CSE Undergraduate Theses - Introduction

What’s going on ....? How to succeed .... ?

Presented by Helen Paik
CSE Thesis Team

People who can help:

• **Thesis Supervisor** ... all thesis related issues

• **Thesis Coordinator** ... Helen Paik
  
  • ‘other’ thesis related issues: nominations, guidance, staff liaison
  
  • Email: hpaik@cse Room: K17-401A, by appointment
  
  • Let’s utilise the forum function of the new thesis site (in WebCMS3)

• **Student Office** ...
  
  • administration: extensions, late penalties, reassessment
  
  • Email: office.thesis@cse, Room: K17-Office, Office opening hours
Thesis Intro Lecture

The goals of this lecture:

• describe the process and requirements for a CSE thesis
• get you started with Thesis A ...

At the end, you should ...
• understand what's required of you
• start to plan your time as a thesis student
Aims of 4th-year Thesis

- allow you to "put together" what you've learned
- give you experience in tackling a sizeable project
- give you exposure to research/implementation topics
- require you to practice planning/time-management
- give you experience in formal report writing and presentation
Overview of Thesis (as-a-whole)

- find a topic (do this now)
- do background research, make plan (S1, weeks 1-7)
- seminar presentation (project overview + plan) (S1, week 7)
  - follow-up on feedback, start work on solution ...
- report (literature review + plan) (due S1, week 12)
  - keep working on solution, evaluate results ...
- final presentation/demonstration (S2, week 11)
- thesis (project + evaluation) (due S2, week 13)
Deliverables in Thesis A

Thesis Seminar Presentation (during Week 7) (30%):

- a 30 minute presentation about your Thesis A topic and the plan
- organise the time/date with School Office

Thesis A Written Report (Week 12) (70%)

- Literature review + design and implementation plan of your thesis
- Use the template provided (thesis course web site)

Thesis Seminar Attendance Sheet (during Week 7):

- Attend 4 (four) seminar presentations of other Thesis A students.
- Submit the attendance sheet with signatures
- No mark, but a requirement for passing Thesis A.
Deliverables in Thesis B

**Thesis Demonstration/Presentation** (During Week 11) (20%):

- a 30 minute presentation about the final outcome of your thesis.
- Organise the time/date yourself with supervisor+assessor

**Final Thesis Report** (Week 13) (80%)

- This is “the thesis” (i.e., should read like a whole piece by itself)

**Thesis Summary/Abstract** (Week 13):

- you are required to submit 150-word summary of your thesis (besides the report).
Thesis Showcase

S2 Week 13 Thursday 5.30pm

Students with good demo results will be invited

- poster/demonstration sessions.
- guests: year 2/3 students, staff members, industry sponsors, postgrad students
- food (not pizza)

Need to submit a poster (extra work), but worthy event to participate
Thesis Part A:

ThesisASeminar = mark out of 3
ThesisAReport = mark out of 7
ThesisAMarkSupervisor = ThesisAReport + ThesisASeminar
ThesisAMark = (ThesisAMarkSupervisor+ThesisAMarkAssessor) / 2
ThesisAGrade = SY, if ThesisAMark >= 5; UN, otherwise

Thesis Part B:

ThesisBDemo = mark out of 20
ThesisBReport = mark out of 80
ThesisBMarkSupervisor = ThesisBDemo + ThesisBReport
ThesisBMarkAssessor = ThesisBDemo + ThesisBReport
ThesisBMark = (SupervisorMark+AssessorMark) / 2

Final Grade:

FinalMark = ThesisBMark*0.9 + ThesisAMark
FinalGrade = HD|DN|CR|PS|FL, determined by FinalMark
FAQ

• Q: How long should X be? (X ∈ Chapter, Report, Seminar, Thesis)
  • A: As long as is necessary to make it convincing.
• Q: When is Y due? (Y ∈ Report, Seminar, Thesis)
  • A: Check the thesis course home page.
  • A: Help fellow Thesis A students out through the course forum for any ‘how to’/‘where to’ questions …
• Q: How much time should I spend on my Thesis?
  • A: Notionally, 150 hours per 6UoC - roughly 10-12 hours a week. But, generally, the more time you spend, the better the outcome
FAQ

• Q: What happens if I can't finish?
  
  • A: You get less marks than you would if you finished. (The definition of "finished" is looser for thesis than assignment)

• Q: Can I get an extension?

• A: as per usual special consideration procedure

• A: If Thesis A is missing, you get AF. If late, zero (0)

• A: If Thesis B is late, you suffer heavy late penalties (5 marks per day off the thesis report mark).
FAQ

• Q: What must I do to get good marks?
  • A: Depends on who you're asking ...
    • Supervisor: knows everything you did. May assess based on continuous performance
    • Assessor: (most likely) sees only Seminar, Demo, Thesis. Likely to assess based on what she/he observes in S/D/T
    • To be safe: ask what they're looking for in a good thesis
Why a Thesis is not an Assignment

• A thesis is significantly different from an assignment:
  • it is, typically, open-ended
    • there is not an obvious "correct" answer or end-point
    • you have more say in the direction the work takes
  • it has a much longer time-frame
    • you need more self-discipline to get things done
    • you have more responsibility to plan your progress
• If you're still in "assignment mode", break the task into 2-week-long steps and treat each one as an assignment (but, alas, no late penalty if you slack off).
Different Types of Theses

- Theses have been classified into:
  - **RES** carry out a small focused piece of research
  - **DEV** build a software and/or hardware system
  - **R&D** combination of the above two ... build a system, but needs research to get it done
- Expectations for each type are slightly different
Research in Computing

• Writing a piece of software, no matter how complex, isn't generally regarded as research in itself.

• However, it would be considered research if

  • it uses a new method/algorithmdata structure

  • it solves a problem not previously solved by computer (e.g., new framework/platform)

  • it applies a solution from one area to solve problems in another area

  • the new solution must be demonstrably better than earlier approaches
Research in Computing

• Evaluation of computing research:
  • solves existing problem more effectively than before
  • solves a wider range of problems than before (generalises)
• Demonstrations of effectiveness follow two tracks ...
  • Theoretical, e.g. analyse complexity, prove upper/lower bounds, ...
  • Experimental, e.g. build prototype; measure performance on range of data ...

• Make sure that you have a good conversation with your supervisor about this ...
Development in Computing

• Aim is to build a system to meet a demand or solve a problem.

• May involve developing software, hardware, or a combination.

• The goal is clearly to build the system, but you must also:
  • follow a (software) engineering methodology (+ document it)
  • provide a demonstration that the system works effectively
  • note any unsolved problems and limitations
Doing Thesis A

• Thesis A aims for you to demonstrate that ...
  • you have a thorough understanding of the topic
  • you have identified an area that requires work
• you have an approach for solving the problem
• you have a plan to demonstrate the likely effectiveness of this approach
• you have a plan for carrying out the work (including time-frames for tasks)
Doing Thesis A

• Specific tasks for Thesis A ...
  • accumulate a collection of references that
    • discuss issues related to the problem being addressed
    • describe attempts by others at solving the problem
  • describe/analyse the problem (aided by references)
  • for DEV theses: produce detailed requirements/spec
  • establish an evaluation framework; analyse prior work
    • consider Ethics Clearance
  • draw up a plan for work to solve the problem
  • start work on solving the problem
Doing Thesis A

- Suggested timetable for Thesis A work:
- Weeks  Task
- 1-3    Meet your supervisor, and sort out what your project is
- 2-10   Collect and read relevant literature
- 2-10   Make notes on your reading
- 4-7    Prepare seminar presentation (Seminar)
- 4-8    Prepare/revise your method and plan
- 4-11   Write the report
- 12     Report
- ASAP   Start working on solution
The seminar aims to:

- give you a chance to practice your presentation skills
- let you show that you have met the goals of Thesis A
  - convince others that you're studying an important/interesting problem
  - demonstrate that you've done some research/thinking about it already
  - have a plan for the rest of the year to solve the problem
- If you already have some results to show, that's a bonus.
- Target your seminar at fellow thesis students (general audience)
- Target the hard-core technical stuff at your supervisor and assessor.
Thesis A Seminar

• Typical Seminar Structure
  • Introduction: sell the topic, summarise aims
  • Background: set context, evaluate previous work
  • Proposal/Plan: how do you plan to tackle the problem
  • Bibliography: give references for all work cited

• Seminar = summary of Report, publicity for project, chance to get feedback
Thesis A Seminar

- 45 minute timeslot is allocated for each presentation:
  - 25 mins talk, 5-10 mins Q+A with audience
  - 10-15 mins debrief with supervisor/assessor
- Take it seriously ... you're being assessed.
- Use max 20 slides; you cannot cover more in 25 mins.
- Pay attention to questions - good source of feedback/ideas
- Attend other people's seminars (requirement).
  - you might get some ideas for your own project
  - they get a chance to present to an audience
Typical Thesis A Structure:

- Introduction: sell the topic, summarise aims (1-2 pages)
- Background: set context, evaluate previous work (4-6 pages)
- Proposal/Plan: how do you plan to tackle the problem (with justification based on ideas in Background) (6-8 pages)
- Bibliography: give references for all work cited (1-2 pages)

"set context" = define/examine problem in detail, set out evaluation framework
Academic Writing Style

• Thesis/report both have overall structure:
  • Introduction ... what the thesis is about
  • Main Part ... the details of the work
  • Conclusion ... what the thesis achieved
• Individual chapters should follow a similar structure:
  • Introduction ... what this chapter is about
  • Main Part ... the details of the chapter
  • Summary ... what the chapter achieved
• May sound repetitive but it provides linkage and rationale for the reader.
• Use the thesis template provided (LaTeX and Word)
Academic Writing Style

• UNSW Student Resources (+ many other university online resources)

• A few common (easy) tips that you can immediately use:
  • Try to be “formal”, “technical”, “impersonal”
    • Using “I” ?
    • Don’t, Isn’t ?
    • “a bit”, “not enough”?
    • “wonderful”, “beautiful”, “terrible”, “hopeless”, “useless”, “amazing”, etc.
  • Introduce and define “terms” properly before start using them
  • Introduce acronym properly when first used
    • e.g., The University of New South Wales (UNSW) is …
  • Use caution: This may cause, or There is evidence to support that … vs. I think this must cause
  • Use Active Voice whenever possible
Doing the Literature Review

• Goals:
  • collect a comprehensive set of publications on the topic
  • build a picture of the nature and scope of the problem
  • develop a framework for evaluating possible solutions
  • analyse the specific work described in the publications

• How comprehensive? (a.k.a. how many references?)
  • until you are convinced that you have all relevant material
  • some topics may require: one main ref + one general ref
  • other topics may have dozens of relevant publications
  • use your judgement when to stop (and ask supervisor)
Doing the Literature Review

• Some tips ...
  
  • try to identify seminal papers on the topic (ask Supervisor)
  
  • use bibliographies to find prior work
  
  • use Citation Index to find subsequent work (e.g. Google Scholar)
  
  • maintain a database using a bibliography tool (e.g. Mendeley)
  
  • read and think about the references
  
  • keep electronic notes; describe in your own words
  
  • identify common themes, structures and assumptions
Using the References

• What you should NOT do with references:
  • copy/paste chunks of text from them into your report
  • if you do this, it's plagiarism and you fail

• Every statement in your thesis which is based on others' work
  • must be attributed to them (via a reference)
  • even if you make the statement entirely in your own words
  • but especially if you are "quoting" them (minimise this)
Using the References

M-trees do not assist Z queries. Even if the Z queries conform to the normal pattern of querying expected in this context, the algorithmic complexity is still too high

• Examples of acceptable use of others' material:
  • and Smith [8] noted "M-trees do not assist Z queries".
  • and (Smith, 1998) noted "M-trees do not assist Z queries".
  • ... and as was pointed out by Smith [8]:
The Bibliography

• The bibliography
  • consists of a list of all of references used in the report
  • with enough detail that a reader could find each reference
  • It should not be simply a list of URLs.
• For each reference, there must be:
  • an author, a title, a date
  • information to identify publication source
  • BibTeX has well-defined styles for different kinds of references.
Example: BibTeX and reference for a journal article:

@Article{ dapd2004,  
title = {Query Size Estimation for Joins using Systematic Sampling},  
author = {Anne Ngu and Banchong Harangsri and John Shepherd},  
journal = {Distributed and Parallel Databases: An International Journal},  
year = {2004},  
volume = {15},  
number = {3},  
pages = {237--275},  
}

which produces:

The Bibliography

Example: BibTeX and reference for a web page:

```latex
@misc{postgresql,
  author = "PostgreSQL Global Development Group",
  title = "PostgreSQL: The world's most advanced open source database",
  howpublished = "http://www.postgresql.org/",
  note = "Accessed: 7 March 2008",
}
```

which produces:

Last Words

• Use Thesis Course Web Site

• Start as soon as possible

• Contact your supervisor ASAP

• Successful Thesis A —> successful Thesis B

• Be positive and enthusiastic. It’s your thesis.