

Department of Computer Science

Project Guidelines for MSc in Advanced Methods in Computer Science

1 Introduction

The project component of the Advanced MSc takes approximately five months of the allotted twelve and carries half the weight of the taught component of the course. The project can be seen as the culmination of the degree - it gives you a chance to demonstrate what you have learned in the taught part of the course and to produce original and publishable work. This document explains what is expected of you, what help you can expect from your supervisor and how projects will be assessed.

There are many different kinds of project that students can undertake. Some projects present a strong theoretical development, while others show excellence and insight in designing and carrying out an empirical study; yet others engineer an artefact. Some projects will show aspects of all of these.

The project is probably the most demanding task that you have to undertake. It is very different from the taught courses. Although you will have a supervisor, you are on your own to a greater extent. The onus is on you to define the project boundaries, to review relevant literature, to devise the methods of investigation, to carry out the investigation, to assess your findings and to report your work in a scholarly manner. You will be introduced to many of these aspects during the Research Methods module. To be successful you will need to plan, estimate and manage your time and energy. The rest you will have to learn as you go along. You have to pass both the written exams and the project to be awarded an MSc. You have to get a distinction in both the exams and the project to get a distinction.

The project is intended to assess your ability to pursue an investigation in a systematic and scholarly manner, to produce original work on your own and on time. It tests your ability and determination to overcome unforeseen problems within the constraints of limited time and resources. Equally important, it tests your ability to communicate concepts both orally and in writing. You will be required to produce various documents to given deadlines throughout the duration of the project. You will be required to give an oral presentation (and where appropriate a demonstration) of your project at a prescribed place and time. If you miss deadlines through bad planning, you will be severely penalised for it.

2 Supervision

A project can be proposed in any area of your specialisation (module). Industrially and commercially proposed topics are welcome but you must find a member of academic staff who agrees to supervise you. You should have **regular weekly meetings of between half an hour and an hour** with your supervisor. You should regard your supervisor as a colleague to

whom you can turn for advice. He or she will represent you at the examiners meeting and will speak up for you if they believe you have been unfairly treated.

Normally, your supervisor will have some interest in the area you have selected for your project. It is your responsibility to find such a supervisor. Supervisors will not be required to take on a disproportionate number of supervisees. Because of great competition in some subject areas there can be no guarantee that you get the supervisor of your choice. **Students will be assigned a supervisor if they fail to find one themselves.** The project topic will be chosen and a suitable supervisor identified as part of the Research Methods module.

With your supervisor, you will agree the topic and terms of reference of the project. **You must choose a topic that will exercise and extend the knowledge you gained on the Advanced MSc.** If you attempt a project that is too ambitious it will need to be reduced in scope. If you attempt a project that is too easy, you are likely to fail because the project is not at MSc level. You should therefore choose a topic that allows for some flexibility; there should be features that you can leave out if you find yourself short of time and features that you can add if everything goes well.

You can if necessary consult other members of staff, or anyone else, who may be able to advise you on your project.

It is not possible to produce a successful project with a period of massive "activity" immediately before the deadline as you may be tempted (but ill advised) to attempt on taught courses. You must work **consistently throughout the duration of the project.** The report should be written incrementally as each stage of the project is undertaken.

To keep within the deadlines you will have to make regular progress and account for where your time has been spent. To help you to do this you are required to record your activity in a weekly log. The log is a weekly record of work you have engaged in to meet your objectives. You should start the log straight away and include records of meetings with your supervisor. You should meet with your supervisor once a week taking your log and interim reports along to review progress. The complete log will form an appendix to your final report.

3 Required Documents

All work must be original and your own. Where you use ideas, structure or text from other sources you must always fully reference this in your report. You are required to produce four documents, on or before specified deadlines, as part of the project. The *project specification* is a short document; the *Interim report* is the first significant output, produced about one-third of the way through the project; the *Draft report* is required one month before the end of the project, followed by the *Final report*. (See below for a detailed description of these documents.)

Assessment (see section 4) will be based largely on the final report, and on your presentation/demonstration. If you have not produced any long documents before, or you are out of practice, it will take time to acquire skill at report writing. Build up your documents and your skill throughout the project. How long does it take you to produce ten pages of prose that you are proud of? How much redrafting must you do if you are to meet the deadlines? If you don't know, find out by documenting aspects of the project *as soon as possible*.

Managing your time so as to keep to the deadlines is very important. You must anticipate printer breakdowns due to overload. You must anticipate that everyone else will be *stupid* enough to leave their printing till the very last moment. This will cause large print queues and cause you to lose valuable marks, even if you initiate printing before the deadline. **BE WARNED, DO NOT LEAVE PRINTING TILL THE FINAL DAY.** If everyone co-operates, the printers will be relatively free for last-minute one-page corrections. A good strategy is to keep different chapters in different files so that they can be printed separately.

3.1 Project Proposal

The purpose of the project proposal is to link supervisor, student and topic. You should send an e-mail to the project coordinator, Mounia Lalmas, before the deadline, stating:

- Your name
- Your supervisor's name
- A provisional title for your project
- A short (i.e. a few paragraphs) description of your proposed project, including a statement of the main aims and objectives

3.2 Project Specification Document

This will provide the following information:

- Student's name
- Project title
- Supervisor's name and dated signature
- Topic proposer and list of people from whom you have sought or expect to seek advice
- List of other students doing or have done (in previous years) related projects (if applicable)
- What is the problem you propose to investigate? How will solving it advance and develop the skills and knowledge you have acquired on the MSc courses? What previous research are you aware of that is relevant?
- Aims and Objectives – aims are what you hope to achieve and objectives are the specific steps to be reached in your attempt to reach your aims
- Resources required (it is your responsibility to make sure that the resources you need are available)
- Interim log, indicating meetings with supervisor and prospective supervisors and material consulted so far.

This document must be signed by your supervisor and handed in at the Departmental Office by the deadline. **The Project Specification Document will be assessed as part of the Research Methods module.** In addition, you will be asked to present your specification as part of the Research Methods module. This will involve a 10-minute presentation, followed by 5 minutes' questions from your examiners.

3.3 Interim Report

The report should include:

- Literature Review

This is an important part of your project. You must review the research that has gone on relevant to your area of investigation. You must assess that research and draw out its strengths and weaknesses in an original and scholarly manner. The review should lead you to refine your line of investigation, justify the approach you take and provide a sound basis for your reasoning about the problem under investigation.

- The research problem

Having reviewed the research you should be in a position to discuss what is the research problem you propose to address, what previous research has contributed to that problem, what remains a research challenge and what it is you can address in your research. This should form a succinct specification of the scope of your project, and must be well reasoned and presented.

- Method of investigation

This is to provide you with a sense of direction. It specifies the objectives of the project (refer to your proposal) and the method of investigation, taking account of the time available and with reference to your review of the literature. You should discuss how and why this method of investigation is the appropriate one to take and how well it will enable you to address the research questions. The detail of the method of investigation should then be presented with a rationale. You should relate the content of this section to the material covered in the Research Methods module.

- Project Plan

This consists of a breakdown of the work to be done into phases, tasks and other activities, with estimates of the time needed to complete the work. It will specify interdependencies of tasks, critical work elements and schedule. PERT and Gantt charts are appropriate ways to display this information. One of the tasks should be writing the draft report.

This document should be handed in by the specified deadline at the Departmental Office.

3.4 Draft Report

This report should be a full draft of the complete report. An outline of the structure is described in Section 3.4. The precise contents of this document should be agreed with your supervisor. It should represent the expected final state of your project. The project plan and weekly log will form appendices to the report. This document should be handed in by the specified deadline at the Departmental Office.

Your supervisor will read this draft and suggest improvements that you can incorporate in the final report. Your supervisor is only obliged to read one draft. In order that your supervisor can comment usefully on the draft report it should be as **complete as possible**. You should be able to work single-mindedly revising your draft during the last few weeks, but be aware that supervisors often take their holidays in July or August and so you will be more than usually on your own in this period.

3.5 Final Report

TWO copies of the final report are required. Each copy should be word-processed and spell-checked. The text of an MSc thesis should normally be **no more than 75 sides excluding appendices and references**. Program listings should not be printed but included on floppy or zip disks and bound in a pocket as part of the appendix. Reports must be laser printed, double sided, on A4 paper and bound with the covers provided by the Departmental Office. They must also be included on the floppy or zip disks. The Department will bind your report for you.

BEWARE: Plagiarism, the presenting of other people's work as your own, is a serious offence tantamount to theft. It will be severely penalised. Text, diagrams, programs, ideas, data, methods and structure or any other aspect of their work that are copied must be duly and fully acknowledged and referenced to their rightful source at the point of their use.

The report should contain the following sections:

- A title page, to be the first page of the report. A template is available for downloading from the project web page. No alternative layout is acceptable. This is to maintain uniformity of presentation of all Departmental reports.
- Acknowledgements - this will usually include your supervisor(s), other students if part of a related project, and any other person or organisation that has assisted in any way in the conduct of the project and its documentation.
- Summary - no more than a one-page precis of your report.
- Contents list **with page numbers**. (MS Word and Latex have features for constructing contents lists automatically.)
- Introduction - this should give the motivation for the investigation. The aims of the project should be stated. This chapter should also explain the structure of the report.
- Body of report - The body will usually occupy several chapters. It must include a literature review and a detailed discussion. Depending on the nature of the project, it may also include an appropriate combination of:
 - hypotheses and theoretical development
 - empirical studies (including method, results and discussion)
 - an account of the design and implementation of the system (software/hardware)
 - an evaluation of your design, methodology, theory.(not necessarily in this order).

- Conclusion - Consideration of the implications and meaning of your results. It should also contain suggestions for future work, or alternative approaches/forms of investigation that, with hindsight, might have led to an improved investigation. This is often the weakest part of a dissertation. It must relate the findings of your work to previous work (from the literature review). Show to what extent you have gone beyond previous work, what contributions you have made, and what are the limitations of your work.
- References - these must be given correctly. Full references in alphabetical order are required as in the references to this document¹.
- Appendices:
 - System and user manuals (if appropriate)
 - The project plan in the form of PERT or Gantt charts
 - Weekly log
 - Report and program code **on disk**
 - Data, materials used (if appropriate)

Both the report **and** code (if there is any) **must** be included on 3.5" floppy disks or zip disks, one disk per copy of the report, which is contained in a pocket of the appendix. **The files must be readable using standard applications and machines in our department** (ideally MS Word for the report; simple text files for the code; Linux/NT binaries). If in doubt, consult your project supervisor. Do not provide the code as hard copy.

You are advised to refer to the material presented in the technical writing section of the Research Methods module for guidance in presenting your report. The IEE has also published a booklet [IEE, 1989b] on technical report writing that lists ten laws which contribute to a good report. This booklet will be obtainable from the Department Office.

3.6 Viva and demonstration

Verbal communication is an important part of your education. The viva (oral presentation and examination) is an opportunity to convey the fact that your work is interesting, novel and carefully thought-out; and it is an opportunity to give your perspective on your work and what your investigation has to offer. The viva and demonstration should last no more than 30 mins. You are advised to refer to the lecture on presentation skills that formed part of the Research Methods module. Further ideas on how to give a successful oral presentation are given in the booklet [IEE, 1989a], copies of which will be obtainable from the Department Office.

4 Method of Assessment

Each project will be marked on the basis of the written report and viva and demonstration. It will be marked by two independent internal examiners, neither of whom will be your supervisor. You are advised to refer to the lecture on presentation skills that formed part of

¹References in the text should take the form:

. . . Rogerson [1989] explains what it takes to produce a successful project. . . .

the Research Methods module. Further ideas on how to give a successful oral presentation are given in the booklet [IEE, 1989a], copies of which will be obtainable from the Department Office.

Deadlines are to be taken seriously and we enforce them. **Late work will be penalised at the rate of 5% per day or part-day.** Remember: *Everything takes twice as long as you think it will!* No excuses will be accepted. It is your responsibility to backup any files pertaining to your project. Hard disks do crash. The departmental file systems become full so that when you attempt to save the work you have just spent eight hours editing, without saving, the editor can crash. Loss of work through faulty disk drives, loss of the only disk or hard copy or poor use of editors is not an acceptable excuse. It is bad engineering practice to rely on a single copy.

The following are the aspects of your project which examiners take into account:

- Researched knowledge and originality
- Theoretical / empirical / engineering competence
- Quality of report (argumentation / structure / English usage)
- Presentation skills in viva and demonstration
- Your ability to reflect and reason about your work

Examiners assign an overall mark and submit a written report on your project. The examiners' report covers:

- a statement of the main contributions and their strengths
- any weak or incorrect points
- thoroughness of background research
- quality of presentation, including any concerns about the writing, structure or clarity of the report
- any doubts as to whether the work was the student's own.

The examiners' reports provide an account of why they have given the mark that they have, in terms of the relative strengths and weaknesses of the particular project. The overall mark is not a simple function of performance in the four assessment categories above. For example, even if you have performed impeccably in the first two technical categories, and have given an excellent viva and demonstration, a poorly written project report may cause it to fail.

If you cannot express yourself well, you will not be able to convince the examiners that you have demonstrated research ability or analysed the design alternatives. **Examiners will deduct marks for poor English.** Use a spelling checker; ask a friend with good English to check your grammar.

PLAGIARISM in any form will be severely dealt with. The College can expel a student and disallow a degree if plagiarism is discovered.

After each examiner has independently arrived at a mark and submitted a report we check that the marks are sufficiently close and ask your supervisor if they consider the marks to be reasonable. If so, the average mark will be taken. In cases of disagreement your supervisor will arbitrate with the examiners and if necessary ask for a third examiner's opinion. External examiners may be asked to look at projects of students on borderlines.

The final mark is interpreted as a distinction (70% or above), pass (50 – 69%) or fail (below 50%).

5 Final Remarks

The project requires a tremendous amount of self-discipline, time and effort. But it is exciting because a successful project rewards with a tremendous amount of satisfaction. It requires the amalgamation of different kinds of skills: problem solving, studying and communication both written and spoken. It stretches your ability to limits you never thought possible. It gives something you can talk about knowledgeably and with excitement to employers. Projects are a great opportunity for you to demonstrate your creative abilities and independence.

As well as counting for one third of your MSc degree, the project is seen as an excellent indicator of a student's overall ability to carry out a serious piece of work, and consequently employers are likely to be impressed by such competence. The following is a typical job advertisement, which appeared on the *jobs* bulletin board:

Computers Unlimited have immediate vacancies for one or two talented CS students to join their development team. Suitable applicants will:

- be qualified to Masters level or above;
- have an extensive knowledge of;
- take pride in delivering high quality work;
- be willing to take responsibility and show initiative;
- have good communication skills.

(The name has been changed to protect the innocent.) The project presents some measure of the last three requirements. Your project will give you a topic of conversation at your job interview, as well as an opportunity to impress prospective employers.

6 References and Bibliography

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IEE (1989a), *Handbook for Speakers*, IEE Professional Brief

IEE (1989b), *Technical Report Writing*, IEE Professional Brief

Rogerson S (1989), *Project Skills Handbook*, Chartwell-Bratt

Simon HA (1981) *The Sciences of the Artificial* (2nd ed), MIT Press