Student Handbook

for

Master of Science/
Postgraduate Diploma/Postgraduate Certificate

programmes in

Big Data
Computing for Business
Computing for Financial Markets
Information Technology
Software Engineering

Division of Computing Science and Mathematics
Faculty of Natural Sciences
University of Stirling

Session 2016/2017

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Division of Computing Science and Mathematics
Faculty of Natural Sciences
University of Stirling
Stirling FK9 4LA
Scotland

Course Directors: Dr. S. B. Jones — Information Technology
Dr. M. Kolberg — Software Engineering, Computing for Business, Computing for Financial Markets
Mr Kevin Swingler — Big Data

Home page: `http://www.cs.stir.ac.uk/courses/msc/`

Review of Courses
DISCLAIMER OF LIABILITY
The University's courses are subject to a continuous process of review. While every effort has been made to ensure the accuracy of material in this Handbook at the time of going to press, the University will not be liable for any errors or omissions. The University reserves the right in every case at its discretion to vary the contents of courses or parts of courses, to offer new courses, to discontinue existing courses and to cancel courses in the event of low enrolments.

Revised: 9 September 2016

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1 General

1.1 Introduction

Welcome to the University of Stirling and to the Division of Computing Science and Mathematics! This handbook is intended to help you in your studies by giving you information about the University, the Division, and your course. Please keep your copy of the handbook for reference.

1.2 The University

The University of Stirling was founded in 1967. It has over 12000 students at present, representing over 110 nationalities.

- The Chancellor is Dr James Naughtie.
- The University's Principal is Professor Gerry McCormac

The University's main buildings are:

- Cottrell Building (teaching, research, administration)
- Andrew Miller Building (library, shops, bank, restaurants)
- Robbins Centre (Student Union)
- MacRobert Centre (theatre, film house)
- Pathfoot Building (teaching, research)
- Gannochy Sports Centre (sports facilities)

In addition, the purpose built Airthrey Medical Centre is adjacent to the student residences.

The Division uses the **Cottrell Building** for teaching. Rooms have numbers like '4B76':

- the initial digit indicates the floor ('2' is the ground floor in most areas!)
- the letter indicates the corridor ('A' and 'B' are the two corridors running the length of the building; letters such as 'X' and 'Y' indicate transverse corridors)
- the last digits indicate the room number for that floor and corridor.

Lecture theatres are mainly on the ground floor (level 2) and are usually numbered without a floor level (e.g. 'LTA4' or just 'A4').

1.3 The Student Programmes Office

The central academic administration of study programmes is the responsibility of the Student Programmes Office, located in the Student Services Hub in the Cottrell Building, room 2Z.

- Brenda Hoggan: Head of the Student Programmes Office
- Email: `studentprogrammes@stir.ac.uk`

1.4 The Division

The Division has Committees to deal with academic matters related to Computing Science. There is also a Computing Science Staff-Student Sub-Committee to which your class will be able to elect representatives. The Division's staff includes:

- Prof. Evan Magill: Head of Division (room 4B80, email `hod@cs.stir.ac.uk`)
- Grace McArthur: Divisional Administrator (room 4B80, email `grace@cs.stir.ac.uk`, tel ext 7421)
- Linda Bradley: Divisional Secretary (room 4B80, email `linda@cs.stir.ac.uk`, tel ext 7436)
- Gemma Gardiner: Administrative Assistant (room 4B80, email `gemma@cs.stir.ac.uk`, tel ext 7420)
- Dr. Simon Jones: Course Director for the taught Masters degree programme in Information Technology (room 4B63, email `sbj@cs.stir.ac.uk`, tel ext 7434)
- Dr. Mario Kolberg: Course Director for the taught Masters degree programmes in Software Engineering, Computing for Business and Computing for Financial Markets (room 4B60, email `mko@cs.stir.ac.uk`, tel ext 7440)
- Mr. Kevin Swingler: Course Director for the taught Masters degree programme in Big data (room 4B97, email `kms@cs.stir.ac.uk`, tel ext 7676)
- Sam Nelson, Graham Cochrane: Divisional Computer Officers (room 4B81, email `sam@cs.stir.ac.uk` and `gco@cs.stir.ac.uk`, or collectively `csg@cs.stir.ac.uk`)

Note: Some of these rooms will change at the start of November 2016, to elsewhere on the 4B corridor, due to substantial office relocations.

1.5 Students with Disabilities

The University is committed to supporting all its students and to taking all reasonable steps to meet their needs. It seeks to foster an inclusive community and to prevent anyone from being marginalised or unable to realise their potential. To this end, it has in place a number of ways to assist students who, because of a disability, may need special arrangements to enable them to study, research and revise, to complete coursework, or to take examinations. Often, these meet students' needs as a matter of course (for example, audio aids in lecture theatres). However, there are occasions when the right support can be offered only if the University is aware of a student's particular situation. For this reason, students are encouraged to disclose any disability to the University. This can be done either:

- by contacting the University's Disability or Dyslexia Adviser in the Student Support Services (located in the Student Services Hub, 2Z) who will arrange a confidential one-to-one meeting to discuss the issues and possible adjustments to University practices or arrangements. If the student then decides that they would rather keep their circumstances private, the matter will go no further, except that a confidential note will be made that the matter was discussed.

  or:

- if a student prefers, they may speak to their Personal Tutor, or any member of staff with whom they feel comfortable. If the student then decides that formal disclosure is in their best interest, a confidential meeting with the Disability Adviser will be arranged to discuss the issues. If, however, the student decides that they would rather keep their circumstances private, the matter will go no further except that a confidential note will be passed to the Disability Adviser that the matter was discussed.

Contact details:

- Student Support Services: External tel. 01786 466022; internal tel. 6022;
  e-mail: `ask@stir.ac.uk`;
  web: `http://www.stir.ac.uk/student-support/`

1.6 Information for those holding a Tier 4 visa

The following text is supplied by the Student Administration Office, Enrolment and Records Team.

If you are in receipt of a Tier 4 Visa then it is essential that you comply with the UK immigration regulations during your stay in the UK. Following your enrolment you would have been sent an email to your University email account which lists your immigration responsibilities. You should familiarise yourself with these responsibilities as you will be withdrawn from the University and reported to the UK Border Agency should you fail to comply with them. This information is available at `http://www.stir.ac.uk/registry/studentinformation/visasandimmigration/`, and in particular the document describing "Points of Contact for Taught Programme Students".

Students are not permitted to be absent from their studies without the authorisation of the University. The normal expectation is that students on Tier 4 Visas will remain at the University for the duration of their studies, including the dissertation period. If you wish to return home early or to conduct dissertation fieldwork away from the University for a period of more than 14 days then you will need to get permission from the Programme Director and then complete an 'Application to Apply for Fieldwork or to Return Home Early' form. See the documents "Field Work" and "Returning Home Early" on the web page above for further information.

You should contact `tier4visastudents@stir.ac.uk` should you have any questions regarding your Tier 4 responsibilities or other matters relating to your Tier 4 visa.

1.7 In-Sessional English Language Classes

If your first language is *not English*, then you are strongly recommended to take advantage of the Autumn Semester In-Sessional English Language Classes offered by the University.

- **These classes are free of charge** and will help you develop your confidence and academic English Language skills.
- Improving your English will help throughout your studies, but you will find it especially valuable when you need to write your Masters dissertation at the end of your programme.
- Please see
  `http://www.stir.ac.uk/study-in-the-uk/in-sessionalenglish/`
- For further information please contact Gemma Gardiner, room 4B80, Division of Computing Science and Mathematics.

2 The Course

2.1 Introduction — the Qualifications

In addition to a range of undergraduate degrees, the Division offers five taught postgraduate programmes:

- The Master of Science/Postgraduate Diploma/Postgraduate Certificate in Big Data
- The Master of Science/Postgraduate Diploma/Postgraduate Certificate in Computing for Business (in collaboration with the Stirling Management School)
- The Master of Science/Postgraduate Diploma/Postgraduate Certificate in Computing for Financial Markets (in collaboration with the Division of Accounting and Finance)
- The Master of Science/Postgraduate Diploma/Postgraduate Certificate in Information Technology
- The Master of Science/Postgraduate Diploma/Postgraduate Certificate in Software Engineering

The Division also supervises M.Sc. and Ph.D. degrees by research.

Diploma and Degree regulations are contained in the *University Calendar*, which is available for consultation on the University Web site at `http://www.stir.ac.uk/calendar/academicregulations/`. The Calendar and other University regulations are definitive in the case of any disagreement with this handbook.

Note that the Postgraduate Certificates may be awarded to students who do not do well enough to be awarded the Postgraduate Diploma (see section B.7 below), but that it is not possible to apply to *register* to study for the Postgraduate Certificate.

2.2 Course Structure

Teaching takes place during an Autumn Semester and a Spring Semester. The Master of Science/Postgraduate Diploma programmes comprise a combination of fixed and optional modules depending on the precise programme. In each of the Autumn and Spring semesters you will take a selection of course modules; in addition (with the exception of the MSc in Big data) there is a Winter programming assignment to be completed during the Winter break, between the two semesters. You are separately assessed on each module and on the Winter assignment, and a final mark for each is set by the Examiners. By the end of the two semesters you will have a complete set of module marks. The Examiners will make award recommendations or permit a student to proceed to the Masters project and dissertation based on those marks — see Appendix B.7 below.

The teaching year dates are given in Appendix A. The specific rules and course modules for the programmes are given in Appendix B.

Detailed descriptions of the course modules that you will be taking each semester are available via the Divisional MSc web page `http://www.cs.stir.ac.uk/courses/msc/syllabuses/`

2.3 Course module codes

- Taught Masters degree module codes in Computing Science: ITNPxyz
- Several modules are taught by other Divisions, and have different codes: for example INVP001, IBUP002, and so on

2.4 Assessment

The Regulations for Postgraduate assessment can be found on the University web site at
`http://www.stir.ac.uk/regulations/postgraduate/assessmentandawardofcredit/`
They are summarised in the following sections.

2.4.1 The Mark Scheme

Each coursework assignment and examination is awarded a mark in the range 0–100 on the University's Common Marking Scheme for Postgraduates:

Mark	Interpretation	Descriptor
90+	Distinction	Meets all the requirements to attain 80–89 but in addition demonstrates an exceptional degree of originality and exceptional analytical, problem-solving and/or creative skills.
80–89		Meets all the requirements to attain 70–79 but in addition demonstrates outstanding quality evidenced by an ability to engage critically and analytically with source material, exhibits independent lines of argument, is highly original and uses an extremely wide range of relevant sources where appropriate.
70–79		Excellent range and depth of attainment of intended learning outcomes, secured by discriminating command of a comprehensive range of relevant materials and analyses, and by deployment of considered judgement relating to key issues, concepts or procedures.
60–69	Merit	Attainment of virtually all intended learning outcomes, clearly grounded on close familiarity with a wide range of supporting evidence, constructively utilised to reveal appreciable depth of understanding.
50–59	Pass	Attainment of most of the intended learning outcomes, some more securely grasped than others, resting on a circumscribed range of evidence and displaying a variable depth of understanding.
40–49	Fail – Marginal	Appreciable deficiencies in the attainment of intended learning outcomes, perhaps lacking a secure basis in relevant factual or analytical dimensions.
0–39	Fail – Clear	No convincing evidence of attainment of intended learning outcomes, such treatment of the subject as is in evidence being directionless and fragmentary.
X	Fail	Failure to comply with published requirements.

Your overall performance for each course module, including the Winter assignment and the MSc project, is also marked on this scale. The overall mark for a module is a weighted average of the coursework and examination marks for the module.

At the end of your course you can ask the Registrar's Office (*not* the Division) to provide a transcript of your performance. The University will make a charge for this.

Note: All marks should be regarded as *provisional* until final module marks are confirmed by the Examiners at the end of each semester.

2.4.2 Assignments

Each course module is coordinated by a Lecturer who acts as Course Module Organizer. Most course modules are continuously assessed by means of assignments. A typical pattern is that there are one or two assignments per course module, and an examination at the end of the course module, though the precise details differ from module to module. In some modules, the achievement of laboratory "checkpoints" also contributes to the final mark.

Assignments typically account for 40% of the final mark, and the examination typically accounts for the remaining 60% (although again the precise balance depends on the module).

In most modules it is **a requirement** that you submit an attempt at each assignment and attempt the exam. If you do not do so then you will receive a Fail grade (X) for the module overall due to failure to comply with the published requirements.

We try to space out the assessed assignments, but are severely limited in our room for manoeuvre. You will therefore find that assignments deadlines often come close together. The best you can do is to start work on assignments as soon as they are handed out, so that you do not have to rush everything at the last minute!

It is now common practice to require electronic submission of assignment solutions via our computer systems. However, written or printed submissions are sometimes required. The submission procedure will be described with each assignment description. It is much easier for the markers if any *written* or *printed* submissions for assignments are handed-in in a standard form. Unless for a particular course module you are told otherwise, we should like you to adhere to the following: use a clear plastic A4 pocket, the sort with a mouth at the top; *label this with the course module name and code, and your student number*; write your student number on each separate piece of paper; number the pages; **do not** bind-up the pieces of paper with staples, treasury-tags, paper clips, or whatever, but just slip them loose into the pocket; if you wish you may put a single strip of sticky tape across the mouth of the plastic pocket. One of the boxes outside room 4B89 will be labelled with the course module code before the assignment is due and you should place the assignment in the box on or before the due date and time.

Note that it is University policy that marking is carried out "anonymously" — that is, as far as is possible, staff should not know whose work they are marking. Therefore you should *not* put your name nor your computer username on any work — your work should be labelled with just your student number, as described above.

It is University policy that assignments should normally be marked and **feedback** returned to students within three weeks of the submission deadline.

The University expects that the work submitted by students is *their own independent work*. This is discussed further in section 4.2.

2.4.3 Problems with handing in Assignments

You are permitted to hand in an assignment late, *though we will deduct marks in fairness to those students who handed in the assignment on time*. Coursework will be accepted up to seven days after the submission date (or expiry of any agreed extension) but the mark will be lowered by three points per day or part thereof (e.g. if you are three days late and the assignment is marked as 59, then you will receive 50 to penalise lateness). After seven days the piece of work will be deemed a non-submission, resulting in Fail for the module overall, due to failure to comply with published requirements. This rule (regarding late submission of coursework) may be relaxed for students who can show good cause for failure to submit on time. *Good cause* may include illness (for which a medical certificate or other evidence will be required). It is also usually the case that the latest time at which a late assignment will be accepted is when marked solutions are handed back to the rest of the class. If you do not hand in an

assignment at all, you will receive Fail for it, and consequently a Fail overall for the course module.

Please do let your Course Module Organizer know of any problems in meeting assignment deadlines. When there are good reasons for difficulties in meeting an assignment deadline, Course Module Organizers may agree an extended deadline for an individual student — such extensions are then *without penalty* (unless, of course, the new deadline is exceeded). In *exceptional circumstances* a Course Module Organizer may recommend to the Examiners, who set the final marks, that the requirement for a student to attempt a particular component of assessment be *waived*. **Please remember:** *do* **let us know of any problems, as we cannot help you otherwise!**

2.4.4 The Winter Programming Assignment

The following does not apply to students on the MSc in Big Data.

During the break between the Autumn and Spring semesters, students must carry out a special programming assignment. The assignment is an important opportunity for students to consolidate and enhance the programming skills gained in the Autumn semester in the context of a more sustained, focused and creative exercise. It will be marked in the normal way, during the Spring semester.

2.4.5 Examinations

Examinations take place at the end of each semester for the modules taught in that semester.

Around the middle of each semester the draft examination timetable will be posted up. We check this ourselves carefully to make sure there are no clashes, but you should do so too, and let the Course Director know of any problems. A little later, the final examination timetable will be posted up.

Note that your examinations may take place *right up to the end of semester*, and you should *not make arrangements to travel away from Stirling before the end of semester.*

Following each diet of examinations, the Divisional Examiners and the External Examiner meet to set the *overall* marks for each student in each course module — each mark is a weighted average of the assignment and examination results.

If you receive an overall mark of 0–49 (a Fail) for a course module then you will usually be eligible to take *'Resit'* assessment in that module examination — this may be assignments and/or an examination. If you attempt the Resit assessment then a new mark is computed in exactly the same way as the original mark, *with the restriction that the mark is limited to 50 at best*. Your final mark for the module is then the higher of the original and new marks. If you do not attempt the Resit assessment then your original mark stands.

You may be granted a *'Deferred'* examination for a course module if you had good reasons for not taking it the first time (e.g. due to illness). If you simply do not turn up for the original examination, you might not be allowed to take a Deferred examination: the Examiners might allow you to take a *discretionary Resit* examination for the module (with the mark limited to 50), or you might receive a Fail for the course module. **Permission to take a Deferred exam is granted by the Student Programmes Office, to whom application must be made promptly.**

The Resit/Deferred examinations are in May (for Autumn modules) or June (for Spring modules).

Sample examination papers are normally available on course module Web pages.

2.4.6 The Project and Dissertation

Some students may be awarded a Postgraduate Certificate, some a Postgraduate Diploma, but most will go on to study for a Master of Science. This will require you to undertake a *supervised project* and to submit a dissertation describing your project work. See appendix C for more information on dissertations.

It is important to appreciate that it is expected that you will undertake the project as a *three month full time activity at Stirling* for the designated period, otherwise a timely and successful completion is unlikely. Students who attempt to combine their project work with a job, or who are absent from Stirling for prolonged periods, often have great difficulties.

In exceptional circumstances, the Student Programmes Office may grant extensions to the dissertation submission deadline, but then an additional fee usually becomes due. If you experience difficulties, and need to consider an extension, you should consult the Course Director.

Each year some projects are available in collaboration with clients from other sections of the University or from outside the University within the Making the Most of Masters scheme (C.3). These projects are allocated competitively to the best students. Other students carry out projects of their own devising, or suggested from within the Division.

2.5 Attendance

On each course module you will have lectures (usually 2 or 3 per week). Lectures start at nominally 5 minutes past the hour and finish at nominally 5 minutes to the hour. In addition, you will have tutorials lasting one hour each (usually 1 per week); on most course modules there are one hour laboratory sessions in addition to tutorials, or instead of them. Attendance at lectures, tutorials and practical sessions is expected, and highly recommended for a successful outcome!

Attendance at tutorials and practicals will be monitored. The University has a policy of monitoring attendance, and if we become concerned about your level of engagement in a module, this will be drawn to the attention of your personal tutor. This is to identify any problems at an early stage and to offer students appropriate support. If you are worried about your ability to attend classes please seek advice from the module coordinator, your personal tutor, or other University Services.

See section 4.1 about what to do if you are ill or otherwise absent.

2.6 A software portfolio

When it comes to job interviews towards the end of the course, you may find that prospective employers would like to see some of your programming work. You should consider keeping a file with neat print-outs and screen shots of your best work — *a software portfolio*.

3 Notices and Facilities

3.1 Administrative Arrangements

Most things happen around the Divisional office (4B80). There is a mail tray for incoming mail addressed to students “care of” the Division, or for staff to leave items for collection by particular students. Tutorial sheets, assignments, and so on, will normally be issued by each Course Module Organizer, but they might be placed for collection on the wooden shelves outside room 4B89. Outside the Divisional office are notice-boards giving details of course modules such as tutorial arrangements

and mark lists. To the left of the door to the Divisional office (as you face it) there is a special noticeboard for the Masters programmes. Monitor the notice boards regularly. There are also metal assignment boxes outside room 4B89 for submission of assignments; these will be marked with your course module code if they are being used. Marked work can usually be collected from designated shelves in 4B80 – please ask the Division office staff.

Mark lists for assignments will usually be posted on the MSc noticeboard. Assignment marks may also be available on course module web sites, at the discretion of the module organizer. Final module marks will be available via the University's Student Web Portal, in each student's academic history record.

3.2 Computer Usernames

All students are given a central University computer username and password. The username usually comprises a student's initials followed by some digits, for example `sbj00037` . It is necessary to enter your username and password to access facilities such as the Portal, Succeed (the University's on-line virtual learning environment) and email. You can also use this username and password to log on to computers on campus, though that will be less important for you, as you will also have a Computing Science user account (see below). You must keep your password secret, and you *must not* allow anyone else to log in using your username and password — it is a disciplinary offence to do so, and in a practical sense could be dangerous or lead to great inconvenience for you.

If you have not done so already, you can find out your University username and password for yourself by logging in to a campus computer using the username `discover`, with password `discover`, and with the log on 'domain' set to `STUDENTS`.

All students have an email account provided by the University; the email address is the student's username followed by `@students.stir.ac.uk`, for example `sbj00037@students.stir.ac.uk` . **It is University policy that all internal email communication will be sent to this account, and that students should email staff from this account to confirm their identity, and not from external accounts such as Yahoo, etc.** If you would like your email to be forwarded automatically to an external account, then please see the link on the MSc course home page which explains how to configure this.

You will also be issued with a Computing Science username, which you should use when logging in to computers in the Computing Science labs. This will allow you to access the specialist facilities in Computing Science labs, and also gives you access to file storage allocated on servers managed by Computing Science.

3.3 Computer Facilities

The MSc programmes have a 'home page' on the World Wide Web that gathers together links to important items of administration and interest. Its address is
`http://www.cs.stir.ac.uk/courses/msc/`

For supervised lab sessions the Masters modules use the Division's own PC labs in the 4X and 4B corridors. It is essential to become reasonably competent in the use of these tools in order to undertake the practical work of the various modules. The Division will issue some optional Basic Skills worksheets to work through on your own.

You may also use the University's centrally managed PC laboratories on campus, but they may not have all the software that you need installed, and may be in use for teaching (sometimes quite heavily). Information about centrally managed facilities and PC availability is shown on the web at address
`http://www.stir.ac.uk/is/student/it/computerlabs/`

With some exceptions, all labs are open 24 hours per day virtually all year — the exceptions normally only being when a lab is in use for a class, or when maintenance is taking place.

If you have any difficulties with computers in the *centrally administered labs*, then please contact the Information Services Helpdesk in the Library (also internal telephone extension 7250, or email `infocentre@stir.ac.uk`).

The Division is well equipped with its own computing facilities, located in the 4X corridor, and rooms 4B89 and 4B91. The labs in the 4X corridor and 4B89 are heavily used by our senior undergraduate students too, so everyone needs to be responsible in sharing the space.

The PC lab in 4B91 is dedicated to the postgraduate students on the MSc courses, and is accessed via a coded lock. To open the lock you push the C button followed by 4780Z. Please keep the door locked for the security of the computers in the room. Only Computing Science postgraduates can log in to the PCs in 4B91.

If you have any difficulties with *Divisional computers*, then please have a friendly word with our Computer Officers Sam and Graham in room 4B81.

If you have your own desk- or lap-top PC, then you may wish to carry out practical work to support your studies on it. The Division has collected together a compendium of the software applications that are used during our courses. This software is available on-line via the Divisional network — see the MSc course home page for details.

Mobile devices (laptops, tables and smartphones) can be connected to the University's wi-fi network through the *eduroam* system — see `http://www.stir.ac.uk/is/student/it/connect/`

3.4 Miscellaneous Points

The structure of the degree, with coursework assignments that are not attempted until the material has been covered in lectures, can seem to leave you under-worked in the early part of each semester, and more heavily loaded in the later part. You can do quite a lot to redress this imbalance by using the early part of each semester to build up speed and confidence. Don't leave all your practical work to the last minute!

Document preparation may be undertaken on the University's computers — Microsoft Office is available. Please try to make sensible, economical use of the printing facilities. Please do *not* use the Division's laser printers for printing excessive numbers of drafts or for making multiple copies of documents — they are too heavily used and everyone needs to act responsibly. In various centrally administered laboratories, there are special print-stations using a 'print credit' system with centrally provided stationery — see instruction notices in the labs, and further information on the Web page `http://www.stir.ac.uk/is/student/it/printcopy/`. Printing in the Division's labs is not controlled by the print credit system — **responsible use is expected**.

The equipment and facilities are provided **for your studies**. Please do not use them for other purposes (e.g. games or private work), and particularly do not allow other people to use them. *Students who need to carry out academic work have priority on all University computers — so please help to foster a good community spirit by giving up your computer graciously when necessary.*

Occasionally the University has to fine a student or to deny access if a student abuses the computing facilities. University regulations require all members of the University to comply with the provisions of the Data Protection Act, and you should also bear in mind the provisions of the Computer Misuse Act.

4 Dealing with Problems

4.1 Introduction

Personal problems are probably best assisted by the specialist University staff. Each student has a Personal Tutor to whom they can talk in confidence. The Personal Tutor may be able to help directly, and will also be able to help the student identify the appropriate specialist help within the University.

The University has Student Counsellors and Support Workers to help with any kind of problem; this service is located in the Cottrell Building, room 2Z (or see `http://www.stir.ac.uk/student-support/` on the Web). The University has its own medical practice adjacent to the student residences (Airthrey Park Medical Centre `http://www.apmc.co.uk`), and Occupational Health Unit.

Academic problems are probably best assisted by the Division's staff. You should approach your Course Director about any problems with the course as a whole, or if you need general advice. If you need help with a particular course module you should approach your course module tutor or the Course Module Organizer. The Head of Division is available to help with problems that cannot be solved more directly.

If you have a problem which is affecting your studies, please let us know *as soon as possible*. If you wait to tell us, it may be too late for us to compensate you for your difficulties. If you have a good reason, we can consider extending deadlines for assignments, requesting deferred examinations, etc. If you fall ill, it is essential to get a medical certificate as evidence. You must promptly notify the Registrar's Office and your Course Director of any failure to undertake assignments or examinations. We can make allowances for problems at our Examiners' Meetings — **but only if you tell us in advance!**

In *exceptional circumstances* the Student Programmes Office may grant a period of 'Leave of Absence' to a student with personal difficulties. The student resumes their studies following the leave of absence.

4.2 Independent Work

To plagiarise is to represent the intellectual property of another as your own. The Oxford English Dictionary definition of plagiarism is as follows:

> the wrongful appropriation or purloining, and publication as one's own, of the ideas, or the expression of the ideas ... of another.

The University expects that all work that is submitted for assessment is your own work. All students should note that the University has a formal policy on plagiarism which can be found via the Academic Misconduct link on `http://www.stir.ac.uk/academicpolicy/handbook/assessment/#q-8`

Advice is also available in the University's 'Little Book of Plagiarism' (`http://www.plagiarism.stir.ac.uk/documents/BookofPlagiarism.pdf`) and 'Little Book of Academic Misconduct' (`http://www.plagiarism.stir.ac.uk/documents/BookofMisconduct.pdf`) — what plagiarism is and how to avoid it.

It is *normal* for students to discuss openly the nature of an assignment and the broad approaches to a solution. It is *normal* to share experience and to discuss ideas that did not work. **However, there comes a point when such activities can turn into collaboration or even copying.** *Submissions must be your own original work.* Advice on this issue is available via the MSc course home page.

Examples of unacceptable behaviour are:

- copying or making use of someone else's file or work
- providing a copy of your own file or work to someone else
- sharing detailed descriptions of your approach with someone else (e.g. a flowchart or pseudo-code)
- working with someone else for extended periods of time, even if done openly
- allowing someone else (e.g. a friend or a tutor) to help you so much that it ceases to be your own individual work.

Unfortunately, deliberate copying by students happens occasionally. For example, a student might pick up your discarded working draft and use it to write his or her program or essay. Be careful about how you dispose of your drafts! A student might copy your file without you knowing, if you are careless. Sharing a lap-top or PC can often be a source of problems too.

If we suspect that work submitted for assessment has been copied, we will interview the students concerned. The penalties for copying will depend on the circumstances, *and can be as severe as being required to withdraw from the University*.

4.3 Appeals

Very occasionally, students disagree with the decision of an Examiners' Meeting. If you find yourself in this position, ask the Head of Division or Course Director for details of the appeals procedure. Note that there is no appeal against the professional academic judgement of the Examiners. An appeal is lodged with the Academic Registrar's Office for one of the following reasons: that the decision was unreasonable because it did not adequately take into account all the factors affecting the student's performance, is procedurally incorrect or has been taken in the absence of all the relevant information (for example, the existence of a medical condition). The University Registry has information about Appeals on its Web page, at
`http://www.quality.stir.ac.uk/ac-policy/stud-ac-appeal.php`

5 Conclusion

This handbook covers most of what you need to know about the Division and how your MSc course is organized. Of course, you will find out a lot more yourself about student societies, social activities, the Student Union, etc. If there is anything else you would like to see in this handbook in future, or if you have any comments on it, please let the author know. We wish you all the best in your studies with us.

A Teaching Dates

A.1 Autumn Semester 2016

Date	Event
12 Sep 2016	Start of semester
12 Sep 2016	Introductory meeting
12 Sep 2016	Teaching begins
24–28 Oct 2016	Mid-semester reading week
2 Dec 2016	Last day of teaching
8–16 Dec 2016	Autumn examinations
19 Dec 2016	End of semester
Early Jan 2017	Examiners' meeting

A.2 Winter Programming Assignment

28 Dec 2016-22 Jan 2017(provisional)

A.3 Spring Semester 2017

Date	Event
13 Jan 2017	Introductory meeting
16 Jan 2017	Start of semester
16 Jan 2017	Teaching begins
20–24 Feb 2017	Mid-semester reading period
13 Apr 2017	Teaching ends
14, 17 Apr 2017	Easter break
24 Apr–12 May 2017	Spring Examinations
15–19 May 2017	Autumn resit/deferred examinations
2 Jun 2017	End of semester
Late May/early Jun 2017	Examiners' meeting
22–27 Jun 2017	Spring resit/deferred examinations
Late Jun 2017	Graduation ceremony for PgDip/PgCert

A.4 M.Sc. Project 2017

Date	Event
2 Jun 2017	Final deadline for MSc project proposals
5 Jun 2017	Project begins
Early August 2017	MSc project poster session
31 Aug 2017	Project ends and dissertation is submitted
October 2017	Final MSc examiners' meeting
November 2017	Graduation ceremony for MSc

B Course Descriptions

B.1 Transferable skills

The following transferable skills are an important product of the course:

- An understanding of the breadth of applicability of modern software systems, and the range of solutions available to the information technologist/software engineer/computer systems specialist.
- Ability to use a range of computer based tools to manage software, design descriptions and textual documentation.
- Skills in the study of systems so that they can be analysed, their behaviour explained and changes planned in a methodical manner.
- (MSc) The ability to plan work, to undertake independent creative activity and to bring it to a successful conclusion.
- (MSc) The ability to write a coherent and informative account of work undertaken.
- (MSc) The ability to prepare and give a presentation of work undertaken to others.

B.2 Syllabus: Information Technology

In the Autumn Semester students take three course modules. All three course modules are compulsory.

Code	Course Module Title	SCQF credits	SCQF level
ITNP001	Principles and Practice of Programming	20	11
ITNP023	Foundations of Information Technology	20	11
ITNP033	Database Principles and Applications	20	11

In the Winter break students carry out the Winter programming assignment:

Code	Course Module Title	SCQF credits	SCQF level
ITNP051	Winter programming assignment	10	11

In the Spring Semester there are three compulsory modules:

Code	Course Module Title	SCQF credits	SCQF level
ITNP070	Networking and Technologies for E-commerce	20	11
ITNP090	Object Oriented Software Design	20	11
ITNPBD6	Data Analytics	20	11

For M.Sc. students the taught part of the course is followed by a full-time 3-month supervised project leading to a dissertation. Module code: ITNP099. This is worth 60 SCQF credits at SCQF level 11.

See appendix C for advice on choosing suitable projects and writing the dissertation.

Students must submit project proposals (see appendix D) to the Course Director before the end of the Spring semester. Students who do not submit their proposal in good time, and without good reason, may not be allowed to carry out the project.

B.3 Syllabus: Software Engineering

In the Autumn Semester students take three compulsory course modules.

Code	Course Module Title	SCQF credits	SCQF level
ITNP01A	Concurrent and Distributed Systems	20	11
ITNPBD2	Representing and Manipulating Data	20	11
ITNPBD3	Relational and non-Relational Databases	20	11

In the Winter break students carry out the Winter programming assignment:

Code	Course Module Title	SCQF credits	SCQF level
ITNP056	Winter programming assignment	10	11

In the Spring Semester there are three compulsory modules:

Code	Course Module Title	SCQF credits	SCQF level
ITNP090	Object Oriented Software Design	20	11
ITNP02B	Telecommunications Systems and Services	20	11
ITNPBD7	Cluster Computing	20	11

For M.Sc. students the taught part of the course is followed by a full-time 3-month supervised project leading to a dissertation. Module code: ITNP096. This is worth 60 SCQF credits at SCQF level 11.

See appendix C for advice on choosing suitable projects and writing the dissertation.

Students must submit project proposals (see appendix D) to the Course Director before the end of the Spring semester. Students who do not submit their proposal in good time, and without good reason, may not be allowed to carry out the project.

B.4 Syllabus: Computing for Business

In the Autumn Semester students take one compulsory module, plus two elective modules to be chosen:

Code	Course Module Title	SCQF credits	SCQF level
IBUP002	Managing Across Cultures	20	11
Either:			
ITNP001	Principles and Practice of Programming	20	11
ITNP033	Database Principles and Applications	20	11
Or:			
ITNP01A	Concurrent and Distributed Systems	20	11
One of:			
ITNPBD2	Representing and Manipulating Data	20	11
ITNPBD3	Relational and non-Relational Databases	20	11

The electives are to be chosen in consultation with the Course Director.

In the Winter break students carry out the Winter programming assignment:

Code	Course Module Title	SCQF credits	SCQF level
ITNP051	Winter programming assignment	10	11

In the Spring Semester there are two compulsory modules, and one elective to be chosen:

Code	Course Module Title	SCQF credits	SCQF level
IBUP003	Business in Europe and the Competing Economies	20	11
IBUP004	International Strategy	20	11
One of:			
ITNP090	Object Oriented Software Design	20	11
ITNPBD6	Data Analytics	20	11
ITNPBD7	Cluster Computing	20	11

The electives are to be chosen in consultation with the Course Director.

For M.Sc. students the taught part of the course is followed by a full-time 3-month supervised project leading to a dissertation. Module code: ITNP097. This is worth 60 SCQF credits at SCQF level 11.

See appendix C for advice on choosing suitable projects and writing the dissertation.

Students must submit project proposals (see appendix D) to the Course Director before the end of the Spring semester. Students who do not submit their proposal in good time, and without good reason, may not be allowed to carry out the project.

B.5 Syllabus: Computing for Financial Markets

In the Autumn Semester students take one compulsory module, plus two elective modules to be chosen:.

Code	Course Module Title	SCQF credits	SCQF level
INVP001	Corporate Finance	20	11
Either:			
ITNP001	Principles and Practice of Programming	20	11
ITNP033	Database Principles and Applications	20	11
Or:			
ITNP01A	Concurrent and Distributed Systems	20	11
One of:			
ITNPBD2	Representing and Manipulating Data	20	11
ITNPBD3	Relational and non-Relational Databases	20	11

The electives are to be chosen in consultation with the Course Director.

In the Winter break students carry out the Winter programming assignment:

Code	Course Module Title	SCQF credits	SCQF level
ITNP051	Winter programming assignment	10	11

In the Spring Semester there are two compulsory modules, and one elective to be chosen:

Code	Course Module Title	SCQF credits	SCQF level
INVP010	Derivatives	20	11
INVP011	Investments and Portfolio Management	20	11
One of:			
ITNP090	Object Oriented Software Design	20	11
ITNPBD6	Data Analytics	20	11
ITNPBD7	Cluster Computing	20	11

The electives are to be chosen in consultation with the Course Director.

For M.Sc. students the taught part of the course is followed by a full-time 3-month supervised project leading to a dissertation. Module code: ITNP098. This is worth 60 SCQF credits at SCQF level 11.

See appendix C for advice on choosing suitable projects and writing the dissertation.

Students must submit project proposals (see appendix D) to the Course Director before the end of the Spring semester. Students who do not submit their proposal in good time, and without good reason, may not be allowed to carry out the project.

B.6 Syllabus: Big Data

In the Autumn Semester students take four compulsory course modules:

Code	Course Module Title	SCQF credits	SCQF level
ITNPBD1	Mathematical Foundations	10	11
ITNPBD2	Representing and Manipulating Data	20	11
ITNPBD3	Relational and Non-Relational Databases	20	11
ITNPBD4	Commercial and Scientific Applications of Big Data	20	11

In the Spring Semester there are three compulsory modules:

Code	Course Module Title	SCQF credits	SCQF level
ITNPBD6	Data Analytics	20	11
ITNPBD7	Cluster Computing	20	11
ITNPBD8	Evolutionary and Heuristic Optimisation	10	11

For M.Sc. students the taught part of the course is followed by a full-time 3-month supervised project leading to a dissertation. Module code: ITNPBD5. This is worth 60 SCQF credits at SCQF level 11.

See appendix C for advice on choosing suitable projects and writing the dissertation.

Students must submit project proposals (see appendix D) to the Course Director before the end of the Spring semester. Students who do not submit their proposal in good time, and without good reason, may not be allowed to carry out the project.

B.7 Summary of Performance Requirements and Awards

A student who has marginally failed to meet the learning outcomes for a taught module may be awarded credits for the module but *at the lower SCQF level 10 (Honours)*. This is called a "Qualified Pass", and does not apply to the project and dissertation. More information about this can be found in the Regulations on the University web site at
`http://www.stir.ac.uk/regulations/postgraduate/assessmentandawardofcredit/#q-`
Note that at most 30 credits at level 10 may count towards eligibility for the Postgraduate Diploma or the MSc, and at most 20 towards the Postgraduate Certificate.

At the end of the programme, a student may be awarded the MSc, Postgraduate Diploma or Postgraduate Certificate, depending on their credit achieved and the levels of those credits. More information about this can be found in the Regulations on the University web site at
`http://www.stir.ac.uk/regulations/postgraduate/qualificationsandawards/`

The MSc, Postgraduate Diploma and Postgraduate Certificate may also be awarded with Distinction or Merit. The criteria for Distinction and Merit are given on the web page above.

B.8 General attendance and submission requirements

Attendance at lectures, tutorials and practical sessions is expected. Attendance will be monitored.

If you do not hand in an assignment then you will receive Fail for that assignment and also for the overall module. Please let your Course Module Organizer know of any problems in meeting assignment deadlines.

If you do not attend the examination, and you are not granted a Deferred examination by the Student Programmes Office, then you may be permitted by the Examiners to attempt a Resit examination, or you may receive a Fail for the module.

The awards criteria referred in B.7 mean that a student who receives one or more Fails will not be awarded a Degree nor a Diploma but may still be eligible for a Postgraduate Certificate. See section 4.1 about what to do if you are ill or otherwise absent.

A student's attendance and engagement record will be taken into account by the Examiners when deciding whether to grant *discretionary* re-assessment.

C

University of Stirling
Computing Science and Mathematics

M.Sc. in Information Technology/Software Engineering/ Computing for Business/Computing for Financial Markets/ Big Data

Dissertation Guidance: Format and Content

(Guidelines revised 30 June 2015)

C.1 Introduction

Completion of satisfactory project work and submission of a well written dissertation is an essential part of the M.Sc. If you do not reach an adequate standard in the dissertation, you will be awarded a Diploma rather than an M.Sc.; fortunately, this happens very rarely. These notes are to help you to choose a dissertation topic and to write the dissertation.

The **objectives** of the project and dissertation are :

- To demonstrate the student's ability to conduct an independent (but supervised) piece of work, to report it effectively and to exercise critical assessment.
- To exercise, develop and demonstrate the student's skills in some aspect(s) of information technology,
  and/or to increase and deepen the student's understanding of some aspect(s) of information technology.
- To apply skills and techniques acquired during the taught part of the degree programme.

During the project period you will:

- Carry out individual project work,
- Write a dissertation describing your project,
- Give a brief talk to the M.Sc. class and Computing Science staff about your project work,
- Give a demonstration of your project work to your supervisor and to your second marker.

The project work undertaken must be a *practical problem solving project* involving *a substantial computing element* — in other words it will rarely be acceptable for a project to be simply a survey of some kind. It is wise to recognise that although your technical skills are greater than they were last September, at the start of the project they may still fall short of those required for satisfactory completion of your chosen project. You will almost certainly need to augment your knowledge. This will take time (for which you are given credit in the assessment process) but with only three months available you will have to work hard both to grasp new technical material and to understand and solve a problem which you have not handled before, possibly in an area where you are not very experienced. There will be the opportunity in your dissertation to state what you needed to learn, so that the markers can assess your achievements correctly.

It is important to appreciate that it is normally expected that you will undertake the project as a *full time activity at Stirling* for the designated period, otherwise a timely and successful completion is unlikely.

It is also necessary to stress the importance of *regular contact* with your project supervisor during the practical work and subsequent write-up. *A weekly meeting is a sensible basis for a schedule of contact.* The supervisor's role is not to solve all your design and implementation problems, nor to make your decisions for you. Their main role is to advise and discuss, to help you plan goals and activities, to help you strike a balance between the different aspects of your work (in particular with respect to the content of the dissertation), to help you monitor your progress — they will also be able to teach you something, and will provide pointers to information sources, although most of the actual *learning* will be up to you as an individual. At dissertation write-up time, your supervisor will also be able to offer their comments on your draft material — see later for more about this.

Your supervisor is a vital resource, and experience shows that students who try to "go it alone", without consulting or heeding their supervisor, rarely produce satisfactory results.

C.2 Choosing a Topic and Supervisor

Details of previous projects are available on the MSc website at
`http://www.cs.stir.ac.uk/courses/`
`msc/projects/PastDissertations/disstitles.html`

The project work undertaken must be a practical, problem solving project, involving a substantial computing element. The project must aim to solve a realistic problem in a systematic manner. The problem should be realistic in the sense that it is not a "toy" problem artificially created for the project, but instead addresses a (potential) real requirement in reasonable breadth and depth. The approach should be systematic in that it applies the systems analysis and software engineering skills learned during the course. It can be helpful to think about applying your new computing skills to some application area that you are familiar with or interested in.

The following paragraphs contain general guidance. In section C.3 there is a description of the Making the Most of Masters scheme — a collaboration with businesses and other external organizations for work-based projects.

Information Technology students have come into the subject from previous studies or experience in other areas of expertise. It makes a great deal of sense for them to choose something which either relates to their previous background, thus providing a bed-rock of experience, or is in an area where the course has generated an interest which they would like to pursue. In the past we have had good dissertations where the student has undertaken a project on some topic related to their first degree – amending a commercial software package used for plotting maps (done by a Geography student); developing a data-base for early middle eastern settlements (done by an Archaeology student); teaching aid for a chemistry experiment (done by an Chemistry student) and so forth.

For *Computing for Financial Markets* students, the project will usually develop an software system for a financial application.

For *Computing for Business* students, there will usually be a management aspect to the project.

For *Big Data* students, the project will be, not surprisingly, work in some aspect of Big data.

Clearly you know more about your background than the staff do, and you know what interests you. So it is up to you to generate possible topics and discuss these with the members of staff whose interests seem to match them. We can advise you on who might supervise a possible topic, on the suitability or likely difficulty of a project, but we are not in general responsible for identifying the topics themselves.

As long as there is a substantial *applied* computing element there is no objection to projects which are supervised partly by staff from other divisions, though you must still have a main supervisor in computing science.

You may find it helpful to look at the list of past dissertation titles and abstracts accessible from the course Web page. Some good examples of past dissertations are available for you to consult — on the shelves in room 4B94 and in the Library.

Try to identify *delimited* rather than *open ended* project topics: this will help you to identify the concrete tasks to be carried out, and will help your focus when working on them.

We have had many successful projects carried out in conjunction with external companies. Arrangements for such collaboration must be made with care, and is best done through the Making the Most of Masters scheme (see C.3).

Most project work is intended, at least in principle, for use by some particular body of users. It is thus very important that you consider the useability of your software and the design of its interface. It is also important that you should be able to obtain some critical feedback from representatives of those users and report it in the dissertation.

It is vital that you make sure that the computing facilities (both software and hardware) that you need are available in the Division or elsewhere that is accessible to you, or can be obtained in good time.

Group projects: Some supervisors may be able to offer *group projects*. Students would work on linked topics, but would not be solving the same problem, and would write independent dissertations.

Use of personal equipment: You may find it desirable to use either your own computer, or other computing equipment, or software, not under the control of the Division. This is acceptable, but you should be aware that the Division may not be able to offer you technical support, and the risk of equipment failure or inadequacy will be entirely your own.

C.3 Making the Most of Masters

The School of Natural Sciences has a long experience of work related learning with many students undertaking their dissertations with relevant businesses (private and public) and third sector organisations.

In recent years, Stirling has been funded to support work based projects through the initiative Making the Most of Masters (MMM) (see `www.mastersprojects.ac.uk`) with a dedicated Project Co-ordinator based in the School and in the Careers Development Centre, Dr Eunice Atkins (eunice.atkins@stir.ac.uk). Through undertaking a work based project it is intended that students will be able to enhance their individual initiative, confidence, self-esteem and their ability to cope with change. In addition, it should also enhance professional competence and provide an opportunity to network with individuals from relevant organizations.

The Programme Directors work with the MMM team to develop links with employers to find "real-life" dissertation projects which are appropriate and have the relevant depth for MSc projects. Students will only be considered for work based projects if their module marks are consistently high. Watch out for more information about applying for a MMM project.

C.4 Proposal Form

No later than the end of the Spring semester you must submit a proposal on the attached form (page 31) to the Course Director for approval.

On the proposal form you must give a provisional title to indicate the area of work, a brief description of the project, and a provisional list of activities and schedule for completion of the project.

Note that the form requires the signature of the member of staff who has agreed to supervise the project.

C.5 The Project Workbook

You must submit a *project workbook* along with your final dissertation. **The workbook is intended to be a collection of notes, both informal and formal, for *your* benefit.** The assessors may look at the workbook for clarification as they are marking the dissertation, but *the workbook itself is not formally assessed*. Your workbook will be returned to you after the assessment process is complete.

Although the workbook is submitted only at the end of the project period, your supervisor will expect to review it regularly and to initial it as having been seen. The workbook should be written as you go along, not after the fact!

For example you may find it surprisingly difficult to remember why you made certain design decisions one month earlier, or may have lost a reference to a book, paper or web page you found useful. Every entry should have a date so that you can review the history of the work. The workbook will be a personal resource for you.

The workbook should be maintained spontaneously. For this reason, it is normal that entries be handwritten. Indeed you should treat it like a scrapbook in which you record anything useful *as you find it*, *as it happens*, *as you think of it*, and *not* a place to write elaborate, time-consuming essays. You could also glue items in (program listings, screen shots, etc)! It is suggested that you use a loose leaf binder or a hard-back exercise book. A4 size will allow easier inclusion of diagrams than A5 would.

At a minimum the workbook should contain:

Header Give your project title, name, student registration number and supervisor name.

Weekly Progress Record what you did on a week by week basis.

Supervisor Meetings Record key items from discussions with your supervisor.

And the entries will usefully include things like:

References Write down references to any paper you read or URL you consulted.

Problems and Solutions Record any problems you found. Also record the solutions you considered and why you chose a particular approach.

Sketches and Diagrams GUI mock-ups, software structures, class/sequence/state diagrams, database designs, ...

To Do Make a note of things you have to do so that you do not forget them, and things that you would like to do or perhaps ought to do but might not have time for.

Be honest in your workbook — it is meant to be a useful record for you rather than a Utopian view for some other reader! When we assess your project you will *not* be penalised for recording things that went wrong — and indeed recording things that do not work, or are not very effective, provides valuable information for the future! There is no reason to be tempted to go back over your workbook and edit out the 'problematic' parts!

C.6 Structure of the Report

During the project period, some good examples of past M.Sc. dissertations will be available for you to inspect. The following structure for the dissertation is suggested as a minimum:

Front Sheet: This should contain your name, the title of the dissertation, the date, the Department (note: its title is *Computing Science and Mathematics*), and the fact that it is submitted in partial fulfilment for the degree.

Abstract: This should give an overview of the main purpose, points and achievements of the dissertation. The main purpose of this item is to indicate to a potential reader the general subject area of the dissertation. No more than one page.

Attestation: You are required to include a short statement that your work is original. If there is any exception to this (e.g. you used material or code from another source), you must acknowledge this and cite the source. If any of your work was undertaken away from the University (e.g. in conjunction with a company) or outside the project period (e.g. during a vacation job), you are required to state this.

Acknowledgements: You could mention your supervisor, others who helped you, permission to include copyright material, etc.

If you are being financially supported by a grant, or other form of sponsorship, you should acknowledge the funding body.

Contents: List the (sub)sections, and include page numbers if you can.

Introduction: Explain the context and purpose of the project. It is important that you ensure that the introduction is full and clear. Your dissertation will be marked by both your supervisor *and* another member of staff; it will also be read by the External Examiner, *and may be read by your successors on the course*. You should identify clearly the kind of reader that you are aiming the dissertation at, and write an introduction suitable for that reader.

It is usually a sound idea to explain how the topic arose — there may be an existing system which is in need of improvement or development — then describe in outline the problem you are trying to tackle, and why you have chosen to do so.

You should state in the Introduction what new technologies/tools you needed to learn in order to carry out the project, and it is useful to provide a concise overview of the structure and content of the dissertation.

Background/literature survey/related work: It may well be that your chosen topic will be in an area where your knowledge is greater than that of the presumed readers. If so it is important that you include in your explanations sufficient *(and just sufficient)* of the non-computing background so that the readers can follow the rest of the dissertation.

A vital component in the dissertation is *a critical survey of "related work"* — so that your work can be seen to have been carried out in *as fully informed a way as possible*. In a more academic style of project, a more traditional *literature survey* is appropriate (with the survey also covering modern sources such as the Internet, of course). In a more system-development style project, it is appropriate to survey any existing systems or products that have similar or related goals. Most projects will be a mixture of both kinds of project. In either case the survey should be *critical*: you should comment on the strengths and weaknesses of the "related work", as you see it in relation to the nature of your project. [It is also appropriate to explicitly consider the alternative technologies that could be brought to bear on the problem — see the next heading.]

At the end of the Introduction and Background you want readers to feel comfortable that they understand the background to the problem, what you set out to do, and enough of any non-computing material to feel certain that they will be able to understand the explanations of your efforts which follow in the succeeding chapters. Good dissertations are nearly always recognisable as such by the time the reader has got to this point.

Problem specification and solution: At this point you should probably give a complete and precise statement of the *problem* that you are setting out to solve: this could (and often will) be a requirements description of a software system that you propose to develop; it could be a description of a case study and the analysis that you intend to perform. This statement of the problem should usually *not* be in terms of the solution technology that you propose, except where some technical aspect of the solution is a genuine *requirement*.

It is usually a good idea to discuss the reasons why you chose to tackle the problem in the way you did, and using the technology that you did. It is rare for there to be only one possible solution and there may well be several possible paths to the selected solution. Discuss the alternative solutions or technologies available, and justify the approach adopted. It is helpful for the reader to know what factors you thought were important, or perhaps paramount, in deciding on your approach.

There is a tendency to rather skate over the points mentioned in the last paragraph and rush into the minutiae of programming. **This is not advisable.** Although the project and dissertation have to have a substantial computing component, *the dissertation should normally emphasise aspects of analysis and design and should contain rather less of the programming detail than you might expect*. You will probably not have space in the dissertation to write about the details of *all* that you have programmed — it is also a very hard thing to write about well. Your readers would probably find such detailed writing difficult to read, and less than illuminating. On the other hand, you *should include some details* of your implementation. The best advice to to include a judicious amount of programming detail — to illustrate important points or principles.

Explain your solution, and how well or otherwise this followed the intended path. It is rare for things to go exactly as planned and the readers know this. What they are interested in is your analysis of the causes of, and the means by which you overcame, any problems encountered.

Even though you have explained the non-computing background in the introduction there will inevitably be further points that need to be included as you develop your account of the work. If the introduction has been well handled than such points should fit neatly in to the reader's understanding.

On computing matters you have to make a judgement. Do not annoy the reader by telling him what he already knows. If, for instance, your project deals with data-bases then clearly you can expect readers to know the general principles which underlie them so you don't waste their (and your) time by telling them. On the other hand they may very well not know the idiosyncrasies of a particular data-base, so if there were some which affected your work then explain what they were, and why they were significant.

It is very important that you make it very clear *what you* have achieved — you will probably have a software application, or perhaps a Web site, that someone could actually use, *so show the reader what can be done with it!* It is probably appropriate to include material giving an *illustration, or demonstration*, of your finished system at work in one or more typical situations — for example, screenshots of a typical session, interspersed with a brief explanation. This part of the dissertation should not be too long, and so probably *cannot* cover everything that your system can do.

Assessment/evaluation: You should include a critical appraisal of your design and the resultant system, commenting on both strengths and weaknesses: if things have not gone as well as planned in one or two areas, and they nearly always have, don't be afraid of saying so. It is almost always to your advantage, *it shows the reader that you have some insight and understanding of what you have been doing*.

On reflection you may decide that your design should have been approached rather differently, or that you might have been better off with a different implementation technology — comment on

this, and perhaps outline the alternative solutions.

You *must* incorporate critical feedback from potential typical intended users of your product, together with *your comments* on the feedback. Explain how you obtained the feedback: the choice of tasks that you perhaps asked your "guinea pigs" to carry out, the design of the questions/questionnaires that you asked them to complete, how you chose your test group of users.

Conclusion: Summarise your main results or achievements, commenting on both strengths and weaknesses. Give suggestions for future work.

References: These are papers and books to which you have referred. General reading should go in a separate Bibliography. Give your citations in the text. A typical format is:

In the text: The architectural semantics given in [Turner 1987] is a load of rubbish.

In the references:

[Turner 1987] Turner, K. J. : 'An Architectural Semantics for LOTOS', in Rudin, H. and West, C. (Eds.): Proc. 7th IFIP WG6.1 Symposium, pp. 15–28, North-Holland, Amsterdam, 1987.

Where you need to include a reference to material obtained via the World Wide Web, FTP, etc, be careful how you do it: such material is usually "ephemeral" — it may not exist for long, and may either vanish or change location. The reference shows that you looked something up, but it may not help a reader in the future to find it for themselves! Make sure that you give the full details of such material, and preferably the date on which you last knew it to be current. Wherever possible, give references to non-ephemeral material instead or in addition.

Appendices: Put detailed or reference material into appendices.

You must not put full printouts of all your coding into the appendices — you may submit it as supplementary material that we keep alongside your dissertation (see below).

User guide and installation guide: If you produced software that is intended for others to use, or that others may wish to extend/improve, then you should consider including a *user guide* and an *installation guide* as appendices. The latter will list all the files that the software comprises (source, executable, data, 'make', etc), where those files should be located for correct operation, how the executable components can be rebuilt from their sources, whether any special system settings/defaults are required, whether any other special applications/facilities are required, how to run the software, and so on.

C.7 Writing the Report

The above dealt with the structure of the report. There remains the question of actually producing it!

From a stylistic point of view: It is usually better *not* to write in the first person, since this is a technical report — that is, do not use "I" or "me". Also, the dissertation should *not* read like a *diary* of your project activities.

When you are writing the dissertation remember who the potential readers are, and explain the ideas in a suitable way. It is best to assume that the reader will be well educated in computing science, but will know little or nothing of the particular topic on which you have been working. In particular, the supervisor will know what the project is about, but the other examiners will not. It is up to you to tell them. They will base their assessment of your work primarily on what you have written in the report, so concentrate on making it intelligible to them.

The writing of this amount of material is going to take time, almost always much more than one is inclined to believe. You really need to be producing your first draft chapters by the first week of August. This may sound early but any later is starting to be too late. There is an obvious problem, namely that at that stage you are still working on the project itself and are not in a position to produce a "final" version.

There are two possible approaches. You can do the parts that can be put in reasonably final form — the first two or three chapters should come into this category, and so perhaps may some of the appendices — and then gradually fill in the gaps as the project continues. The alternative is to do a rough draft of the complete text, excluding perhaps the appendices and diagrams, and then gradually improve and refine the draft.

The first approach may seem easier in the sense that you do not write text until you are reasonably certain of what you intend to say; the second approach appears trickier since you have to draft some parts in without all the material necessary for its completion. This is not as difficult nor as foolish as it may seem: in many ways the process is similar to the development of a large program. You can either enter sections or paragraphs which simply say "Here I will discuss the handling of problem X" and pass on, or enter text which describes the handling of X (perhaps as you hope it will occur) and correct it later if this becomes necessary. In effect you may not know exactly what you intend to say but you are making a decision as to where you intend to say it.

The rationale of the second approach is that a reader can get a much better feel of the overall impression conveyed by the document and this has several distinct advantages. If a re-arrangement of the material is necessary or desirable then this is more likely to become apparent from a full draft and the sooner this is done the better. There is less text to switch and, at this stage, little or no cross-referencing to correct. Additionally, with a full draft, it is much easier to judge whether there is time to complete all the project work you intend and, if not, to make a selection of the bits on which you should concentrate. Should there be a "hole" in your work — and again this is more likely to be exposed by a full draft — then it is far better to discover this at a time when something can be done about it

If you prefer to follow the first approach then by all means do so but if you want a critical review from your supervisor then make sure they get the complete version in adequate time. If it doesn't appear until a week or so before the hand-in date the supervisor has to find time, just before the start of a new academic year, to read and comment. Should it happen that the report does contain some severe shortcomings then there will be little time to do anything other than attempt to rectify the worst of them.

If you plan to use a word processing package to write your dissertation, for example Microsoft Word, then *learn how to use it properly*. Constructing a document with the size and form of a technical dissertation is a very different matter from writing a letter home or composing a 2000 word essay on Robert Burns. Word can give you a lot of help if you exploit its capabilities: find out about paragraph styles, figure captions, bookmarks, cross references, including screen images and so on — you may waste a lot of time otherwise!

You will find a Microsoft Word dissertation template on the Projects Web page — you are required to use this template: take a copy and just fill in the spaces!

Plagiarism: Work which is submitted for assessment *must be your own work*. All students should note that the University has a formal policy on plagiarism which can be found at
`http://www.quality.stir.ac.uk/ac-policy/Misconduct.php`
Practical advice on how to avoid plagiarism can be found in the University's Little Book of Plagiarism at
`http://www.quality.stir.ac.uk/documents/BookofPlagiarism.pdf`

C.8 Submission

You must submit to the Divisional office (4B80):

- Three copies of the dissertation — printed **double-sided** on **plain A4 paper** *and* ***NOT bound in a cover***.
- One additional copy of the Title page and Abstract from the dissertation.
- Your project workbook.
- A completed **dissertation submission form** (attached, page 33).

You must submit through Turnitin on the Succeed pages for your project module:

- One copy of your dissertation in MS Word format.
  Turnitin will be available for you to make multiple submissions, to check the originality rating of your dissertation. The final submission must be identical to the printed dissertation that you submit.

You should also submit to the Division's digital repository:

- A copy of all electronic material: your dissertation, program files, web pages, projects, configuration files, supplementary libraries, and so on.

They should be submitted on or before the specified submission date, unless you have arranged otherwise with the Course Director or Student Programmes Office.

The dissertation must be clearly printed, double-sided, on plain A4 sheets. Leave a lefthand and righthand margin of about 3 cm. for binding. It is suggested that the dissertation is typeset in an 11 point font with a one-and-a-half line spacing. The dissertation template on the Projects Web page already contains appropriate settings. The entire dissertation should be roughly about 40–50 pages in size (15,000 words) including diagrams and tables; a further 20 pages can be included for appendices. If you expect to have significantly more or less text, have this approved by your supervisor.

You should minimise use of the laser printers for printing draft material by previewing the output on-screen. You **must not** use the Division's laser printers for printing multiple copies of your dissertation — they are not resourced for such use, and are not fast enough. You are strongly recommend instead to use one of the centrally managed student print stations located around the University. See the web page `http://www.stir.ac.uk/is/student/it/printcopy/`
To do this you need to print to one of the named printer services, and for this you will need to be logged on to *a PC in a central lab*. You can submit three copies for printing. If you wish, you may print on high quality paper, but we do not require it.

Do NOT simply include bulky material such as program code in your dissertation. However, if the material is *an essential part of the dissertation* (e.g. a program illustrating an algorithm) and requires to be assessed, then make it an appendix of the dissertation and copy it along with the rest — ask your supervisor about this.

You should submit the copies of the dissertation *unbound*; we will then have them bound in a uniform way. One copy will be placed in the Division's library, one will be kept by the supervisor, and one will be returned to you with your project workbook. A selection of the best dissertations are kept in the main University Library for general access, and you are required to agree to this.

C.9 Talk

A one day workshop will be organised during early August, at which all M.Sc. students are required to give a brief Powerpoint presentation of their project work to their fellow M.Sc. students and to Divisional staff. Detailed arrangements for the workshop will be announced nearer the date. This is an excellent opportunity to practice your technical presentation skills in a supportive environment. The presentation is not formally marked, but it will help your supervisor and second marker to gain an initial impression of your project. The Powerpoint presentations will be collected, and published on the previous projects web page at `http://www.cs.stir.ac.uk/courses/msc/projects/PastDissertations/disstitles.html`

C.10 Demonstration

In addition to the formal submission of the dissertation, you are **required** to demonstrate the software/systems that you have developed to your supervisor *and to a second member of staff who will also mark your dissertation.* Your supervisor and the second marker will ask you questions about your work too. The demonstration will contribute to your markers' assessment of your project and dissertation.

You will be informed who your second marker is before the submission deadline, and it will be **your responsibility** to arrange a demonstration.

C.11 Assessment

Each dissertation is independently assessed by your supervisor and another member of staff; the External Examiner is also involved. An M.Sc. with Distinction may be awarded for a particularly good dissertation combined with particularly good coursework.

The quality of the following aspects of your project and dissertation will be taken into account in the assessment:

Formulation: Statement of the purpose and objectives of the project.

Discussion: Explanation of the state-of-the-art as found in the literature, and your assessment of this. Analysis of the problem being tackled.

Approach, solution and evaluation: Justification of your approach to the problem. Discussion of any significant choices that had to made, in particular where there were trade-offs or compromises to be resolved. Description of your solution, including an appropriate level of implementation detail. Description of testing and evaluation of your solution. Explanation of what you actually did if you were unable to completely follow your planned approach.

Conclusions/assessment: Summary of achievements. Reflection on strengths and weaknesses of the solution. Recommendations for further work.

Difficulty: The level of difficulty of the project: in the dissertation you should draw attention to any problems or difficulties which you overcame, and which you could not reasonably have overcome, and you should be clear about what new technologies you had to learn in order to carry out your project.

Achievement: The level of achievement in the project.

Presentation: Try to give a good presentation of your work. Make effective use of a word processor to give a neat, consistent layout to the dissertation. Use spelling checkers, grammar style analysers, etc. wherever possible. Give your supervisor good time to read your drafts.

When assessing a final mark for your project and dissertation, the assessors give separate marks for the technical and presentational aspects of your work, and these are combined with weightings 70% and 30% respectively to obtain the final mark.

The technical content
(weight 0.7) is marked against the University's Postgraduate Common Marking Scheme Descriptors (see `http://www.stir.ac.uk/regulations/postgraduate/assessmentandawardofcredit/`), with the following weightings of the different aspects of the report:

Abstract/Introduction	10%
Background/State of the art	20%
Technical description	40%
Evaluation and Conclusions	20%
References	10%

C.12 Conclusion

In border-line cases, you may be required to attend a short oral examination of your work. If you fail to attend this examination, the Examiners will exercise their discretion in making the final decision.

The copyright in your work and the dissertation is vested in you and your supervisor.

D

University of Stirling
Computing Science and Mathematics

MSc Project/Dissertation Proposal

Programme: ***(delete as appropriate)***
Information Technology / Software Engineering / Big Data /
Computing for Business / Computing for Financial Markets

Your name: **Registration no:**

Project supervisor:

Provisional project title:

Description of project, with provisional list of activities and schedule:
(continue on another sheet if necessary)

Your signature: **Date:**

Supervisor's signature:

E

University of Stirling
Computing Science and Mathematics

MSc Dissertation submission form

You should submit your dissertation at the Divisional office, room 4B80, on or before the specified date. You must complete all parts of this form *except* those lines marked with ⋆, and hand it in when submitting your dissertation. The Secretary receiving the dissertation will complete the lines marked ⋆. The upper part of the form will be retained by the Division in your file, and the receipt will be returned to you as proof of submission.

MSc dissertation submission (to be retained by the Division in the student's file)
MSc in IT / SE / CB / CFM / BD (delete as appropriate)

I am submitting:

- **One original** and **two copies** of my dissertation entitled

  IN CAPITALS
- My **project workbook**, and **one additional copy of the Title page and Abstract**.
- **I confirm that I have submitted a copy of my dissertation to Turnitin** YES/NO
- **I confirm that I have submitted a copy of all electronic materials to the Division's digital repository** YES/NO
- **I agree to my dissertation being lodged in the main University Library for general access.** *(Delete if you do not agree)*

Signed ..... Date .....

Name ..... Reg no: .....
IN CAPITALS

⋆ Received by ..... Date .....

Receipt for MSc dissertation **(to be returned to the student)**

MSc in IT / SE / CB / CFM / BD (delete as appropriate)

Received from (student's name)

IN CAPITALS

- **One original** and **two copies** of the dissertation entitled

  IN CAPITALS
- The **project workbook**, and **one additional copy of the Title page and Abstract**.

⋆ Received by ..... Date .....