

COMP9991 Research Project A
Course outline

School of Computer Science and Engineering
The University of New South Wales
Sydney, Australia

1 Requisites

All conditions below must be met at the time when the application is made.

1. Be enrolled in program 8543 Master of Information Technology.
2. Be (possibly partly thanks to advanced standing) credited with 66 units of credit.
3. Have a WAM of 75 or higher.
4. Not have failed any course.
5. Have agreement from a CSE or Data61 academic supervisor.
6. Have written a project description.

2 Learning outcomes

On successful completion of this course, graduates will be able to demonstrate the following learning outcomes.

1. Be able to carry out a literature survey on a specified research problem.
2. Be able to plan a research project (under supervision).
3. Be able to present one's work via a live presentation.
4. Be able to conduct research (under supervision).

3 Course aims

This course aims for students to commence study on a research topic mutually agreed with a CSE academic supervisor. By the end of the term, they need to

1. present a review of the topic, including current approaches,
2. offer a plan for future work, and
3. have made some progress towards carrying out that plan.

4 Assessment

A seminar should be held at the earliest in week 9 of session, and at the latest at a date that makes it possible for supervisor and assessor to communicate the outcome to the course convenor or to student services by

- for Term 1, May 25
- for Term 2, September 7
- for Term 3, January 24

The seminar will be attended by at least the supervisor and the assessor. It is strongly advisable to advertise the seminar to the research students in the School (via email sent to research-students@cse.unsw.edu.au) to

- give a chance to every PhD and Master by research student who is interested in the topic to find out more,
- make sure that maximal feedback is received,
- practice giving presentations to a larger audience.

Supervisor and assessor will not only provide feedback on the progress and plan, but also determine which of COMP9992 or COMP9993 is most appropriate in the following term, taking into account student wishes and administrative constraints.

An EC grading scheme is used. A mark is awarded at the end of COMP9992 or COMP9993 (provided that supervisor and assessor agree that student can enrol in one or the other in the following term), and includes assessment of work done in both terms, including a mark for COMP9991.

Still, students who do not provide an adequate plan for the project by the end of term will NOT be allowed to continue to COMP9992 or COMP9993 and must repeat COMP9991.

5 Details on the Project description

Your application should include a precise and detailed research proposal, that will on average require 1 or 2 pages of text, possibly including diagrams. The length of the proposal is not of paramount importance. What is essential is that it be very clearly and very precisely formulated. Here are the key points that your proposal should address.

- What problem will you tackle? Is the research theoretical, practical, or does it mix theory and implementation?
  - If the research is theoretical, then you are expected to express in a suitable theoretical framework significant statements, whose proofs are nontrivial and properly written. An example of such a result would be the precise description of a new algorithm that solves a given problem, a statement on the running time complexity of the algorithm, and a nontrivial proof that justifies that statement. For the work to be significant, the underlying problem should be known to be important, and the algorithm should have advantages over existing ones, being either more efficient, or no less efficient but markedly more elegant, or simpler.
  - If the research is practical, then you are expected to deliver a stable, well designed, well tested implementation of a system that could be released as beta software. As this is a research project, there should be challenges to solve before you can proceed with the implementation. For instance, you might have to modify some data structures or algorithms in a nontrivial way to perform some crucial computations. For the work to be significant, it should be known that there is a community of potential users who would be keen to try your system to address some of the needs they have, and your implementation should have advantages over existing ones, being more powerful, or more user-friendly.
  - If the research mixes theory and implementation, then you would typically improve an algorithm that is known to have important practical use, and accordingly modify an existing implementation, or implement a prototype. The modifications to the algorithm would not by themselves be substantial enough and the proof of correctness of the algorithm, or the proof that is has such and such complexity, would not be difficult enough to result in a successful theoretical research project. Also, the implementation would not be challenging enough to result in a successful practical research project. But taken together, theoretical results and implementation would require substantial work and validate the interest of the approach.
- It is definitely not enough to use existing techniques on a given problem and determine which one performs better on the basis of experimental results. Though this kind activity could be part of a research project, it would not be enough to fully qualify the work as research, whereas you are expected to complete a full fledged, comprehensive piece of research. Hence it is essential to pitch the difficulty of the project at the right level, neither too easy nor too challenging, and make sure that you will have to demonstrate enough creativity, inventiveness, cleverness, rigour, knowledge, and more, but within the limits of what you can achieve in at most 9 months of work.
- Why is the problem you want to tackle significant, what tells you it is an important problem?
- What are the limitations of the current approaches, what do you claim your re- search will bring to the current state of the art?
- What do you expect your research to deliver, in terms of theoretical results or implementation? By its very nature, research is unpredictable, and the outcome of your research might be significantly different to what you had envisioned. What will be evaluated is the outcome itself, and not whether the outcome matches what you had envisioned. But it is important when you write your proposal to have views on what are the significant and achievable aims that will first guide your research.
- What are the fundamental features of your approach? Successful research usually starts with one or two very good ideas, that appear as promising and fruitful. You should be able to express these ideas as clearly and precisely as possible, so that interested readers can appreciate their potential. Writing a good research proposal is essential to put your research project on the right footing. The exercise will help you considerably in getting a clear picture of the work that lies ahead. It is likely that you will have to go through a number of drafts, discussing each of them with your supervisor, before you write and submit the final version. If your research proposal is not good enough, then the Postgraduate Coursework Academic Advisor will not approve your application. If your application is successful, then an assessor will be assigned to the project, who together with your supervisor, will eventually evaluate your work and assign a final mark.