Your MSc Dissertation

Issues,

Forethoughts,

Guidance and

Common Misconceptions

1 Introduction

Over the last few years I have discussed many aspects of dissertations with students who will be carrying out this work in the next phase of their studies. In an attempt to present some sort of consistent view of the issues that are often raised, I have written them down in the following document.

Please do not hesitate to discuss any of these things with me when you have absorbed the following text. I hope it helps. If there is anything that you feel could also be included to your, or future students', benefit, please do not hesitate to let me know.

2 Preamble

The dissertation is unlike anything you have (probably) experienced in your studies so far in that it is a piece of original work that is firmly grounded in (and related to) published work in your chosen area. It is most definitely NOT just about writing a system to do something.

The premise is that you pose a research question (or statement), based upon your own interest and supporting reading, that is answered by (or illustrated by) the artefact that you build.

To be able to do this, you will:

- carry out a literature review, where you (find, read and) review the work published by others in the application area (generally) you have chosen for you dissertation.
- develop a research and investigation chapter where you reflect upon what you have found in your literature review, formulate a 'research question' to be answered or a 'research statement' to be confirmed (or refuted) and define how your artefact will help to answer this (or not)
- model the functionality your artefact is to deliver
- design your artefact
- develop your artefact
- test and evaluate your artefact
- evaluate your dissertation overall

You will write a report (the dissertation itself) in which you summarise and describe the points above in 13,000 words or less (excluding appendices) and, when this has been submitted, you will attend a Viva Voce with your supervisor and second assessor to talk about your dissertation and to demonstrate the artefact you have created.

3 Structure of the Dissertation

The dissertation itself is best regarded as comprising the following sections:

1 Preamble
2 Introduction
3 Literature review
4 Research / investigation
5 Artefact / solution
6 Testing / validation
7 Conclusions
8 Bibliography / references
9 Appendices / glossary

You can see much more information on each of these sections on Russel Campion's website here and the marking guide for the dissertation section 6 of this document.

4 A Word of Warning

Using your dissertation work to try to solve a 'real world' problem gives a focus, drive and level of interest that cannot be rivalled by more academic things. It does however introduce factors that may hinder you severely in reaching your academic goals, meeting the deadlines and achieving a good mark. Whilst it is nice to deliver something useful to a third party (even if the third party is you!), your focus from start to finish is in doing the best academic work you can. If this means compromising things that your 'customer' needs in order to achieve best academic result, this is what you will do. The word 'prototype' is a good get out here. I did once see a project that managed to satisfy both sets of criteria. Just the one, five years ago. It was fabulous but by gum it wasn't easy and it's a rare thing.

5 Literature Review

Embarking upon a review of literature relevant to your dissertation can seem to be a daunting task – IF you are 'only' thinking of what your system is to do. The trick to resolve this potential stumbling block is to articulate what your research question or statement is.

For example recent work has made a statement such as

"Data mining can provide is a valuable technique to detect credit card fraud"

Or

"Unused disk space on network OPCs can be used by other machines as a virtual disk drive"

For the first statement above, a literature review might now include work on:

- Credit cards (history, mechanics, advantages, disadvantages, security, chip and pin etc etc)
- Credit card fraud (history, size of problem, legal issues, history, metrics etc etc etc)
- Detection (history, motives, techniques, success, metrics etc etc etc)
- Data mining (mechanics, technology, history, use in credit card fraud detection, approaches\techniques metrics, exponents, success rates etc etc etc)

This decomposition (a few minutes work if you already know the area of your dissertation) has expanded the topic into 24 different areas – all of which will have relevant available literature AND has provided a focus and relevance for your reading that may not have existed before. In addition, writing a page to summarise you reading on each area will generate 12,000 words of your dissertation! Almost the maximum word count..

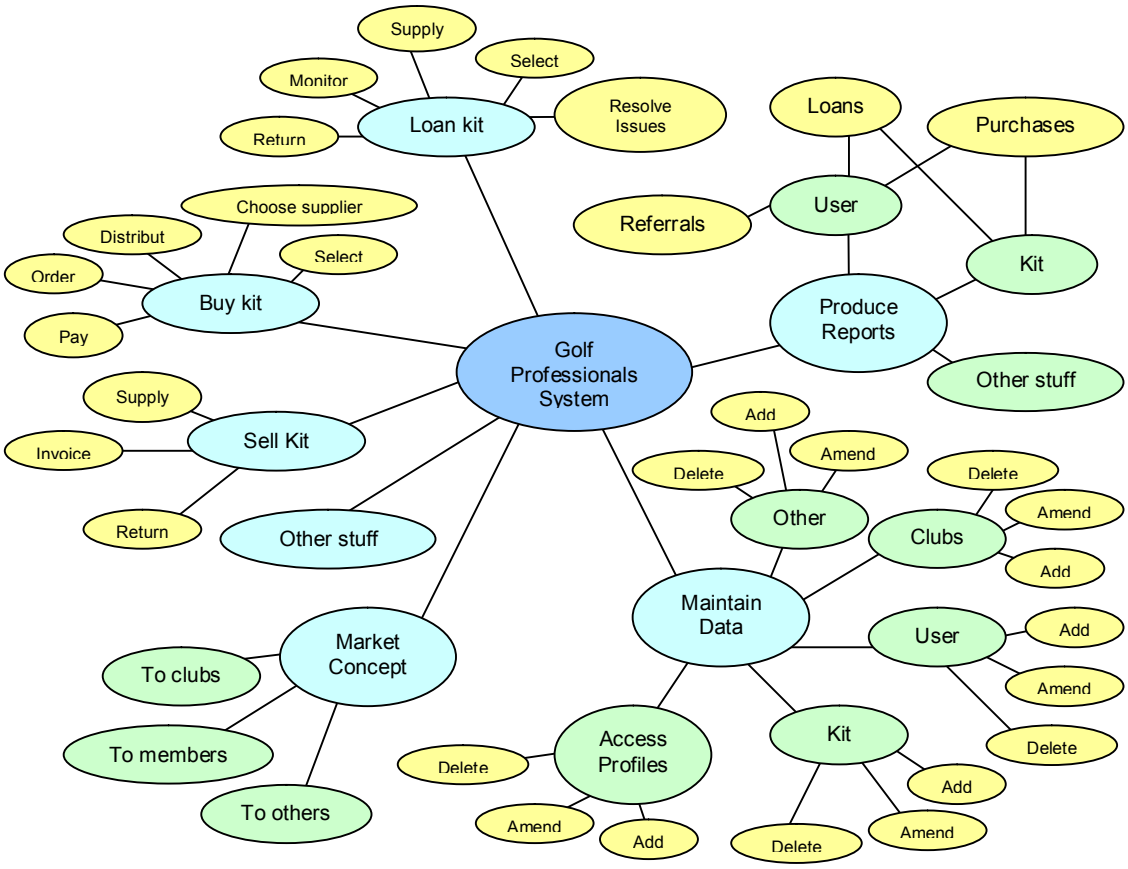
6 WHAT Is the Artefact Going to Do?

One of the difficult to understand areas of creating a big system (well, big for you) is why it helps to know what it is that the system is to do. 'Of course I know what it is to do' I hear you cry. If I didn't know that, I wouldn't be doing it. Well, that may be the case but, when you actually think in detail about it, you'll probably realise that two short words describe how much you really know. The artefact should either support or refute your research statement or answer your research question (if you have articulated it as a question).

The first part of creating your artefact is to decide WHAT your artefact is actually going to do. The 'how' comes later. When using the tools and techniques recommended for a particular methodology it is very easy to become all hung up on shapes of symbols, levels and all sorts of distracting things and so lose the point of what you are trying to achieve. What you are unlikely to have been taught is, as a first step, to ignore the recommended way of doing stuff and find a way for you to get your head around what your system is going to need to do.

For me, the way that works well is a mind map (or a 'blob' picture). You simply draw a blob to represent your system in its entirety in the middle of a big sheet of paper and, from this central blob, draw a number of sub-blobs to represent the main things the system should do. Not how it should do them, but what needs to be done. At this stage the blob and blobbettes all work by magic. Or fairies or however you want. Nothing is impossible. Each of the blobbettes will also need to have a number of sub-blobbettes to give some detail of what's happening. When you have enough sub-sub-sub-blobbettes so that, at the lowest level of detail, you can 'see' things working, you have defined what your system needs to do. When you have this, using some technique (such as DFD's, Use Cases or whatever) is much more straightforward.

To help you understand I've roughed out a blob picture below for the three lines of the proposal attached that say what the system's about. It is still fairly high level, but might make you think. Three lines to thirty odd high-ish level functions. I don't know the system well and it took me a couple of hours. The back of a big fag packet would have been quicker and achieved the same thing.



In my experience, if your head works the way that mine does (decomposing complicated things into small enough pieces to a level where even I can understand them and then building them all back again into the complicated thing that I can now understand) mind maps are amazingly enabling things. If your head works the way that heads work when they write lists and\or reject 'patently ridiculous' options very early in a decision making process, they are a waste of space. The best way to find out if they work for you is to try!

The original idea was Tony Buzan's who I suspect was having a wonderful time in the 1960s when he came up with the idea. There is now much literature about to tell you how to do them, loads of which appears of you Google 'mind map'.

I think that the following links will help you greatly:

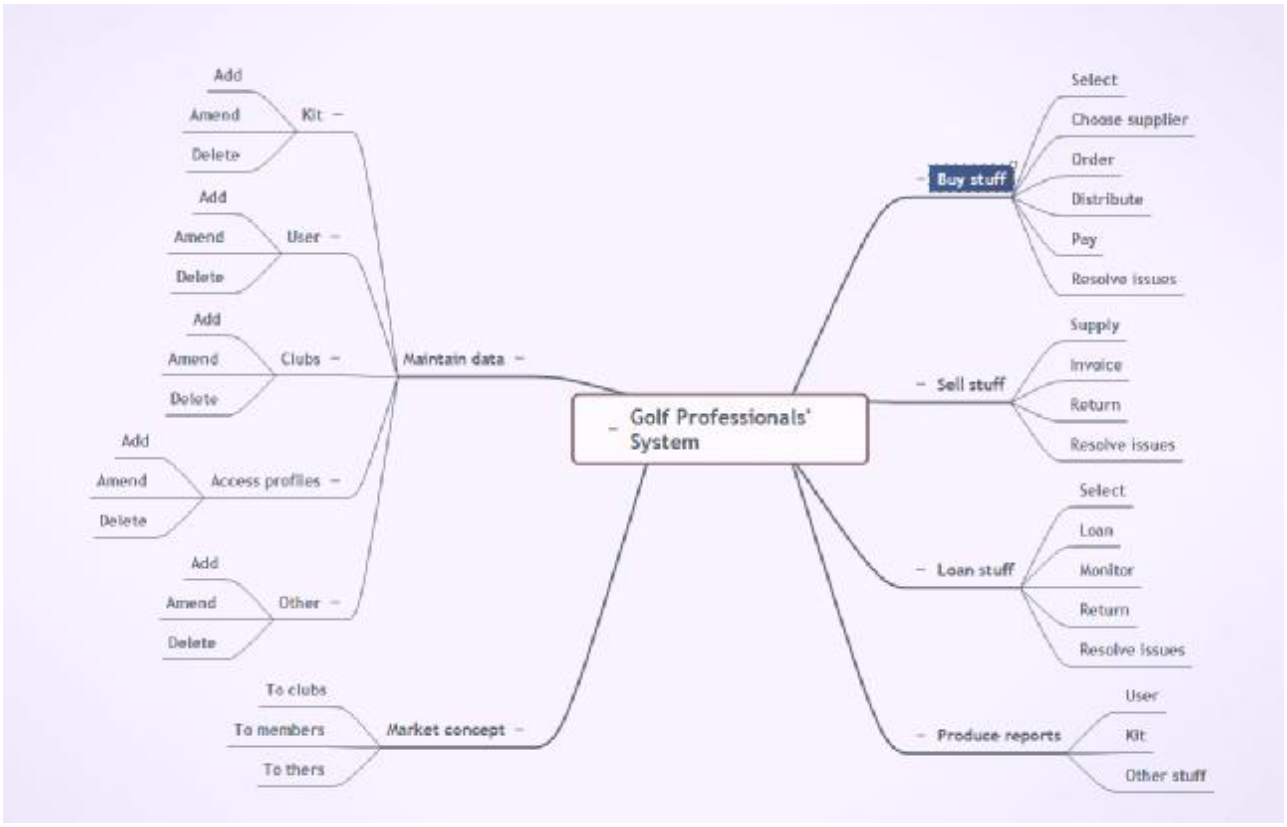
http://www.jcu.edu.au/studying/services/studyskills/mindmap/howto.html for a 'how to' guide
http://en.wikipedia.org/wiki/Mind_map which, if predictable, is really good too

The university has Mind Genius available on all machines and there is even freebie software available -

www.visual-mind.com is good and has a 30 day free trial which seems to be infinitely extensible if you keep downloading a new trail version.

http://freemind.sourceforge.net/wiki/index.php/Main_Page works well too even if it's a bit clunky to use and it's free for ever

Using Visual Mind makes the blob picture above seem much more credible as:



7 Marking Guides For the Dissertation

The following section contains the marking guide that is used for the dissertation. The guide describes the aspects being assessed and define the marks for each level of performance for that criterion. Most marks come from your project supervisor but some come from the assigned 'second assessor'. This is another member of the academic staff who will be aware of you and your disertation and provides a second opinion at various points of the dissertation journey. Read, learn and inwardly digest. The marks don't come from where I suspect you may think they might come from. There are very few marks indeed to be gained from the system itself!

6.1 General

Understanding: To what extent did the student develop their knowledge of the subject matter?

Poorly 0	1 2	3 4	5 6	7 8	Well 9 10
No understanding of subject matter shown in the dissertation	Only minimal understanding shown of subject matter. Little to suggest the student has studied the topic as a dissertation	A basic knowledge of subject matter is shown but in many areas this is superficial with many flaws visible	Adequate knowledge of subject matter is shown. In the main the student's work is fair but lacks giving required detail and depth in areas	Good level of knowledge shown related to the subject matter in some areas though misses minor details	Very high level of subject matter shown with all or near all aspects covered well

Development of Research Skills: To what extent did the student develop existing skills or acquire new knowledge in the areas of research and their specific subject area?

Not much 0	1 2	3 4	5 6	7 8	A lot 9 10
No new or existing skills developed	Only trivial skills learned or developed. Learning in the main is negligible. Not much in the way of totally new learning undertaken	Some skills developed either existing or totally new. The skills learned are basic and restrictive with further development possible	The student has developed some sound existing and new skills, but has room to have applied themselves to several more skills	A pleasing number of existing skills have been developed at depth. A large number of new skills have also been learned	The student has shown a high level of development related to the development of existing and new skills. In relation to the project substantive learning of skills is shown.

Achievement of aim/objectives: Broadly speaking, was the project successful in meeting its objectives? Where not achieved is there evidence to show how the objectives were pursued?

Not successful 0	1 2	3 4	5 6	7 8	Very successful 9 10
No address of objectives is shown	Very minor address shown. In the main most objectives are missed or only completed marginally and below a satisfactory level	Basic address of objectives in that each is addressed but achievement for each is weak	Suitable address in that objectives are met adequately but there is much scope for a greater depth in achievement	All objectives have been met and to a good level. In areas there is the scope to take some slightly further	All objectives have been well met to a thorough level. In general the dissertation will show a high level of deliverable related to each objective

6.2 Approach

Planning: Was the student's work well planned and carried out according to plan?

Badly planned 0	1 2	3 4	5 6	6 8 7	Well planned 9 10
The student did not plan well or carry out the work accordingly	Only trivial planning carried out evident by difficulties encountered in completing the dissertation	The student did basic prior planning in carrying out the dissertation, but did not always stick to the work set out	Suitable planning at the initiation phase with the dissertation being carried out well in accordance to this planning	Good level of initial planning completed identifying most problems. Throughout the student has managed to carry out the project in accordance to their initial planning	High level of planning completed at the initiation stage of the dissertation and throughout the dissertation managed to a very high level

Research Methodology: Was the work carried out methodically using an appropriate research strategy as well as appropriate tools and techniques?

Very poorly 0	1 2	3 4	5 6	7 8	Very well 9 10
No address of methodical approach or use of tools and techniques	Only weak adherence to a methodical approach. Tools and techniques weak to absent	Some evidence of following a simple methodical approach with attendant tools and techniques where required. Deliverables though will be poor due to the simplistic methodological approach.	Methodological approach is clearly present within the students work. Tools and techniques applied to a reasonable degree	Good methodological approach evident. Application of tools and techniques is of a pleasing standard and covers details to an appropriate standard	Very good level of methodological approach shown. Tools and techniques applied and completed to a professional level

Independence of Thought: Was the student's work independent or did he/she require excessive guidance?

Excessive guidance 0	1 2	3 4	5 6	7 8	Independent 9 10
Student unable to work independently at all, and/or no attempt to inform supervisor of progress	Excessive guidance required. The student unable to think for themselves. Continual reliance on supervisor support and leadership, no proactive attempt by the student to keep the supervisor informed about progress	A high level of support required to aid the student to complete the dissertation. Student informed supervisor of progress In some areas the student was independent but still required substantial support	Student in the main able to implement the project independently, informed supervisor of progress and only requiring moderate direction from the supervisor	The student completed the dissertation by directing most of its development from their own thinking and planning. Student fully informed supervisor as the work unfolded and showed mature discussion of its development.	The student worked very independently in completing the project Student fully informed supervisor as the work unfolded and showed mature discussion of its development as well as being able to provide original discussion on the research methodology and/or content as it progressed

6.3 Project Dissertation

Dissertation Structure: Was the dissertation well organised with appropriate sections (abstract, contents, introduction, conclusions, references, indices, etc.)? Is the dissertation of a professional standard?

Very poor					Very well
0	**1 2**	**3 4**	**5 6**	**7 8**	**9 10**
The written document does not adequately represent a dissertation	The dissertation will be very poor in presentation with its construction lacking elements of the dissertation (e.g. unsuitable structuring)	The created dissertation will be weak in its presentation. Sections required will be present but not addressed at a suitable level	A reasonable dissertation will have been produced with all required sections. In areas there will be minor deficiencies such as layout or poor referencing	A dissertation will have been produced of a good structure containing suitable sections and pleasing referencing.	A very good dissertation will have been produced showing no deficiencies in organisation. The work will be of a professional standard

Background: Does the dissertation provide appropriate context for the work undertaken, including the final deliverable?

Inappropriate					Appropriate
0	**1 2**	**3 4**	**5 6**	**7 8**	**9 10**
From the dissertation it is not evident what the context of the work is.	Only a minimal representation of the context of work undertaken. Dissertation does not portray a representative perspective of the work undertaken	It is evident that the dissertation does provide context for some of the work completed. However, detail is sketchy and in some cases missing	A fair address of the context of work is given but in several areas specific details are not documented well	A good level of detail is provided related to the context of the work undertaken. Only a few minor issues may have been omitted	A high level of detail is provided related to context. All areas of the dissertation are well addressed with no omissions

Work Undertaken: Does the report adequately represent the work undertaken by the student, in particular, identifying options available, decisions taken with rationale, and with relevant supporting details in appendices?

Very poorly					Very well
0	**1 2**	**3 4**	**5 6**	**7 8**	**9 10**
The dissertation is not representative of the work completed by the student	The dissertation produced does not present the work undertaken by the student well. Although it documents the work it is severely deficient	The dissertation represents the work the student has completed to a basic level. It will include identifying options, decision rationale and appendices but these will lack giving a suitable level of detail	A reasonable address of the work completed by the student has been completed. Decision rationale will be included as will discussion of options and appendices. The level of detail given will be lacking slightly	A good level of detail will be provided relating to decision rationale, identifying options and appendices. Only minor details may be omitted	A high level of detail shown throughout the dissertation related to identifying options, decision rationale, and supporting detail within the appendices

Evaluation of final deliverable: Does the dissertation provide an appropriate critical appraisal of the work undertaken, the deliverable produced and the results obtained from 'testing' the deliverable?

Very poorly					Very well
0	**1 2**	**3 4**	**5 6**	**7 8**	**9 10**
No appraisal included	Only a weak appraisal included no real critical detail provided, very superficial in nature	A basic appraisal is provided but is fairly weak omitting to address several important appraisal issues	Suitable appraisal given which addresses most areas but slightly lacking in depth	A good appraisal given covering nearly all appraisal aspects and to a good level of depth	A very high quality appraisal provided covering all issues to an extremely high standard

6.4 Presentation

Introduction/Background and Conclusion to dissertation: Did the student provide a structured introduction and conclusion which identified the important aspects of the work?

Very poorly — Very well

0	1 2	3 4	5 6	7 8	9 10
No introduction or conclusion	Weak introduction and conclusion given, failing to discuss the issues associated with the dissertation	Introduction and conclusion provides a limited discussion of the key issues associated with the dissertation	Satisfactory introduction and conclusion but lacking in detail in most areas	Good introduction and conclusion covering most areas of interest in detail. Some areas a bit sparsely discussed.	Very good introduction and conclusion covering all areas of interest in detail

Coherence of argument: How well was the student able to discuss their research activities and justify their decisions/findings?

Very poor — Very well

0	1 2	3 4	5 6	7 8	9 10
No discussion or consideration of major decision points or any discussion of overall findings	Some decision making processes are discussed but lack detail and clarity of the thinking process	Decision points and research activities mentioned but with little evidence to show any clear/appropriate thinking. Final findings not discussed relating to aim/objectives of research	Satisfactory discussions but lacking in detail. Final findings described but no critical review of the whole research process.	Justification is given for the choice of research activity and choices made with some gaps in the arguments. The final deliverable is discussed but the review does provide a clear critical review of the student's achievements.	Detailed discussion covering all aspects of research activities and choices made leaving no doubt that appropriate choices have been made. The final deliverable has been reviewed fully with the impact of the research discussed in context of the research area.

Questions and Answers: How well did the student respond to questions on the work and its context?

Very poorly — Very well

0	1 2	3 4	5 6	7 8	9 10
Unable to answer questions adequately	Showed a lack of understanding of the subject area while trying to answer questions	Hesitant or incorrect knowledge shown in answering questions showing a lack of commitment to the subject area	Satisfactory answers to questions given but more detail could be included in answers	Good answers in the main only lacking slightly more cohesive arguments	All questions answered well with a high level of depth provided within the answers

REFER / FAIL	
Grade Point 0 (0%)	
Grade Point 1 (1-19%)	
Grade Point 2 (20-29%)	
Grade Point 3 (30-39%)	
Grade Point 4 (40-42%)	
Grade Point 5 (43-46%)	
Grade Point 6 (47-49%)	

PASS	
Grade Point 7 (50-52%)	
Grade Point 8 (53-56%)	
Grade Point 9 (57-59%)	
MERIT	
Grade Point 10 (60-62%)	
Grade Point 11 (63-66%)	
Grade Point 12 (67-69%)	

DISTINCTION	
Grade Point 13 (70-73%)	
Grade Point 14 (74-76%)	
Grade Point 15 (77-100%)	

QAA descriptors

[http://www.qaa.ac.uk/academicinfrastructure/benchmark/masters/MastersDegreeCharConsult2009.pdf]

MSc **Programme characteristics**
Programmes in this category often have the following characteristics:
· they are predominantly composed of structured learning opportunities (are 'taught') although frequently at least a third of the programme is devoted to a research project, leading to a dissertation or the production of other output such as an artefact, performance or musical composition
· they are typically of 9 to 18 months' duration, with 12 months being most common, based on a fulltime
mode of study
· this category of master's degree includes integrated master's degrees, where master's level study is integrated with study at the level of a bachelor's with honours degree within a single programme
· this category of master's degrees also includes the MRes, where the student develops the ability to conduct research through a programme of structured learning
· degrees of this type are normally unclassified, although it may be possible to be awarded a merit, distinction or other grade, with the exception of the integrated master's that is often classified.

Programme purposes
Programmes in this category may have the following aims:
· to prepare students for the next stage in their careers, whether that is further academic or professional study, or entering employment of different kinds.

Intended entrants
Requirements for entry to a research master's programme (including the circumstances in which accreditation of prior knowledge, understanding and skills may be used) will be defined by the institution. However, programmes in this category often attract:
· entrants who have a background in the subject or a cognate subject area, acquired through previous study (a bachelor's with honours degree or equivalent) or experience.
In the case of integrated master's degrees, progression to the final two or three (in Scotland) years of the programme is determined two years before the intended year of completion and often requires higher grades than progression on the bachelor's degree alone.

Relationship to further study or employment
· Graduates of specialised/advanced master's programmes will normally be equipped to enter doctoral study in their discipline or to take up employment in both subjectrelated
and generalist environments.

Characteristics of graduates
11
Graduates of specialised/advanced master's degrees typically have:
i) subjectspecific
attributes
· an indepth
knowledge and understanding of the discipline informed by
current scholarship and research, including a critical awareness of current issues and developments in the subject
· the ability to complete a research project in the subject, which may include a critical review of existing literature or other scholarly outputs
ii) generic attributes
a range of generic abilities and skills that include the ability to:

· use initiative and take responsibility
· solve problems in creative and innovative ways
· make decisions in challenging situations
· continue to learn independently and to develop professionally
· communicate effectively, with colleagues and a wider audience, in a variety of media.

Engineering benchmark statement:
[http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/engineering.asp]