limitations .....	2
<b>REQUIRED REPORTS</b> .....	3
<b>RESEARCH PROPOSAL</b> .....	3
Writing the Proposal .....	3
Presenting the Proposal .....	6
<b>RESEARCH REPORT</b> .....	6
Writing the Report .....	7
Presenting the Report .....	8
Final Documents .....	9
<b>EVALUATION CRITERIA</b> .....	9
<b>SUMMARY</b> .....	10
<b>REFERENCES</b> .....	11
<b>APPENDICES</b>	
A. Sample Title Page .....	12
B. Sample Vita .....	14



## INTRODUCTION

Computer science graduate students must complete a closure exercise as part of the master's degree requirements. The exercise is classified as either a master's project or thesis. Both efforts require significant work. A *thesis* is an extensive research essay on an approved computer science topic, original in either its content or mode of integration. A *project* is an applied study that combines an approved computer science topic with actual problems or issues in a professional setting.

Completing the closure exercise demonstrates that you are a qualified computer professional. Your work will generally demonstrate programming abilities, technical writing skills, data analysis, oral presentation skills and mastery of a specific area of computer science. However, the particular skills necessary to complete your work may vary.

Writing skills are especially important in technical fields such as computer science. The Computer Science Department adopted *Reporting Technical Information*, by Houp and Pearsall (1992) as a standard reference for the final document of your closure exercise. The department recommends that you purchase this text and become familiar with its content. It is an excellent source for refreshing or improving your technical writing skills. In addition, if your writing skills are deficient, the UIS Center for Teaching and Learning (Brookens 460) is an academic support service available at no cost. Writing specialists at the Center provide individual instruction in a variety of writing skills.

## SELECTING A PROJECT ADVISOR AND TOPIC

Identifying an appropriate topic is sometimes the most difficult part of research. Select a topic that draws upon your interests and knowledge acquired while completing graduate work at UIS. Talk with the CSC faculty about their interests and your ideas. If you find a match, ask the faculty member to be your Project Advisor. You may want to visit the Brookens Library Archive located in the basement to review previous Master's projects. Visit the CSC 550 Home Page on the World Wide Web for additional information and abstracts of previous projects (<http://csc.uis.edu>).

You will work closely with your Advisor in developing a research proposal and coordinating the research effort. Work pace and expectations are determined between you and your Advisor. Discuss how often you plan to meet and indicate how much guidance you feel you need.

You are allowed to change your research topic or your Advisor with the following constraints. If you wish to change the topic you must complete a new proposal, form a new Closure Committee, and have it accepted again. If you wish to change Advisors in the middle of your research, you must have consent of the old and new Advisor. Otherwise, the work is not transferable and you must complete a new proposal, form a new Closure Committee, and have it accepted again.

Here are some of the research interests of the CSC faculty:

Svet Braynov:	Computer Security, Artificial Intelligence, E-Commerce
Kamyar Dezhgosh:	Networks, Object Oriented Languages
Chung-Wei Lee:	Wireless/Mobile Networking; Video Streaming
Keith Miller:	Software Engineering, Computer Ethics
Ted Mims:	Parallel Processing, Networks, Operating Systems
Ratko Orlandic	Databases; Data mining;

## **SELECTING A CLOSURE COMMITTEE**

Your Closure Committee is responsible for deciding whether or not your research effort is acceptable for a master's degree. The committee consists of three faculty members. Your Advisor chairs the committee. A second CSC faculty member is chosen by you with her/his consent to represent the Department. The third member represents the School and is appointed by the Dean of the School of Liberal Arts and Sciences. To request a Dean's Choice, you must e-mail [csc@uis.edu](mailto:csc@uis.edu) and include your name, UIN, title of the project, advisor, and student choice member. Committee members should be selected during the early stages of the proposal preparation since the selection of a third committee member can take up to three weeks.

## **COURSE REQUIREMENTS**

*After your proposal is accepted*, you register for 4 hours of CSC 550 the following semester to begin work on the project. If the closure exercise is not completed during the initial semester, you must register for one hour of CSC 550, on an audit basis, for each semester the work remains incomplete (summer enrollment not required). Failure to maintain continuous enrollment will require retroactive registration of one credit hour per semester. Consideration will be given to waive this requirement for unusual circumstances. You must apply in writing to the Computer Science Department for this consideration.

## **TIME LIMITATIONS**

The final report for a closure exercise must be completed and formally accepted within two calendar years from the date the proposal is accepted. Failure to complete the report within the required time will cancel your current effort. You must then start the process over and complete a new proposal. Consideration will be given for extensions on an individual basis. You must apply in writing to the Computer Science Department for this consideration.

## REQUIRED REPORTS

The Master's Project requires two written reports: a Proposal Report and a Final Report. There is no page limit or expected length for either report. The only important requirement is that your advisor (and, later, your committee) is satisfied with how you presented the material in writing. A description of the two required documents can be found in the next two sections. Although an outline is suggested for each report, graduate students are free to change the outline of a document for the sake of clarity. However, it is recommended that you discuss changes in the outline of your documents with your advisor.

The Computer Science Department demands the highest level of Computer Science ethics and scholarship from its Graduate Students. The Computer Science Department has adopted a Policy on Academic Honesty, which applies to all parts of the Master's Project. In particular, except for circumstances that fall under what is known as "Fair Use" (see <http://fairuse.stanford.edu> for related articles), you should not integrate into your document sentences, paragraphs, figures, tables, or code from a source that is protected by Copyright Laws (including, but not limited to: books, papers, and Web-pages). Even if you provide the source of the document where the piece in question can be originally found, you could still be violating Copyright Laws. Discuss quoting or using Copyright material in your document with your advisor. Except for very special circumstances, your advisor expects to see the entire document written in your own words.

## RESEARCH PROPOSAL

The proposal defines the topic, establishes the scope required for completion, and estimates completion times for each stage of the work. Once accepted, the proposal serves as a contract between you and the Closure Committee as to what must be done. The scope may not be enlarged without your consent and the scope may not be reduced without the committee's consent.

## WRITING THE PROPOSAL

Chapter 15 (Houp and Pearsall, 1992) describes the preparation and presentation of a research proposal. Your proposal may vary but will probably contain many of the following sections.

Title Page



- Table of Contents
- List of Illustrations (if necessary)
- Project Summary
- Introduction
  - Rationale and Significance
  - Problem Statement
- Literature Review
- Plan of Work
  - Task Breakdown
  - Software and Hardware Specifications (used for development)
  - Software Prototype Definition (if appropriate)
  - Evaluation Plan
  - Time Schedule
- References
- Vita
- Appendices (if necessary)

## Format and Style

Follow these requirements to insure your report is professional and consistent with other project reports completed in Computer Science. All text should be twelve point font and double spaced. Each page should have a border of one and a half inches along the left margin and one inch along the top, right, and bottom margins. Chapter titles should be centered, boldfaced, in all caps and begin on a new page. Major section headings should be left justified, boldfaced and in all caps. Subheadings should be left justified and boldfaced but not all caps. Each figure and table must be referenced in the document (Figure 1) and have labels.

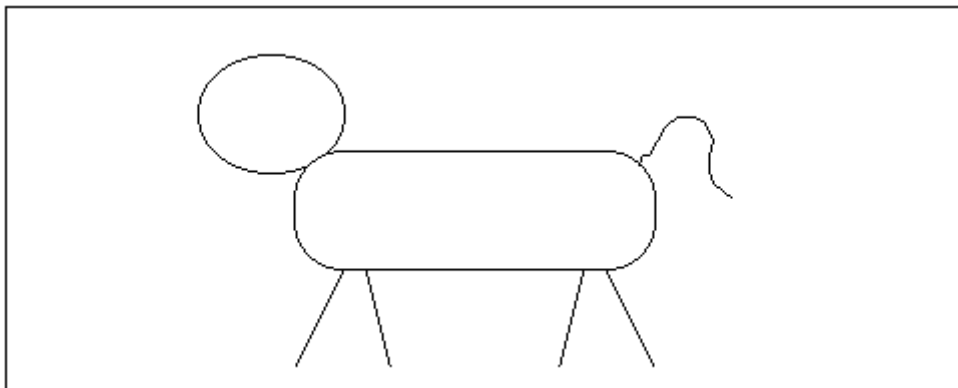


Figure 1. Sample figure and title.

## Title Page

The title page contains the title, your name, committee member's names, and the date of the proposal presentation. The title should provide sufficient information to allow someone to make an intelligent judgment about the topic, type of study and the level at which it is to be carried out. Refer to appendix A for a sample.

## **Introduction**

The introduction briefly explains the problem and creates interest for reading further. Make the subject and purpose of your work completely clear in the rationale and significance section. One should not have to read several pages before understanding the problem.

The problem statement evolves from the introduction and is usually a question that you plan to answer. Are parallel algorithms faster than sequential algorithms for a particular problem? Which of two user interfaces is best for text editing? How can access to database information be improved? Describe the problem and justify why you selected the problem. You must convince the Closure Committee that the work will be worthwhile.

## **Literature Review**

An extensive review of related literature is an essential component of any research. It describes what has already been done in the area and demonstrates your understanding of the problem and related issues. It should answer questions such as: Who is engaged in similar work? What has proven useless? What has been successful? Attempt to synthesize previous work rather than merely recount what has been done.

Although there is no specific number of references that must be included in this section, it is difficult to imagine a topic that would require fewer than ten. Most of the references should be from appropriate computer science journals. Weekly magazines and textbooks are usually not appropriate. Use the author-date documentation style which combines parenthetical references with an alphabetized list of cited works (Houp and Pearsall, 1992, 313-320).

The Internet is full of technical reports and research papers and is a valid source of research material. You must, however, evaluate the quality of the information (and the source) before using and citing electronic documents in your review. Remember that only few papers in the Web are peer-reviewed or evaluated by an editor before they are posted. Read *Evaluating Internet Research Sources* (Harris, 1997) for a nice discussion on evaluating the quality of information on Internet sources. Once you decide to use an Internet resource, you must cite it as you would for a paper or a book. See *The MLA-Style of Referencing Online Sources* (Walker, 1995) for suggestions on how to cite electronic sources.

You will probably spend a good amount of time working on the Literature Review section. Speak with your advisor for possible topics or papers that might help you get started. The UIS library has good electronic search engines that can be used to locate important papers in the topic you are studying. For a search engine dedicated only to Computer Science literature, turn your browsers to *The Collection of Computer Science Bibliographies*.

## **Plan of Work**

After you have established the problem and the need for its solution, you must explain how you are going to carry out the work. This section may vary depending on your work but the following information is usually necessary.

Computer science research generally includes developing software to demonstrate an understanding of the topic or as a proof of concept. The software you intend to develop must be clearly specified in the proposal including the programming language and computer hardware you intend to use.

Research often includes some type of evaluation to compare different techniques or to verify hypotheses. Clearly describe the evaluation plan or process you intend to perform and the controls to insure that the results are not due to chance. This includes the data you expect to collect and how it will be analyzed.

## **References**

Include complete references to any work that you cite in the report. However, do not 'pad' the list with references that you do not cite in the report. It is not appropriate to include references that you may have read but did not cite in the report. Use the author-date documentation style which combines parenthetical references with an alphabetized list of cited works (Houp and Pearsall, 1992, 313-320).

## **Vita**

A vita provides information to the committee about your education and related work experience. Refer to appendix B for a sample of the correct format.

## **PRESENTING THE PROPOSAL**

You will make an oral presentation of the proposal to your committee. A copy of the proposal must be provided to all committee members before scheduling the presentation. A time and date will be scheduled when all committee members are satisfied with the proposal.

The presentation should be rehearsed and well organized to clearly describe the research proposal. It should last no longer than thirty minutes including questions and answers. If you have limited experience with public speaking, you should consult with your Advisor. Chapter 19 (Houp and Pearsall, 1992) describes the preparation and delivery of an oral presentation.

Present the specifics of the proposal and be prepared to answer questions from the committee concerning all aspects of the proposal. Questions might include why you selected the topic, how you anticipate performing each phase of the work, or if there are any expected problems.

After the presentation, you will leave the room while the committee discusses if the proposal is acceptable. The Closure Committee will accept the proposal, have you make some changes before acceptance, or reject it. It is common to require some changes before acceptance.

## **RESEARCH REPORT**

The research report repeats and expands on the proposal. It includes a description of how you approached the problem, difficulties encountered and strategies developed to overcome the difficulties. Consult your Advisor to determine if source code and a user's manual should be included in an appendix for any software you developed. Similar to the Proposal, your advisor must be satisfied with your Research Report before it goes before the entire committee for consideration.

## **WRITING THE REPORT**

Chapter 18 (Houp and Pearsall, 1992) describes the preparation and presentation of an empirical research report. Your report may vary but will probably contain many of the following sections.

- Title Page
- Table of Contents
- List of Illustrations (if necessary)
- Abstract
- Introduction
  - Rationale and Significance
  - Problem Statement
- Literature Review
- Materials and Methods
  - Design of the Investigation
  - Software and Hardware Specifications
  - Procedures
  - Methods for Observation and Interpretation
- Results
- Discussion
- References
- Vita
- Appendices (if necessary)

## **Format and Style**

Follow these requirements to insure your report is professional and consistent with other project reports completed in Computer Science. All text should be twelve-point font and double-spaced. Each page should have a border of one and a half inches along the left margin and one inch along the top, right, and bottom margins. Chapter titles should be centered, boldfaced, in all caps and begin on a new page. Major section headings should be left justified, boldfaced and in all caps. Subheadings should be left justified and boldfaced but not all caps. Figures and tables should be labeled below the item.

## **Acknowledgments**

This optional section is used to briefly acknowledge all persons that in some way or another helped you complete the Graduate Project.

## **Introduction and Literature Review**

These sections will probably be very similar to the original versions in the research proposal.

## **Materials and Methods**

Describe each aspect of the work you performed in sufficient detail to allow an independent researcher to evaluate your results and duplicate the work if necessary. Any software and hardware you used should be described. Procedures you used to collect and analyze data must be clearly stated.

## **Results**

The results section provides all of the data you collected during your research. Begin with a brief overview of what you found and then present the actual results using tables and graphs. The tables and graphs should be carefully labeled to allow a clear understanding of the results. Do not be surprised if this is one of the shortest sections of the report. You should report the results but do not interpret them in this section. The conclusions you draw from the results are presented in the discussion section.

## **Discussion**

This section is used to summarize and draw conclusions based on your work. It is perhaps the most difficult section to write because it covers a lot of ground and requires careful planning to present the information clearly. Here are some typical questions that might be raised in the discussion. Were the research objectives met? Did you prove or disprove what you intended? How could the work have been improved? How can this work be extended further?

## **References**

Include complete reference to any work that you cite in the report. However, do not 'pad' the list with references that you do not cite in the report. It is not appropriate to include references that you may have read but did not cite in the report. Use the author-date documentation style which combines parenthetical references with an alphabetized list of cited works (Houp and Pearsall, 1992, 313-320).

## **PRESENTING THE REPORT**

You will make a final oral presentation to your committee. A copy of the report must be provided to all committee members one week before scheduling the presentation. A time and date will be scheduled when all committee members are satisfied with the draft.

Present the specifics of the research and be prepared to answer questions from the committee concerning all aspects of the work. Questions might include why you selected the topic, what were the results, how can the work be continued, and how did you arrive at your conclusions. The presentation should be rehearsed and well

organized to clearly describe the problem and results. It should last no longer than thirty minutes including questions and answers. Use your time wisely.

After the presentation, you will leave the room while the committee discusses if the work is acceptable. The Closure Committee will either accept the final document, have you make some changes before acceptance, or reject it. It is common to require some minor changes before acceptance.

## **FINAL DOCUMENTS**

Three copies of the corrected final report must be bound with an appropriate cover. A glued binding is more professional in appearance than a spiral binding. Two copies should be turned in to the Program Secretary. One copy is sent to the Dean of the School of Liberal Arts and Sciences who forwards it to the UIS Library to be added to the collection, the second copy goes to your Advisor. The third copy is for you to keep.

**IMPORTANT:** Your advisor or the Program Secretary will give you a copy of the signed approval form to include in your report. The approval form should be placed just after the cover so that it is the first page of your report. The form is bound in the version sent to the Dean and in the versions for yourself and your advisor.

## **EVALUATION CRITERIA**

The Committee will evaluate your closure exercise based on the following criteria. If any of the criteria are judged to be below average, the entire effort is subject to rejection until improvements are made.

### **Literature Review**

The research report should contain an extensive literature review related to your topic. The committee must be convinced that you thoroughly understand the topic and have spent enough time researching the topic.

### **Writing Style**

Technical writing skills are critical to a computer science professional. Your final report should be suitable for publication in a computer science journal or proceedings.

### **Oral Presentation**

Oral communication skills are important for any professional. Your presentations for the proposal and final report should be well rehearsed and presented in a professional manner. The committee must be convinced that you are able to respond in an intelligent manner to questions related to your field of expertise.

### **Data Analysis**

Most research requires a data analysis component to test a hypothesis or convince someone that your work was successful. If your closure exercise requires data analysis then you must satisfy the committee that you are familiar with basic statistical concepts to prove a hypothesis.

### **Programming Skills**

A computer science professional must demonstrate outstanding programming technique. This includes designing well-structured algorithms, extensive documentation, and suitable user manuals if necessary. If your closure exercise involves programming then consult with your advisor about which documentation, if any, should be included in your final report.

## **SUMMARY**

This document describes in detail the steps required by Computer Science Graduate Students for the completion of their Graduate Project. All these steps can be summarized as follows:

### **1. Project Selection**

- Select an advisor that matches your interests.
- With the help of the selected advisor, come up with a project idea. Of course, you may come up with your own project idea before you select an advisor.

### **2. The Proposal**

- Write the Research Proposal for the project.
- Select a committee and notify your advisor of your preferences. Your advisor will fill the necessary paperwork to get the committee appointed.
- Your advisor must approve the Research Proposal before it is distributed to the committee.
- Once your advisor is satisfied with your Research Proposal, copies of the Proposal will be distributed to the committee and a presentation will be scheduled.
- An oral 20-25 minute proposal presentation is given on the scheduled day. The committee may decide to accept (maybe with modifications) or reject the proposal.
- Register for CSC550 (4 credits) the next semester (or the current semester if you think you will be able to present the final presentation before it ends).

### **3. Final Presentation**

- Work on the project and write a final report
- Once your advisor accepts the final report and is satisfied with your work, the report will be distributed to the committee and the final presentation scheduled.

- An oral 20-25 minute final presentation is given on the scheduled day. The committee may decide to accept (maybe with modifications) or reject your work.



## REFERENCES

- Harris, R. *Evaluating Internet Research Sources*. November 17, 1997.  
[http://www.sccu.edu/faculty/R\\_Harris/evalu8it.htm](http://www.sccu.edu/faculty/R_Harris/evalu8it.htm).
- Houp, W. H. and Pearsall, T. E. 1992. *Reporting Technical Information*. 7th ed. New York: Macmillan.
- Walker, J. R. *MLA-Style Citations of Electronic Sources*. Version 1.2. January, 1995.  
<http://www.cas.usf.edu/english/walker/mla.html>.



## **APPENDIX A:**

### **SAMPLE TITLE PAGE**

# **USABILITY EVALUATION OF INTERFACES FOR 3D INTERACTION**

Presented in Partial Fulfillment of the Requirements  
for the Degree Master of Science of Computer Science

By

Jonathan Smyth, B.A.

\*\*\*\*\*

University of Illinois at Springfield

1997

## **APPENDIX B:**

### **SAMPLE VITA**

## Jonathan Smyth

- Education**      B. S. Computer Science, Texas A&M University
- Experience**      Computer Operator, Comanche Peak Nuclear Power Plant  
Systems Programmer, ABC Computer Company  
Graduate Teaching Associate, University of Illinois at Springfield
- Course Work**    AU 91    CSC 481 - Intro to Computer Graphics  
AU 91    CSC 478 - Intro to Software Engineering  
SP 92    CSC 483 - Intro to Computer Networks  
SP 92    CSC 582 - User Interface Design and Evaluation  
AU 92    PAC 406 - Computers and Society  
AU 92    CSC 581 - Computer Graphics  
AU 92    CSC 572 - Database  
SP 93    CSC 550 - Master's Closure Exercise