



THE UNIVERSITY OF
MELBOURNE

School of Computing and Information Systems

Guide to Research Projects

1 Introduction

Congratulations on choosing a research project in the School of Computing and Information Systems. You are embarking on an exciting journey with world-class researchers. Some of the Masters level courses available in CIS have a compulsory research project, others have an optional project. Whichever course you are enrolled in, make sure you have put in the groundwork to choose a project and a supervisor who suits your research interests. Research is a challenging exercise, but careful planning will ensure that you are doing a project that engages you and makes the task satisfying and rewarding.

Research Projects can be attempted in the following courses:

Master of Information Technology

25pt compulsory research project

Stream coordinators:

- Computing: Artem Polyvyanyy, artem.polyvyanyy@unimelb.edu.au
- Distributed Computing: Eduardo Oliveira, eduardo.oliveira@unimelb.edu.au
- AI: Kris Ehinger, kris.ehinger@unimelb.edu.au
- Cybersecurity: Toby Murray, toby.murray@unimelb.edu.au
- HCI: Jorge Goncalves, jorge.goncalves@unimelb.edu.au
- Spatial: Stephan Winter, winter@unimelb.edu.au

Subject coordinator for COMP90005, COMP90019, COMP90028, COMP90030 and COMP90055:

- Rao Kotagiri kotagiri@unimelb.edu.au, Nir Lipovetzky nir.lipovetzky@unimelb.edu.au (semester 1),
- Peter Schachte - schachte@unimelb.edu.au, Atif Ahmad atif@unimelb.edu.au (semester 2)

Subject coordinator for INFO90008 – INFO90009:

- Melissa Rogerson, melissa.rogerson@unimelb.edu.au

Subject coordinator for INFO90010:

- Gil Tidhar gtidhar@unimelb.edu.au

Subject coordinator for GEOM90043:

- Stephan Winter, winter@unimelb.edu.au

Master of Information Systems

25pt or 50pt optional research project

Degree coordinator: Sean Maynard, ph: 8344 1528, MIS-HELP@unimelb.edu.au

Health stream coordinator: Kathleen Gray, kgray@unimelb.edu.au

Subject coordinator for ISYS90100 – ISYS90110: Abel Armas, abel.armas@unimelb.edu.au

Subject coordinator for ISYS90079: Kathleen Gray, kgray@unimelb.edu.au

Master of Science/Computer Science

75 point compulsory research project.

Degree coordinator: Nic Geard, ph: 9305 6216, nicholas.geard@unimelb.edu.au

Subject coordinator for COMP90060 – COMP90071: Nic Geard

2 Scope of this Guide

This guide is for students in the degrees listed above, with two exceptions. If you are (1) in the MIT HCI stream or (2) in the MIS Health stream, more specific guides are available from the Stream Coordinators, Vas Kostakos and Kathleen Gray.

An LMS Learning Community has been created for all CIS project students outside of the two streams just mentioned. The name of the Learning Community is “CIS Master Research Projects”. This guide applies to all students who are enrolled in that Learning Community.

This guide is applicable for conventional research projects. If you are enrolled in a 25pt project in MIT and wish to do a software development project, consult the separate document *Capstone Project: Software Development Project Assessment Guidelines*. All documents mentioned here are available via links in the “CIS Master Research Projects SM2” Learning Community.

At commencement of your project, you need to discuss and agree with your supervisor whether your project is a conventional research project, or a software development project.

If you are enrolled in GEOM90043, please note the slightly different assessment statement – contact the Stream Coordinator, Stephan Winter, if you have queries specific to this subject.

3 The Research Plan

Whatever degree you are enrolled in, you need to carefully plan your research project.

3.1 Distributing Your Workload

Depending on the size of the project you are doing, a Masters level research project can be completed in one semester or spread over a number of semesters. You can use various subject combinations to decide how you might combine your research work with coursework. Think carefully about your distribution of workload by evaluating any constraints that may exist in your project design. For example, will you have sufficient time to obtain ethics clearance and to arrange interviews with subjects. It is often preferable to spread a project over more than one semester to allow for delays in any of these areas.

3.2 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, or Geomatics. On the CIS and Geomatics websites you can find descriptions of the research groups and their interests. If you are interested in a particular project you can contact the academic indicated. If you are interested in the general research group, email the contact person for the group.

You will need to approach an academic 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, while others would prefer for students to design their own topics. 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 his or her 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 him/her, 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.

Once the supervisor has approved your proposal, make sure you have their confirmation by email. In Week 1 you will be pointed to an online “project registration form” which you must complete, providing us with the details of your project. If you are doing a multi-semester project, you still need to complete the form each semester; it is a hurdle requirement. The information in the form enables us to schedule oral presentations etc, and it allows your degree coordinator to check that your project is relevant to your degree or specialisation.

3.3 Information, the LMS, and project registration

General information about projects and sample projects is available on the webpage

http://people.eng.unimelb.edu.au/nlipovetzky/research_projects/cisresearchprojects.html

Enrolment in the LMS Learning Community is automatic. We use it for communication across all the relevant project subjects. During the semester it will be used to keep you informed about milestones for your thesis, request any required information on project details and facilitate final submission of thesis. Please be responsive to announcements and information requests from this Community. It will be operating from the start of the semester, and it will have a link to the project registration form.

3.4 Performance Expectations

Regardless of how the research project is structured (e.g. over one semester, two semesters, or more), it is essential that progress be demonstrated for each semester. This would typically include all or some of:

- mid-semester progress report
- end of semester progress report (for semesters where student is not completing).

These reports are hurdle requirements and should be taken seriously. *The format of reports should be negotiated with your supervisor.*

Proposal Report (hurdle requirement)

The project proposal should include a literature review, problem statement and methodology for investigating the problem. *You should submit this to your supervisor* as vehicle for discussion about your progress and ask them for their feedback.

If it is a one semester project then the proposal report is due by 5pm on Friday of the 2nd teaching week. Submit it to your supervisor.

If it is a multi-semester project beginning in this Semester, then the proposal report is due by 5pm on Friday of the 4th teaching week. Submit it to your supervisor.

See the useful guide "Writing a Research Proposal - A guide for Science and Engineering students": http://services.unimelb.edu.au/__data/assets/pdf_file/0006/471273/Writing_a_research_proposal_Science_Engineering_Update_051112.pdf

Oral Presentation (worth 10%)

The oral presentation will describe the findings and contribution. Do not be concerned if you have not completed your project before the oral presentation is delivered. The focus of the presentation should be on higher level issues, such as the problem description, motivation and general approach.

All projects will require one final presentation in the completing semester.

Presentations will be scheduled in the final week of semester. A detailed schedule will be released nearer the time.

Students will be informed of their presentation date with adequate notice and will be expected to present at the allocated time.

Presentation Format

The presentation should contain some visual material and can be produced using Powerpoint or similar software.

Final presentations should last 10 minutes with 2-3 minutes for audience questions.

In preparing your presentation, think about the higher level issues and how to make the presentation interesting to your audience. There are many excellent resources freely available on how to present well - use these!

Final Report (worth 90%)

Word lengths and expected contents for theses are described in section 4 of this document.

The thesis submission deadline is 10am on the first day of the Examination period. You will be expected to submit a PDF of your thesis. Detailed instructions for submission will be publicised via this Community nearer the date.

3.5 Milestones

If your project spans more than one semester, your supervisor will expect to see a written report summarising work produced during the semester. In addition, core milestones for each semester need to be met. A research project typically has several core milestones, as determined between you and your supervisor. These include:

- Choosing a supervisor and identifying a project
- Project proposal
- Conducting a literature review of relevant prior work on the problem
- Establishing a research question based on the literature review
- Investigation and study design – which may include ethics application
- Data collection and/or advanced algorithms
- Analysis
- Final write up of report

4 The Format of the Report

4.1 Length

The following length suggestions *are indicative* only. What is important is that the final thesis includes all the required elements in the structure below and tells a coherent and conclusive story with a clear contribution.

The length of the research project report will depend on the size of the project

- a 12.5 pt thesis: The written work should be approximately 5,000 words in length
- a 25 pt thesis: The written work should be approximately 6,000-8000 words in length
- a 50 pt thesis: The written work should be approximately 12,000-16,000 words in length
- a 75 pt thesis: The written work should be approximately 18,000-25,000 words in length

4.2 Structure

The thesis should be on A4 size paper with one-and-a-half line spacing. The font size should be 11 or 12 point. The thesis should include:

- A title page
- An abstract of approximately 200 words
- A signed and dated declaration with the following statement:

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).

- Any acknowledgements if appropriate
- A table of contents
- A list of tables
- A list of figures
- The main text
- A list of references
- Appendices

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 Library.

5 Assessment

5.1 Examination

Each thesis will be assessed by at least two examiners (at least one of which is not a supervisor).

The final score for the thesis is negotiated by the examiners involved. If there is lack of agreement, the thesis will go to an additional examiner.

5.2 Extension Policy and Late Submission Penalties

Extensions will only be granted based on presentation of a medical certificate or other formal documentation. Unless you have been granted an extension by your subject co-ordinator (Harald Sondergaard, Nic Geard, Vas Kostakos, Charlotte Pierce or Stephan Winter), 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.

For example, suppose a thesis is marked out of 100 marks. Then if submitted 6 hours late, a penalty of 10 marks will be applied, if submitted 36 hours late, a penalty of 20 marks will be applied, if submitted 50 hours late a penalty of 30 marks will be applied, etc.

5.3 Assessment Criteria

Examiners are asked to score the thesis 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 allocate an overall mark for the thesis and comments with respect to each of the criteria. Examiners should reflect on how they achieved the final mark from the perspective of the six criteria. 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 final mark for the thesis.

Assessment is based on the submitted document only. Additional efforts that are not recorded in the thesis will not be considered.

Below is a rubric that characterises the differences between a low, medium, or high mark for each of the six criteria.

	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 thesis.	Some defects, including completeness, structural oddities or difficult passages. Perhaps difficult to read.	Up to the standard expected of a good conference paper or business 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.

5.4 Overview of Score

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 from. 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 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.

6 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.

6.1 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 arms 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.

6.2 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
- Copying, binding and submission of the thesis as outlined above.
- Reporting on progress to supervisor at the end of each semester

6.3 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

6.4 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.

7 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.

7.1 Ethics Approval for the Research Project

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 Melbourne School of Engineering (MSE). 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).

7.2 The Terms of Reference

The terms of reference of EHEAG are:

- To examine and assess proposals which involve the use of humans as participants in the research of staff and students of the School of Engineering, and to advise the Human Research Ethics Committee (HREC) and its Sub-Committees on whether the proposals comply with the ethical guidelines adopted by the University and the Human Research Ethics Committee;
- To ensure that proper arrangements are made in accordance with University and HREC policy for security and disposal of confidential data collected in the course of research;
- To keep appropriate records for audit and compliance purposes.

8 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/>)