

CS908 Research Methods

Developing a Research Proposal

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A Reminder

- Your project counts for a large part of your degree

Department of Computer Science

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CS907 Dissertation Project (CSA) and CS913 Dissertation Project (DA)

The dissertation is intended to give students the opportunity to consolidate the knowledge that they have acquired during the taught component of the MSc, and to undertake a research led project. Students are expected to carry out a significant development exercise, either in the form of a research project or a knowledge transfer project that is applying recent research and the advanced topics taught in the course. The project will require strong project management skills, problem-solving abilities, and self directed study. Although not a requirement, there is scope for industrial involvement in dissertation projects, and this is encouraged. The dissertation also provides opportunity for interdisciplinary work, again building on the the modules taught earlier in the course, and will require students to demonstrate a mature knowledge of computer science and its applications.

The organiser for this module is Dr Alex Tiskin, to whom all queries concerning the organisation of MSc dissertations should be addressed. For any matter to do with the content of a particular project, students should see their supervisor.

MSc dissertations contain the following components:

- Registration: establishing a subject area, and supervisor.
- Proposal: assessed as part of CS908 Research Methods. See CS908 website for [further details](#). Most students follow through on their proposal in their dissertation – however, please note that it is not allowed to duplicate any coursework submission.
- Presentation: 20-25 min (including questions), counts for 5% of the total module mark.
- Interim report: 4,000 words limit, counts for 15% of the total module mark. The interim report should not repeat the proposal, but rather outline the progress of the project so far, feedback received, any changes to the project's objectives or methods, and plans for the rest of the project.
- Final dissertation report: 20,000 words limit, counts for 80% of the total module mark. The final report must contain an "ordered, critical and reasoned exposition", and be "clearly and concisely written, show evidence of originality in knowledge and in interpretation".

Project Roadmap

- The weeks ahead are critical to your dissertation
 - Project selection / negotiation
 - Supervisor relationship
 - Research planning and initiation

What Should You Do?

- Consider your interests in computer science
 - Interesting topics you've encountered?
 - Research areas you're familiar with?
 - Project ideas that appeal to you?
- Talk about your ideas with academics in computer science

Project? What Project!?

- Research proposal due on

Thursday 15 Feb 12 noon (week 6 of Term 2)

- You'll need to have a good idea about the project you're taking on before you can write a good research proposal
- Explore about different research interests in the department

Department of Computer Science

- Roughly 35 active research staff across 3 research divisions

Methodologies and Applications

Areas of interest include: Computational Neuroscience; Bioimage Analysis; Digital Forensics; Multimedia Processing and Computer Vision; Intelligent and Adaptive Systems; Machine Learning and Biomedical Text Mining.

Systems and Software

Areas of interest include: High Performance and Scientific Computing; Parallel and Distributed Computing; Communication Networks and Data Science; Software Tools; Fault Tolerant and Reliable Systems.

Theory and Foundations

Areas of interest include: Automata Theory, Model Checking, Verification, and Controller Synthesis; Algorithm Design and Analysis; Sublinear Algorithms and Combinatorics; Approximation, Online Algorithms and Constrained Optimisation.

- Interests in a variety of areas within each research group

Foundations of Computer Science

- Strengths in many topics of theoretical computer science, including the Algorithm Design and Analysis, Complexity Theory, Logic, Automata and Formal Verification
- Understanding fundamental problems arising in computer science, often to design mathematical tools and better algorithms to address these problems
- Affiliated with the [Centre for Discrete Mathematics and its Applications \(DIMAP\)](#)

Performance Computing and Visualisation

- Innovating at the intersection of computer science theory and application in order to deliver technology across established research fields
 - High Performance and Scientific Computing
 - Business and Internet Computing
 - Fault Tolerant and Reliable Systems
 - Intelligent and Distributed Systems
 - Multimedia and Image Processing
 - Digital Forensics

Intelligent and Adaptive Systems

- Explore and develop software technologies, applied in areas such as the social and semantic web, education and human-computer integration
 - Educational Technology
 - Empirical Modelling
 - Personalisation and Adaptation
- A tradition in research projects involving the development of software tools and alternative perspectives on established research issues, particularly at the postgraduate level

Computational Biology and Bioimaging

- Interests in the application of computer science to neuroscience, cell dynamics, biological networks, and bio-image analysis, synthetic biology
- Active research in computational hormone control, obesity, movement control, learning, odour recognition, proteomics and applied medical science
- Involved in the Warwick Systems Biology Centre and Molecular Analytical Science CDT

Your Own Research Ideas

- You don't have to rely on the ideas of academic staff as a starting point for your project
- Staff are always happy to support you in developing your own research ideas and even developing a wider agenda
 - Have you encountered a research topic you are interested in?
- You may find that your ideas fit well with ongoing research

External Research Ideas

- Encouraged - provided the focus is on research
- Consultation with your supervisor is essential

I Do / Don't Know Which Project

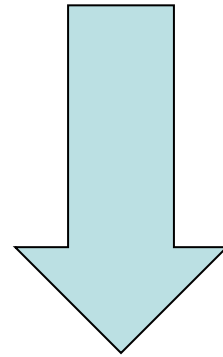
- Don't panic!
- Developing a successful research project is a process
- Keep reading, talking and thinking about your interests

The Next Steps

- Once you have a good idea or bunch of ideas, it's important to talk with potential supervisors
 - Are they interested?
 - Feasibility?
 - Framing your research ideas?

What Happens Then?

- Once you have agreed on a project or some specific area then you should begin to see how the content of CS908 fits with a real research project




Research proposal

Developing a research proposal

- **Content, focus, scope and relationship to a research project**

Your Research Proposal - Purpose

- Demonstrate research planning 
 - Providing content for the project you are undertaking
 - Identifying the main aims of your research project
 - Demonstrating an understanding of important existing research
 - Discussing your proposed approach to achieving aims
 - Outlining project considerations - timeline, constraints etc...
 - Convincing your reader of your understanding

Your Research Proposal - Content

- Detailed report
- Self-contained sections
- Comprehensible to a peer outside the research field
- More on specific structure later

Your Research Proposal - Focus

- What you have done and what you intend to do
 - Both are required for a compelling research proposal
- Clearly focus on research questions you have identified

Your Research Proposal - Scope

- Not necessarily a deeply technical document
- More than an executive summary of what you intend to do
- Often best to limit to **background**, your **research questions** and **project aims**, your understanding of **related work**, the **processes** you may use and aspects of **research planning**

Your Research Proposal - Fit

- After reading your proposal your reader should:
 - **Appreciate the nature of the project you're proposing and be convinced of its potential success**
 - Understand enough of the context and existing research you have described to assess the significance of your aims
 - Have an idea of the means by which your aims will be realised
 - Be confident in your research planning, particularly with respect to your timeline, milestones, constraints and risk management

Your Research Proposal - Possible Structure

1. Introduction - Background, Aims, Problem Statement...
2. Related Work / Existing Research
3. Research Processes
4. Project Management - Timeline, Constraints, Risk...
5. Progress
6. Conclusion

The Research Process

- Remember that you're framing the research process
 1. Define a research question
 2. Gather information
 3. Form a hypothesis
 4. Test the hypothesis
 5. Analyse test data
 6. Draw conclusions
 7. Publish results
 8. Re-test

Marking of a Research Proposal

- Deadline: week 6 of Term 2 (submit a .pdf via Tabula and a hard copy)
- It will be marked by me and your supervisor. Marks will be moderated by the third person.
- Technical content: 70%
- Presentation of your written work: 30%
- Marking criteria: see Your Research Proposal - Fit slide
- The word limit is not specified. Recommendation to aim for 8-10 pages.

Your Research Proposal - Helpful Tips

- Your supervisor will use this document to see whether the project is making good progress or heading for disaster
 - Be clear and concise in your writing
 - Be honest and upfront about the work you have done
- Your research proposal will help when writing your dissertation
 - Start early, think carefully and focus on research issues
- Use what you've learned in CS908

Your Research Proposal - Problems?

- If you think you may have a problem with the development of your proposal you should speak to your supervisor, or personal tutor if you don't have one yet, immediately
- The issues we have covered are general, it'll be important to learn more about the requirements of the area in which you'll be working
 - Your supervisor, peers and other academics can help here