



School of Computer Science

MSc Study Guide



MSc STUDY GUIDE

INTRODUCTION

The aim of the MSc is to provide a level of core knowledge, to practise skills necessary for the application of that knowledge and to develop intellectual abilities. You will attend lectures, tutorials, workshops and supervised laboratory classes. However, the volume of material to be covered is substantial, and you will need to make the most of your time if you are to gain the maximum value from your studies. You will have successfully achieved the aims of your earlier studies, whether as part of a formal education programme or less formally as part of your employment. We will not, therefore, attempt to teach you to “suck eggs”; the notes that follow are intended as a reminder of the basic time management needs, to help you focus on learning, and a summary of the very few requirements of the University, as they apply to the completion and presentation of your academic work.

WHERE TO STUDY

Your ability to make effective use of study time depends on your learning environment, and on the way you organise your study. Every person has a unique set of ideal conditions for concentration, but you will at least need to ensure that the level of distractions is kept to a minimum. You may find that this is best achieved by working within the School or perhaps your concentration will be better when you work at home. Most people will adopt a mixture of the two, finding the opportunity for interaction with other students helpful at times and distracting at others.

PLANNING

Planning is necessary to ensure that you make the best use of your time, and that you keep time aside for your family, friends and other interests. Study takes a great deal of time and motivation, but it does not mean that you should become a hermit!

Some people find that it helps to produce a weekly planning chart. The times listed on the chart should reflect your waking habits, so “morning people” may want an earlier start to the planned day than “evening people”; the best times of day for study differ from person to person.

If you are studying part-time, you should first of all block out periods at work and travelling to work, then mark in time for the various things you want, or have, to do - hobbies, time with the children, chores etc. If you are studying full-time, you should note all the formal contact sessions with the University and any other fixed commitments such as planned trips home. With the available time remaining, you should now plan your studies, bearing in mind the expected workload. Again, workloads will vary between individuals, so when you first see course material you will need to make an assessment of the time you will require. Don't forget that the amount of material provided is not necessarily a clear indication of workload; if reading lists are short, you will probably need to spend more time on research, recall, learning and just plain thinking!

People generally have periods of effective learning, interspersed with less efficient activities. The learning curve tends to show a significant dip in the middle of any period of study. This dip can be minimised by planning to spend periods of 20 - 25 minutes studying at a time, with breaks of 2 - 3 minutes scheduled within them. These short periods of learning are most efficient because they:

- ensure that you are rested at the start of each block of work;
- allow the brain to sort information out during a break, enhancing recall;
- ensure that dips in recall are the minimum;
- provide several peaks of recall, rather than just two.

However, you must beware of the temptation to start something new during the break, as it is often all too easy to find a reason to avoid returning to your studies. You should also make it a habit quickly to review the previous period's work at the start of each new study session.

MANAGING YOUR STUDIES

Managing your studies implies both time planning, as described above, and planning the subjects and material to be studied. Clearly, the time and place available for study may dictate what you do; for example, it may be more appropriate to *read* in the bath than to write a report!

Planning the topics to be studied requires not just choosing to study a general subject area, but also formulating specific goals for each planned period. The goal should be realistic and achievable, and also relevant. Setting yourself goals which cannot be achieved will quickly lead to a loss of morale, while easy goals will give a false impression of progress.

Your goals will also help you to deal with difficult subjects, or those you dislike. For example, you may set yourself targets in subjects you dislike, to be completed before moving on to subjects you enjoy. However, you should vary the order of topics, to avoid leaving the same subject until you are tired, when learning is therefore reduced.

Planning your studies also means selecting an appropriate approach to the subject matter. There are two principles which hold for all subjects:

- In general, focusing on general ideas rather than specific facts makes it easier to recall the facts, which support the ideas;
- Probably the most important rule for learning is to keep up to date; if you fall behind, it will be very difficult to catch up because a large backlog is more daunting, and most subjects rely on building on previous concepts; because of this it becomes more difficult to understand the subject matter if you have not managed to keep up.

You should, early on in your programme of study, devise a system for organising your material and your learning environment. If things are always in the same place, you will not waste time looking for the dictionary or for a pencil. Similarly, you may find it useful to build your notes up according to subject area, particularly when a syllabus covers a wide variety of topics; this helps to relate concepts to different areas of study, as well as making cross references easier. "Flags" attached to papers can make it easier to find key definitions, references and explanations more quickly.

READING

Since much of your learning material will be in written form (textbooks, learned papers and supporting papers), it is important to develop the skill of reading effectively. Effective reading implies understanding, and this presumes that you understand the layout, read actively (not passively) and retain an interest in what you are reading. “Word recognition” is often not enough to be able to understand the points an author is making; jargon, assumptions and disbelief can all serve to confound understanding!

The Open University recommends the “SQ3R” approach to reading effectively, where the acronym stands for Survey, Question, Read, Recall and Review.

- **Survey.** You should not read the intended material straight through - you will remember and understand little. A few minutes browsing will be time well spent, reading headings, looking at pictures and their captions, etc. Think about why they may have been included, and how they relate to the structure of the overall work. Take careful note of any graphs, tables or diagrams. Read any introduction, and the summary if there is one. This survey will give you a good idea of what is included, before you study the content in detail.
- **Question.** Formulate questions about what you are going to read. It is often useful to turn headings into several questions (*Why should I ask questions? Where will I find the answers?*) and make a note if it helps. The answers to questions formulated from headings should be found in the appropriate section; the purpose of the questions is in part to stimulate interest, and also to provide a goal for the activity of reading.
- **Read.** Only now should you read the text. In reading, you should not only recognise the words but seek answers to your questions. Make a mental note of the main points, especially those which answer questions you had not formulated. Most paragraphs are structured round one “topic” sentence which contains the main idea of the paragraph. This could be anywhere in the paragraph, but is often either the first or last sentence.
- **Recall.** After reading the selected passage of text, put the book or paper down and try to recall the main points, and the answers to the questions you set yourself. Now is a good time to put the main points into writing, both to force you to think of them and to provide a permanent record, for revision purposes. Re-reading the topic sentences may help to confirm that your recall is correct. If you cannot remember, you should re-read the whole passage or section, and try to recall it. You should repeat the steps (“SQ2R”) for all the material you previewed in the step, before going on to the final step, “Review”.
- **Review.** When you have either read all the material previewed, or come to the end of the available or planned time, stop and review all the material you have read, not just the last chunk. This helps to consolidate learning. If you have accurate notes from earlier steps, you will be able to check the accuracy of your review without returning to the source material.

You will undoubtedly find that even the methodical approach to reading suggested above does not always lead to understanding; we have all had that dreadful experience where we understand as individual words all those that are written down,

but cannot start to fathom the meaning of the whole thing! When this happens, the following may help:

- See if the author's framework of ideas suggests a logical development that aids understanding. The use of headings sometimes suggests the framework.
- Look for important details such as proofs and examples, which support the main ideas.
- Consider whether diagrams and illustrations help to make the ideas clearer.
- Search your own experience for examples, and see if these, and your own words, help.
- Consider whether the new material conflicts with, or enhances, the material you have already studied.
- If after trying all these you still have difficulty in understanding, take a break. Try to discuss your difficulties with another student, or with a member of the academic staff.

If all else fails, feel free to disagree with an author! Critically assess his arguments, logic and supporting evidence, and challenge his assumptions. Consider whether another explanation might fit the evidence, and test alternate theories against both the author's evidence, and your own experience. See whether other references offer alternative explanations, or even provide criticism of what you are reading; many journals have a series of papers and articles which start with an initial paper based on some premise, and followed up by rebuttals, further evidence, literature reviews etc.

RESEARCH

Before embarking on your search for information, you should be clear what it is you are trying to find, and why you need it. If you need some vital piece of information, you should be able to get it somehow! However, it is also possible to get bogged down in the wealth of information available, and you should remember the law of diminishing returns.

There are a great many sources of information to supplement what is provided as formal course material. At the level of a masters degree, you will be expected to supplement your reading with individual research, and elements of the degree programme have little or no formal study material provided (for example, the final project). Factual information is usually available in reference books. This will include definitions, and subject dictionaries are more likely to be up to date than general language dictionaries. Handbooks are often the best source of factual data, such as physical properties or programming language syntax.

General background information is often available in a subject encyclopaedia. These frequently supplement basic information with series of references, though these are often somewhat out of date. More detailed information is often available in a review article, often in a professional journal.

The internet may be a good source of information, particularly where enthusiasts have compiled subject area bibliographies. However, the quality of material available is tremendously variable, and should be reviewed critically before you use it. Many

noted contributors to subject areas do use the internet for prepublication peer review of proposed papers, and these can be particularly useful. You will soon learn which are the most profitable sites.

Often the best source of information is libraries - public, university or specialist. Libraries have one major advantage over alternative sources of information – librarians! They can save you an enormous amount of time and trouble, because they know their way round the shelves and the catalogues. They also develop their own personal knowledge and can refer to other searches in helping you. Librarians will also be able to give you an up to date list of organisations relevant to your area of research, as well as publications.

Well organised research should involve most of the following activities:

- **Clarify your aims.** You should understand what it is you need to know in order to develop your ideas or support your arguments, as well as identifying gaps in your knowledge.
- **Set limits.** You should set realistic limits to bound your searching. This will depend on how detailed is the information you need, as well as how important it is to the work. You may want to search for only recent information on the topic. Above all, however, you should set yourself a time limit.
- **Conduct an introductory survey.** This is a high level search, using encyclopaedias, bibliographies and books, from which you should note down useful sounding references, relevant organisations and important sounding authors. Note down also key words and phrases, for a subsequent more detailed search.
- **Find detailed information.** You should determine which sources you intend to use, and prioritise them. Priorities should be based on factors such as accessibility (*where are they – local library? your own bookshelf?*), broad subject areas and the type of information you need. Start with the most recent *cumulative* source, such as an annual volume, then consider the most recent issues and work back. Look at the contents, indexes and any instructions for use; using abstracts is an art, and, again, if you get into difficulties ask a librarian for help.
- **Feedback.** Critically review your research, to ensure that it is on the right lines.
- **Document your search.** Note where you have looked and where you found particular information; it is incredibly frustrating not to be able to find a crucial bit of information you once had!
- **Record your references.** Fully record all your references, and crucial leads. You need this information both for loan requests, and your own bibliography.

EFFECTIVE LEARNING

The heart of education is not teaching, but learning. Adults in the learning situation have already developed their ability to direct themselves; this implies that the “lecturer” cannot assume he or she knows what is best, and can pass information across in the form of “lectures”. Rather, he or she adopts a role as a facilitator, a

resource best used in the way that is mutually agreed. The main task becomes one of facilitating self-directed learning, in the agreed areas.

Adult learners bring substantial experience, information and expertise to the learning situation, in addition to that offered by the teachers. It is therefore an appropriate use of these resources to focus on techniques which draw on the knowledge of individuals, and the group. Such approaches include case studies, discussion groups and projects ("action research"), in preference to lectures (although, of course, there is still a place for the formal presentation).

ASSESSMENT OF LEARNING

Amongst the techniques used to help ensure that effective learning has taken place is the use of questions. Questions may be formally assessed, or may be set as "formative" coursework, to provide feedback as well as giving you the opportunity to test your understanding. Clearly, assessment is a part of any formal learning process, and it is important that you achieve adequate grades to meet your goals – either the degree or successful completion of individual programme modules. Important as assessment is, however, we do not want you to focus on formal assessment to the detriment of the overall learning experience. We will not set coursework or examinations designed to catch you out, and no one piece of work will be sufficient to doom you to failure! You should therefore be sensible in your approach to assessment and avoid spending so much time on a piece of assessed work that your overall performance falls short of your own standards.

ASSESSMENT - ASSESSED COURSEWORK

The general requirements for answering assessed coursework are quite straightforward. As a minimum, the tutor will be looking to see that you have answered the question in a way that demonstrates understanding. Assessed work, like examinations, aims to find out how much you have understood of what you have been taught, and to test your ability to apply your learning to problems.

The cardinal sin in any assessed work is plagiarism. In any part of the formal examination process, the University regulations governing plagiarism apply. Plagiarism is the passing off of others' ideas or work as your own. Whilst it is wholly appropriate that your research into the existing body of knowledge will be reported in support of your arguments, ideas and problem solving, the source must be referenced. The general rule is that a particular view should be credited to its originator by name and published source. Similarly any lengthy extract must be properly referenced. The judicious and rigorous use of references will avoid any charge of plagiarism. We also expect you to discuss ideas freely with other students, but we do not expect collaboration on individual work submitted as your own. Further guidance on avoiding suspicions of plagiarism can be found in your Course Handbook.

The Course Team have no specific requirements with regard to the presentation of your work. The School uses English for all its teaching material, and we would expect your work to be submitted in English (although, of course, you may ask for arrangements to be made for the assessment of work produced in Welsh). Above all, your work should be legible. Work submitted for assessment should be accompanied by the appropriate cover sheet, which is available on the School web server.

Please be aware that we expect a careful use of English to propose your ideas and support your arguments. The ability to communicate well in written form is an essential skill, and you should take this opportunity to develop your own writing ability. Your arguments should be concise and logical, your style should be economical and precise, your grammar and spelling should be correct, and your presentation should be professional. We expect that students will generally use computers to prepare work for submission, and are fully aware of how different media and ways of presenting information can be combined in any document. We shall, however, be looking at content rather than presentation, and will not be diverted from poor evidence of understanding by the substantial use of clip art!

On the subject of computers and their use to produce coursework, beware of spelling and grammar checkers. We have found that spelling checkers are best used as gross typing error detectors, because of the difficulties arising from homonyms, and Microsoft's view of good grammar is not that of Sir Ernest Gowers¹! Although these tools have their place, they do not (and should not) take the place of your own knowledge and skills.

EXAMINATIONS

Study for an examination requires planning, and you should try to conduct regular reviews of your learning whilst completing the study associated with each module, to make revision more effective. You will find it easier to revise if your notes include all the major points in a topic area, as well as relevant evidence and examples. The key to revision is to ensure understanding, rather than attempting last minute cramming. If you really understand the material, it will remain with you and you will be able to build on it in succeeding studies.

You may find it helpful to read through your notes once without writing anything, and then to read again making summary notes. The act of writing helps the memory as well as focusing the mind on the topic. However, these must be *active* notes, not just a copying of what had already been written. You will not have time to read large passages out of textbooks, but may find it possible to skim them if your notes were not good enough from first study.

You should test yourself in each topic, and try to answer questions that come to mind. Do not practise answering "essay" type questions, unless you wish to do so to help you judge what you can write in a particular time. However, it may be useful to write outline notes for questions from previous examinations, to aid your understanding and self-confidence.

Put things into your own words when you are making notes, as this too will help your understanding. Where you memorise definitions or quotations, to illustrate an answer, you must, of course, be word perfect.

Do not attempt to "fine tune" the revision for any subject area - usually the effort needed for a few extra marks is simply not worthwhile. However, you should not let any subject go completely without thought, because the marks obtained from a superficial answer rather than failing to complete the required number of questions can make a big difference to the overall total.

¹ Gowers, Sir Ernest (1962), "The Complete Plain Words". Harmondsworth, Penguin Books; ISBN: 0140511997 Reissued 3rd Ed. See also <http://www.ourcivilisation.com/smartboard/shop/goworse/> for an on-line version.

Again, your revision should be active rather than passive. There is little better preparation than completing lots of practice answers, and you may find it useful to do these early in your revision, rather than when you know the subject inside out, to help focus on the areas requiring greater effort.

It is difficult to give guidance on examination technique, which is unfortunate because poor technique rather than inadequate knowledge is often the downfall of otherwise worthy candidates. Examiners are not out to trick people, and are simply trying to find out if they have understood and can apply what they are supposed to have learned. The following points may serve to reduce the chances of failing to do yourself justice:

- The night before an examination, you should aim to relax, or have only a brief review of your examination notes. Make sure you have a good night's sleep.
- Take the right equipment into the examination room - pens, pencils, calculators etc.
- Arrive early, to give yourself time to relax a little (yes you can!)
- Wear a watch, and make sure it agrees with the clock the examiner is using. Out of courtesy for others, switch off any chime or alarm. Ensure that mobile phones are switched off.
- Read the paper very carefully, and make sure you know all the following information:
 1. The number of questions or sections in the paper;
 2. How many questions you must answer overall, and how many from each section;
 3. Whether any questions are compulsory or particular combinations are not allowed;
 4. Whether the questions must be answered in any particular order;
 5. What type of questions there are;
 6. What type of answers are required, and where they are to be written (e.g. is there a computer marked answer sheet for multiple choice questions?)
 7. How many marks are available for each question, and part of a question;
 8. What information (name, examination number etc.) is needed on answer sheets/books;
 9. Whether you need to start each answer on a new page or book.

Examination instructions vary from year to year, and between programme modules. It is therefore vital that you understand fully what each examination requires you to do. Once you have the information above, you can start to plan your time. You must give yourself adequate time to read the paper thoroughly, choose your questions (which may involve writing quick notes to compare your knowledge), answer them and then review your answers before the end of the time allowed. Your time plan must, of course, reflect the relative value of different questions or sections.

Obviously, you must think carefully which questions to answer, based on an assessment of your relevant knowledge. Read through all the questions and mark those you think you can do well, those you think you would not be able to muster a “pass” on and those where you can gain some useful marks. Using this first selection, then decide which you are going to answer and in which order.

For essay questions, you should then plan your answer for the first one and start answering it. Your plan should be in note form, and you should aim to write informative paragraph headings under which you write relevant ideas, facts and evidence. Number these headings, so that they enable you to write your answer in a logical development of your arguments. Do not write down the question, although you should have an introductory paragraph that identifies what your answer will do, and how that answers the question set.

Towards the end of the time allowed, you should ensure that you have attempted all the questions that you should have. Read through all your answers, and clarify or correct any words that are illegible, or misspelled. You should not, however, aim to rewrite large sections unless you have time to spare. Finally, check to make sure the answers are correctly numbered.

PROJECT

The major piece of assessed coursework is the project dissertation. This is a formal report based on an individual project. The detailed requirements for the project, and for presenting the results of your work, will be made available at a later date. However, it is always useful to keep an eye open for areas of particular interest, or potential areas of research, for later development into a project.

SUMMARY

This study guide may not be appropriate to every student, because of their earlier learning experiences and current needs and obligations. It should not be taken as an essential approach to your studies, but it provides, as the term guide suggests, an *aide memoire* to help reduce the load on those embarking on a demanding programme, possibly as mature students for the first time since completing formal studies some time ago.

If you require further information, then you can refer to published University sources such as degree regulations or can ask your personal tutor, or any member of the Course Team. We want, of course, everyone to gain their MSc degree from this programme, but what are most important are the overall learning experience and your self development in pursuit of your own life goals. We are here to help you.