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

Final Grade

Thesis Part A:

```
ThesisASeminar = mark out of 3
ThesisAReport = mark out of 7
ThesisAMarkSupervisor = ThesisAReport + ThesisASeminar
ThesisAMarkAssessor = 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/algorithm/data 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

Thesis A Seminar

- 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

Thesis A Report

- 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.

The Bibliography

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:

Anne Ngu, Banchong Harangsri, and John Shepherd. Query size estimation for joins using systematic sampling. Distributed and Parallel Databases: An International Journal, 15(3):237-275, 2004.

The Bibliography

Example: BibTeX and reference for a web page:

```
@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:

PostgreSQL Global Development Group. PostgreSQL: The world's most advanced open source database. http://www.postgresql.org/. Accessed: 7 March 2008.

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.