School of Computing and Information Systems
The University of Melbourne

Guide to Master of Computer Science Research Projects

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1 Introduction

This guide is for students completing a 100 point research project as part of their Master of Computer Science (MCS),via the subjects COMP90078–COMP90081. It contains information on conducting your research project, preparing your final report, assessment of your research project, and related topics.

2 The Research Plan

2.1 Scheduling Your Project

The default schedule for the MCS 100pt research project for full-time students is over two consecutive semesters in your second year of study, taking COMP90078 and COMP90079 concurrently in the first semester and COMP90080 and COMP90081 concurrently in the second semester. For part-time students, the project would be completed over four consecutive semesters, taking one subject per semester.

Before commencing your project, you will typically have completed 100 points of coursework subjects in your first year of study (or first two years for part-time students). Alternative schedules (eg, mixing full-time and part-time) may be possible by exception and should be discussed with your prospective supervisor.

2.2 Choosing a Project and a Supervisor

In choosing a project, your first step should be to look at the areas of interest of the research groups in CIS. On the CIS website you can find descriptions of the research groups and their interests, as well as links to the home pages of individual academics. The CIS projects website (`https://apps2.eng.unimelb.edu.au/cis-projects/`) provides a list of available projects and supervisors.

After considering this information, you should approach one or more academics in the school who may be willing to supervise your project. Generally, this will be someone with a research interest or some background in a topic area that you are interested in. Some academics may suggest research topics (as listed on the CIS projects website), while others are happy for students to design their own topics. In that case, you should write a brief (at most two-page) description of your proposed project, and have it approved by the supervisor. Project descriptions must include a project title, a description of the research topic and the approach to be taken, and discussion of what is expected to be achieved. It is best to discuss the proposal directly with the intended supervisor well before the beginning of the semester of study and obtain their agreement. No proposal will be accepted without the agreement of the intended supervisor.

Remember that the supervisor needs to choose you as well as you choosing the supervisor. When you speak to a supervisor about working with them, be prepared to discuss the possible project in depth by doing some previous reading. We strongly recommend that you approach several supervisors prior to making a final choice; it is usual to be discussing alternative projects with several supervisors at the same time.

Before the beginning of your first semester, your project will need to be registered on the CIS projects website (`https://apps2.eng.unimelb.edu.au/cis-projects/`). At this stage,

- *If you have not yet identified an academic who has agreed to be your supervisor*, you should use this system to register your interest in (up to five) projects and upload supporting documents (for example, a CV, transcript and statement of research interest) to enable potential supervisors to evaluate your suitability for their project. Supervisors will then select students to allocate to their projects. Note that, at this point, you may be selected by any of the supervisors you nominate—if you wish to work on a specific project, you should get in touch with that supervisor directly.
- *If you have already identified a staff member who has agreed to be your supervisor*, you may or may not see the project you have discussed listed here. Some supervisors who have already identified students for their projects may choose not to display them for application. If you **do** see your project listed, please indicate your interest as above, and also let your prospective supervisor know you have done so. If you **do not** see your project listed, please communicate with your supervisor to let them know that you are still interested and ask them to allocate you to their project.

2.3 Performance Expectations

A 100 point research project is a substantial undertaking and you should, early on in your project, negotiate with your supervisor how you are going to demonstrate ongoing progress; for example, via meetings, meeting summaries, deliverable drafts, etc.

Your work is assessed at three points during your project:

Research Proposal (worth 30%)

A 6,000 word report detailing:

- your research aims and objectives,
- your research plan, and
- a detailed review of relevant literature.

The research proposal is due in week 8 / 16 for full-time / part-time students respectively. This is a **hurdle requirement** meaning that it **must** be completed successfully before continuing to COMP90080 and COMP90081. For guidance to the structure of a research proposal, the following website may be helpful: `https://students.unimelb.edu.au/academic-skills/explore-our-resources/graduate-research/writing-a-research-proposal`.

Your proposal should include:

- a title page, including your name and student ID, the name(s) of your supervisor(s), and **word count**
- the main text
- a list of references

Oral Presentation (worth 5%)

A 15 minute work in progress presentation outlining the problem you are addressing, the general approach you are taking, work completed to date, and future plans. The oral presentation will take place at the end of the semester in which you complete COMP90079 (Part 2). A detailed schedule for presentations will be released toward the end of each semester.

In preparing your presentation, think about the higher level issues and how to make the presentation interesting to a general computer science audience. You should also be prepared to answer questions from the audience.

Final Thesis (worth 65%)

A final thesis of approximately 25,000–30,000 words detailing your research aims and objectives, approach, findings, interpretation and conclusion. Your thesis may incorporate material previously submitted as part of your research proposal for this project. The final thesis should be submitted on A4 size paper with one-and-a -half line spacing and a font size of 11 or 12 point.

Your thesis should include:

- a title page, including your name and student ID, and the name(s) of your supervisor(s)
- an abstract (approximately 200–300 words)
- a signed and dated declaration (see wording below)
- any acknowledgements if appropriate
- a table of contents
- a list of tables
- a list of figures
- the main text
- a list of references
- any appendices, if required

Declaration: I certify that:

- this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person where due reference is not made in the text.
- where necessary I have received clearance for this research from the University's Ethics Committee (Approval Number .....) and have submitted all required data to the School.
- the thesis is ..... words in length (excluding text in images, table, bibliographies and appendices).

The final report is due in the first week of exam period in the semester in which you complete COMP90081 (Part 4). For advice on style and structure, we recommend *How to Write a Better Minor Thesis*, by Paul Gruba and Justin Zobel (Springer 2017). The book is freely available as an e-book through the University of Melbourne Library.

2.4 Milestones

A research project typically has several core milestones that should be met. While the structure of individual projects may vary, a typical project may include:

- Choosing a project and identifying a supervisor
- Identifying a research problem
- Conducting a literature review of relevant prior work on the problem
- Establishing a research question based on the literature review
- *Research proposal*
- Investigation and development of methods
- *Oral presentation*
- Data collection, experimentation or analysis
- Analysis and interpretation of data and results
- Write up of final report
- *Final report*

3 Assessment

3.1 Examination

Your research proposal, oral presentation and final thesis will be assessed by at least two independent examiners (ie, who were not involved in supervision of your project). The final mark for the thesis component will be determined by a Board of Coursework Thesis Examination in discussion with the examiners.

3.2 Extension Policy and Late Submission Penalties

Extensions will only be granted based on presentation of a medical certificate or other formal documentation (eg, recognition of Special Consideration by the University). Unless you have been granted an extension by your project co-ordinator (Jey Han Lau), you are expected to submit your thesis by the due date. Late submissions without an official extension will accrue a penalty of 10% per day (or part thereof) late.

3.3 Assessment Criteria — Research Proposal

Examiners are asked to score the proposal on three criteria:

- Organisation of proposal and clarity of expression
- Research aim, objectives, and plan

Table 1: Assessment Criteria for a Research Proposal

criterion	low 0%–64%	medium 65%–74%	high 75%–100%
Organisation of proposal and clarity of expression	Difficult to read throughout. Important material frequently missing. Little to be gained from reading the proposal.	Some defects, including completeness, structural oddities or difficult passages. Perhaps difficult to read.	Up to the standard expected of a good conference paper or technical report. Well organised. Pleasant to read.
Research aim, objectives, and plan	Aim unclear. Research objectives missing or poorly specified. Plan insufficient to judge feasibility.	Some defects. Aim and/or objectives unclear. Plan lacks some detail of tasks and timing.	Research aim and objectives clearly specified and coherent. Detailed and feasible plan provided.
Review of the relevant literature	Student is unclear on the issues at hand and the review is very patchy.	Gaps. Lacking in detail. Superficial discussion. Questionable that the student understands the area well.	Thorough lit review including important papers. Demonstrating a good understanding of the literature.

- Review of the relevant literature

Examiners are asked to provide a mark and accompanying comments for each of the criteria as well as an overall mark for this component. Each of the criteria are weighted evenly.

Table 1 provides a rubric that characterises the differences between a low, medium, or high mark for each of the three criteria.

3.4 Assessment Criteria — Oral Presentation

Examiners are asked to score the oral presentation on three criteria:

- Structure, flow and argument (60% of mark), including:
  - research question addressed, explanation and justification of importance/interest
  - choice and justification of appropriate method
  - progression of argument throughout talk
- Materials (20% of mark), including effective use of visual resources
- Presentation technique (20% of mark), including:
  - clarity of communicating talk structure
  - engagement with audience, answering of questions

Note that the audience, including examiners, may well not be experts in the specific area of your research. Therefore, it is important to pitch your presentation to be accessible to a broad computer science audience.

3.5 Assessment Criteria — Final Report

Examiners are asked to score the final report on six criteria:

- Organisation of Thesis and Clarity of Expression
- Grasp of the problem and review of the relevant literature
- Research method (including data collection and analysis where relevant)
- Presentation of results
- Conclusion and suggestions for future work
- Contribution

Examiners are asked to provide a mark and accompanying comments for each of the criteria as well as an overall mark for this component. However, the most important aspect of a research project is the degree to which it adds knowledge to the field. Thus it is expected that Contribution, Research Method and Grasp of the Problem will be more significant in contributing to the mark for the final report.

Assessment is based on the submitted document(s) only. Additional efforts that are not recorded in the final report will not be considered.

Table 2 provides a rubric that characterises the differences between a low, medium, or high mark for each of the six criteria.

3.6 Overview of Marks

Having derived a mark for the thesis, examiners check that the mark accords with the descriptions below.

95–100% Truly outstanding in every way. In an entire academic career such a student may be encountered only once or twice. The student would be welcome as a PhD candidate in the School and would be expected to succeed with a hands-off supervision style.

90–94% Excellent in every way. Publishable with only minor revisions. In an entire academic career such a student may be encountered a handful of times. The student would be welcome as a PhD candidate in the School and would be expected to succeed with moderate support.

85–89% Excellent in many respects. Such students may be in the minority but should be frequently encountered in a typical academic's life. The student would be welcome as a PhD candidate in the School and would be expected to succeed with a hands-on supervision style.

80–84% The student should succeed as a PhD candidate but would need supervisory support. For an H1 the student needs to demonstrate an ability to undertake high quality research. They should have a good to exceptional grasp of the relevant literature, have articulated why and

Table 2: Assessment Criteria for a Final Report

criterion	low 0%–64%	medium 65%–74%	high 75%–100%
Organisation of thesis and clarity of expression	Difficult to read throughout. Important material frequently missing. Little to be gained from reading the proposal.	Some defects, including completeness, structural oddities or difficult passages. Perhaps difficult to read.	Up to the standard expected of a good conference paper or technical report. Well organised. Pleasant to read.
Grasp of the problem and review of the relevant literature	Student is unclear on the issues at hand and the review is very patchy.	Gaps. Lacking in detail. Superficial discussion. Questionable that the student understands the area well.	Thorough lit review including important papers. Demonstrating a good understanding of the literature.
Research method (including data collection and analysis where relevant)	Not described or inappropriate method used or poor execution of method.	Appropriate methodology used but some problems with its execution.	Well designed and executed. Demonstrates understanding of research methodology.
Presentation of results	Incomplete, meaningless or missing.	Results are adequately described but not placed in a broader context nor critiqued.	Critical presentation of the results. Places the results in a broader context.
Conclusion and suggestions for future work	Poor or no analysis of outcomes. Poor or no analysis of strengths and weaknesses presented. No extensions to work proposed.	Adequate analysis of outcomes. Some analysis of strengths and weaknesses presented. Modest or no extensions to work proposed.	Detailed analysis of the outcomes. Understands both strengths and weaknesses of the findings. Proposes extensions to the work.
Contribution	Without merit.	Adequate response to the research question. Unlikely to be of interest to others. Lacks novelty or significance.	Novel, of interest to others and possibly significant.

how they have undertaken the research, and have presented and analysed the results clearly and with insight.

75–79% For an H2A the report is very good but has some significant shortcomings also (perhaps missing but important references or poor presentation of results). With substantial rewriting and possibly some extra work the report may be publishable. The student is unlikely to be immediately capable at a PhD.

70–74% The report is good but has significant shortcomings also. The report may indicate interesting directions but contains nothing of significance in itself. The student has not demonstrated an aptitude for research and significant involvement from supervisors is likely. However, an H2B thesis would not usually be of interest to others in the field and would not usually contain publishable material. Furthermore, an H2B performance does not demonstrate an aptitude for research.

65–69% The report is good in one or two respects only and has significant shortcomings in other areas. The student is not suited to research.

<65% The thesis is of very poor standard for post-graduate research and would suggest that the student is not able to pursue further research. This thesis is complete, but sloppily designed and executed. It has unclear or inaccurate results, with little demonstration of their relevance. It is difficult to read. Important topics omitted. The bibliography has major gaps and is only discussed superficially.

4 Roles and Responsibilities for Student and Supervisor

A research project is a significant undertaking and the interaction of student and supervisor is an important component of the research process. That interaction can be greatly facilitated if both the student and the supervisor have a clear understanding of their respective roles and responsibilities. It is good to agree on those expectations up-front at the commencement of the supervisory relationship. Some things to discuss include frequency and format of meetings, preparation required before meetings, degree of direction to be given by the supervisor, frequency of submission of intermediate writing, timing of turn around on feedback. There are no right or wrong answers to these issues but it is vital that all concerned are clear of what to expect at the start of the process.

4.1 The Integrity of a Research Thesis

The integrity of the thesis rests on it being the student's work; therefore, supervision should be supportive but also at arm's length. It is neither ethical nor reasonable for the supervisor to conduct the research or write the report. Therefore, the student should have no expectation that the supervisor will overly assist with the work. In particular:

- The supervisor must not specify the research question. The supervisor may propose a project description; however, the student specifies the research question. The supervisor should provide guidance and feedback, but the task of articulating the research problem is the student's.
- The supervisor must not collect or analyse the data.

- The supervisor must not write or heavily edit the thesis. The University of Melbourne PhD Handbook defines editing as 'the detailed and extensive correction of problems in writing style and of mechanical inaccuracy (as opposed to giving general guidelines about problems)'. Just as with a PhD, this is not acceptable supervision practice during Masters. Although the supervisor should provide commentary on writing style and presentation, it is not the supervisor's task to write the thesis, or any part thereof.

4.2 Roles and Responsibilities of the Student

The student should initiate many of the activities in the supervision of a research project, in particular the administration activities. Responsibilities of the student include:

- Selecting a research topic
- Informing the course Coordinator of the topics selected
- Preparing a research proposal
- Maintaining progress as documented in the research proposal
- Negotiating alterations to the research proposal with the supervisor
- Meeting regularly with the supervisor (it is advisable to maintain a diary entry that summarises each meeting – email this to your supervisor after each meeting)
- Raising any issues or problems with the supervisor at an early date
- Ensuring that the writing style and presentation of the thesis is appropriate
- Reporting on progress to supervisor at the end of each semester

4.3 Roles and Responsibilities of the Supervisor

The supervisor should meet regularly with the student and provide assistance and monitor progress. Responsibilities of the supervisor include:

- Negotiating a suitable research topic with the student
- Assisting the student to prepare the research proposal
- Guiding the student to appropriate reference material
- Checking that the work contained in the research proposal looks feasible and appropriate
- Meeting regularly with the student
- Informing the course Coordinator if the student fails to attend scheduled meetings without reason
- Checking for writing style and presentation problems
- Acting as an examiner for Masters theses
- Where appropriate, encouraging the student to publish their research.
- Monitor progress of student for each semester

4.4 Difficulties Relating to the Student/Supervisor Relationship

The majority of student/supervisor relationships are supportive and rewarding, for both parties. Difficulties may arise from time to time, and these difficulties can interfere with progress. It is important that any issues are resolved respectfully and quickly - there is no time to waste in a relatively short research project! If either the student or the supervisor has concerns that they are unable to

resolve within supervision, they should discuss these with the degree co-ordinator who will aim to assist in moving the situation forward. If this proves unsatisfactory, then the matter should be discussed with the Head of School.

5 Ethics Application (where relevant)

Discuss with your supervisor whether an ethics application is required. Ethics approval is more commonly required in Information Systems related projects than in Computer Science projects, but each project needs to be individually evaluated.

Students engaged in any research requiring human subjects (e.g. case studies with interviews, experiments, surveys) must apply for ethics approval before a project can proceed. It is best to embark on the ethics approval process as soon as possible so data gathering can proceed swiftly.

The Engineering Human Ethics Advisory Group (EHEAG) is the committee which overviews ethical issues, reviews all ethics applications and approves minimal risk applications within the Faculty of Engineering and Information Technology (FEIT). All non-minimal risk applications (medium to very high risk) are reviewed by the EHEAG, and then referred to one of the University's Human Ethics Sub-Committees (HESC).

6 Academic Honesty and Plagiarism

We expect all students to work to the highest academic standards of honesty and integrity. In many cases you will be submitting assignments where other students in your classes are dealing with similar or the same questions and which are similar to questions asked in previous years. Students are expected to submit individual original work, in no way "borrowed" from other students or the Internet.

The ideas and words in a research report must be the student's own. Ideas or words taken from another source must be explicitly credited to its original author. Using the words or ideas of another as if they were one's own is plagiarism and is considered to be academic misconduct. This issue is taken very seriously by the university.

Research reports should discuss other work related to the student's own, presenting the ideas of others who have previously studied similar topics. However, it must be clear to the reader which ideas were developed by others and must cite their sources each time they are presented. Any quotes taken from other works must be clearly shown to be quotes, and must cite their sources.

The School does not have any prescribed citation style (check with your supervisor for acceptable styles). The citation style must be used consistently throughout the thesis. Students must familiarise themselves with the university's policies on academic honesty and plagiarism. These are available from the university's web page (`http://academichonesty.unimelb.edu.au/`).

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