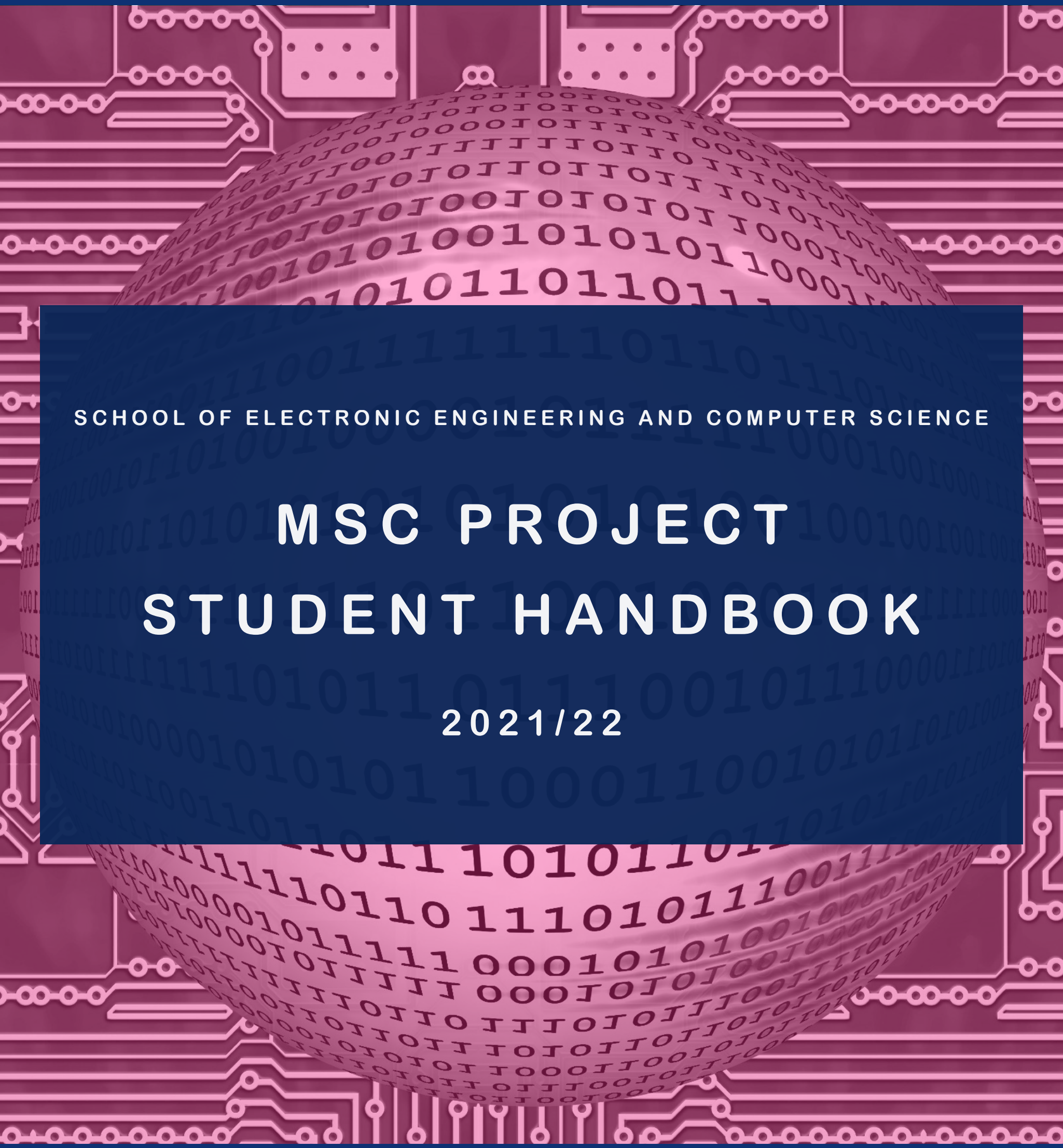
Queen Mary
University of London



SCHOOL OF ELECTRONIC ENGINEERING AND COMPUTER SCIENCE

MSC PROJECT STUDENT HANDBOOK

2021/22

SUPPORTED BY THE

institute of CODING

CONTENTS

1. INTRODUCTION

This handbook provides an overview of the MSc projects within the School of Electronic Engineering and Computer Science. You are strongly recommended to read and follow the guidelines within this handbook.

The MSc project gives you an opportunity to apply the techniques and technologies that you have learnt to a significant advanced project. This project will be an independent piece of work, which will either be significantly development based or else have a research focus.

All projects will be expected either to investigate or to make use of techniques that are at the leading edge. The project will be supervised by an academic member of staff from a relevant research area that will culminate in writing a dissertation, which will be in the form of a research paper that can be submitted to a conference or journal. This paper will be evaluated using the standard criteria for scholarly work. In addition to a research paper, projects will also include reflective essay and a viva component, where you will be required to explain and defend your project.

1.1 AIMS

The MSc project aims:

- To give you the opportunity to investigate or apply leading edge techniques or theories in a significant, extended piece of project work.
- To enable you to gain a deep understanding of a specialised area of Electronic Engineering and Computer Science.

1.2 WHEN SHOULD YOU START?

You are **strongly encouraged** to start doing some background reading during semester two, as you will be expected to submit a project specification on **28th February 2022**.

2. PROJECT SUPPORT

There will be a series of project support sessions given by the project coordinator to support you in your MSc project. Attendance to these sessions will be monitored*. There is also an area on QMPlus where the lecture slides can be found, along with other supporting material.

There is a forum on QMPlus for the MSc projects where discussions can take place. This will be monitored by the project coordinator, who will answer questions if this seems useful.

The forum is not a substitute for questions that your supervisor should be helping you with.

***Unsatisfactory attendance will be reported to your Programme Director.**

3. PROJECT SUPERVISION

3.1 GROUP SUPERVISION MODEL

Some supervisors may adopt a group supervision model, where students will either be working on a research or an implementation project. The research project will be related to the supervisor's area of interest/expertise, while the implementation project will be based on a particular platform identified by the supervisor.

The supervisor will allocate a series of common tasks that the students can initially work on together, however **each student project will need to produce a tangible output that is unique from the other projects within their supervision group**.

Below are some group supervision project examples:

Data Analytics Projects
This type of project will involve analysing a particular dataset under the designated supervisor. Students will work as a group during the project implementation phase for tasks such as data acquisition and cleansing. **The unique individual aspect of this project will include tasks such as performing particular data analysis**. The students will then write individual papers on which they will be assessed.

Research Projects
Students will work a project that will based on the research area proposed by the supervisor. This involve the students working as a research group, where each student project will address a **unique research problem**.

3.2 SELECTING A SUPERVISOR

On **22nd November 2021**, a list of supervisors and their project ideas/topics will be published on the EECS intranet landing page. Use this information to decide which member of staff you would like to contact in order to discuss project ideas.

Procedure for supervisor selection and allocation

1. Read the project ideas on the MSc Project QMPlus page. Make sure you carefully consider all the information before emailing a potential supervisor.

2. Before contacting a potential supervisor, download and complete the 'Proposal Form' that is available on QMPlus.

3. Contact the potential supervisor, by sending them an email with your completed initial proposal form. It is important that when you contact the academic member of staff that you demonstrate a keen interest and be well-informed about the potential project idea or the supervisor's areas of interest.

You will be expected to complete an online form (QMPlus), where you will need to select a shortlist of five academics that you would like to be supervised by. You are only allowed to contact the academics that you selected within your shortlist. Academic staff will not respond to your email if they are not selected within your shortlist on QMPlus.

4. If the potential supervisor is happy to supervise you, then he/she will claim you as a supervisee.

5. As soon as you have an agreement with a supervisor, you must a) make all other potential supervisors you were communicating with aware that you will be supervised by another academic and b) stop contacting any further supervisors.

6. The deadline for supervision selection is **28th January 2022**. After this date, you will be you will be allocated a supervisor by the Coordinator. These allocations cannot be guaranteed to perfectly match your interests, therefore it is vital that you be proactive in finding a supervisor who best matches your interests.

Supervisors have a quota of project students and the number of vacancies for taking on students will be updated online as students are claimed. Changing supervisors, once you have one, needs the agreement of your old and new supervisors.

3.3 KEEPING IN CONTACT WITH YOUR SUPERVISOR

It is important to meet with your supervisor regularly. If your project is not going well, tell your supervisor about it and definitely do not stop going to meetings.

If you have a particular issue that you cannot deal with in a regular meeting, email your supervisor for an appointment. It is likely that your supervisor will sometimes be away at research meetings or other events, so keep a note of these.

Keep track of your project progress, meetings with your supervisor, difficulties in diary/ notebook. It will help you to record issues you want to discuss with your supervisor when you meet and this site will be very useful when you are compiling content for your writeup.

Your time with your supervisor is limited. Hence it is essential that you make the most of this time. To do so, you need to have a good idea of what you wish to achieve during your supervision meetings.

3.4 STUDENT RESPONSIBILITIES

- You need to monitor the project progress. Your role is something like a project leader whereas the supervisor's role is more like a consultant and manager.

- You need to maintain regular contact and arrange appointments with your supervisor.

- It is your responsibility to gain the knowledge required and deal with implementation details. It is not the responsibility of the supervisor to provide ready-made solutions. You need to formulate the problems before asking your supervisor.

- It is important that you are self-motivated. You should not expect that you will be spoon-fed by your supervisor.

- You need to tell your supervisor about any equipment failure, technical or other difficulties, e.g. extenuating circumstances, that will interrupt your work.

- You can expect to receive a response from your supervisor and the project co-ordinator to e-mails and telephone messages within five working days (excluding weekends and any holidays). If there is no response then please notify the project co-ordinator.

3.5 SUPERVISOR RESPONSIBILITIES

- It is the supervisor's responsibility to define the project objectives and the possible outcomes, or to refine these and check whether they are adequate if you have suggested your own project.

- The supervisor will provide advice and guidance but leave solutions and implementation details to the student.

- The supervisor will explain the project assessment method to the student and be responsible for evaluating the student's project in terms of quality and quantity of the effort expended.

- Your supervisor is not obliged to chase you if you fail to keep appointments with him/her.

4. PROJECT DELIVERABLES

4.1 WEIGHTING OF PROJECT ELEMENTS AND DEADLINES

The weightings and deadlines are as follows:

Project Element	Assessed by	Weighting	Deadline	Submission Location
Project definition	Not assessed but approved by supervisor	0%	**28th March 2022**	QMPlus
Draft dissertation research paper	Not assessed, however supervisor will provide feedback	0%	**11th July 2022**	QMPlus
Final dissertation research paper, reflective essay and supporting documentation	Supervisor and second examiner	100%	**15th Aug 2022**	QMPlus
Presentation Video	Supervisor and second examiner		**17th Aug 2022**	QMPlus
Presentation at Viva*	Supervisor and second examiner		**22nd Aug to 2nd Sept 2022**	Location: Online

Key

Formative Assessment	Summative Assessment

***Failure to attend the viva will lead to mark of zero for the project.**

4.2 PROJECT DEFINITION

You will be expected to submit a project definition document on **28th March 2022**, which should be a 3-4 page description your project. The contents of this document will vary, as it will dependent on the type of project you are undertaking. Hence this document may include:

- Details of the specific problem being addressed.
- An initial analysis of user requirements and data collection methods.
- The algorithms, methodologies and techniques to be employed.
- An initial specification of how users will interact with the system.
- Programming languages, software, hardware, databases.
- A list of background materials consulted so far, including internet resources.

This document should also include a work-plan, which will illustrate:

- What you are going to do? e.g. tasks and sub-tasks
- When you are going to do it? e.g. time-periods

You can present this information as you wish, e.g. a list of tasks and sub-tasks with outcomes and dates, or in the form of a Gantt chart.

4.3 DISSERTATION - RESEARCH PAPER

In order to document your project findings and results you will need to a write a dissertation, which will be in the form of a research paper that can be submitted to a conference or journal. This paper will be evaluated using the standard criteria for scholarly work. The submission deadline for your dissertation is **15th August 2022**. This will be assessed by your supervisor and second examiner.

PLEASE DO NOT SUBMIT YOUR PAPER TO A PEER-REVIEWED JOURNAL/ CONFERENCE OR ONLINE ARCHIVES WITHOUT SEEKING PERMISSION FROM YOUR SUPERVISOR.

The structure of your research paper will vary depending on the nature of the project, however the basic structure of your paper will include:

- **Abstract**
- **Introduction**
- **Related work** - “What others have done?”
  - Background research (primary research)
  - and/or literature review (secondary research)
- **Methodology** - “What you have done?”
  - Requirements capture / analysis – what your system should do
  - Design – how you went about your work
  - Implementation – practical techniques, problems, solutions
  - Testing and/or evaluation – how well your solution worked
- **Results**
- **Discussion / Conclusion**
  - This should be a critical analysis of your work and an honest appraisal of the achievements of your project.
- **Future work**
  - Discuss how your current work can be extended, which provides readers with an insight on new research directions.
- **References**

4.3.1 PAPER FORMAT

- Two column format
- 8 pages - This excludes references and appendices.

A template (LaTEX and word) is available on QMPlus, which has the correct formatting required for submission.

ECS7500P (MSc Advanced Research Project) and ECS754P/ECS753P (MSc by Research Project) students will be expected to produce a dissertation research paper that will be 12 pages (excludes references and appendices). The extra four pages should reflect more substantial results, which translates into a more in-depth literature review, design, analyses and evaluations.

4.4 REFLECTIVE ESSAY

You will also need to submit a 5 page reflective essay, which will supplement your research paper. The reflective essay is a part of the making criteria for the project as a whole, as it is not an individual component. The purpose of the essay is to allow you to elaborate further on the points below and include a reflective account of the project that would not normally be in a research paper.

- Analysis of strengths/weaknesses
- Presentation of possibilities for further work
  - Work that you would have conducted if you had more time.
- Critical analysis of the relationship between theory and practical work produced
- Awareness of Legal, Social Ethical Issues and Sustainability

This essay has a submission deadline of **15th August 2022**. This will be assessed by your supervisor and second examiner.

Degree Apprenticeship students will NOT need to submit a reflective essay.

4.4.1 ESSAY FORMAT

- Font face: Arial
- Font size: 11
- Single line spacing
- Single column
- 5 pages max (excluding references)

A word template is available on QMPlus, which has the correct formatting required for submission.

4.5 DRAFT RESEARCH PAPER

You will have the opportunity to submit a draft version of your research paper on **11th July 2022** to your supervisor. This will not be assessed, however it is a fantastic opportunity for you to get feedback before the final submission of the paper.

4.6 PROJECT VIVA - VIDEO AND VIVA SESSION

The viva assessment will be split into two sub components:

1. Presentation Video
2. Viva Q&A Session

The viva assessment will be assessed by your supervisor and second examiner. Please note that the viva itself informs the project mark. The viva should **not** be treated as a separate component from the project itself. Hence a viva can both increase and decrease the mark gauged from the project documentation (i.e. dissertation paper and reflective essay).

4.6.1 PRESENTATION VIDEO

Video is a powerful medium to disseminate your project, as it gives you an opportunity to showcase your project to a wider audience and provide further insights. In relation to this, you will need to create a 10 minute presentation video (±10% duration), where you will be expected to provide an overview of your project and contributions. This is a unique opportunity for you to convince your examiners that your project is of high quality and interesting. The purpose of this presentation video will be to provide an overview of the:

- area you worked in,
- the statement of the problem you investigated,
- the description of the methods used to solve the problem,
- a demonstration of the practical/implementation work,
- a summary of your work,
- a presentation of your results (both positive and negative).

This presentation video has a submission deadline of **17th August 2022**.

4.6.2 VIVA Q&A SESSION

During the period **22nd August to 2nd September 2022**, you will be allocated a time-slot where you will be assessed on your ability to answer questions about your project to your examiners. This session will be 20 minutes, where you will be expected to answer questions about your project contributions (i.e. methodology and demo), which will also include questions about implementation (i.e. coding).

If you fail to attend the viva then you will receive a mark of zero for the project.

You will also fail your project if you fail to submit the dissertation research paper, reflective essay, supporting documentation and presentation video.

5. PROBLEM DEFINITION

An excellent project is dependent on the construction of a clear problem definition. Stating the problem to be solved is more than just writing a series of anecdotal notes for the reasons that have motivated you to develop some hardware or write a particular piece of software. For example, it is not sufficient enough to write that you have an interest in healthy living and you wish to develop an application that supports users within the elderly community by providing them with intelligent recommendations to lead an independent and healthy lifestyle. This motivation may be a good starting point for a project of your choice. However, you need to do some reading to establish the nature of Electronic Engineering or Computer Science that would be required to solve this particular problem.

The method to investigate the underlying problem will require reading books, and research articles (e.g. conference and journal papers).

In relation to the project example above, you would do the following:

- Read research articles on current software systems developed to encourage health and wellbeing within elderly communities.
- Investigate and review the range of functionalities they support.
- Identify issues and shortcomings.
- Investigate current software frameworks adopted to solve this problem.

It is essential that you have a clear idea of the underlying problem you are trying to solve; therefore it is strongly recommended that a suitable starting point for research will be to use the following resources:

- ACM Digital Library - https://dl.acm.org
- IEEE Xplore Digital Library - http://ieeexplore.ieee.org/Xplore/home.jsp
- Google Scholar - https://scholar.google.co.uk

It is essential that you create notes and summaries of the references that you find useful, as these will be useful when writing your literature review, which is a significant component of your interim and final report.

6. RESOURCES

6.1 HARDWARE

There is an area of the electronics laboratory for project hardware development and you can request to be allocated a cupboard space in the lab to keep your hardware and work on your project.

The electronics lab provides a supply of basic electronic parts and you can take parts from the carousel in the 3rd floor electronics lab. For other specific parts you must request that an order form is created. The Lab Manager can authorise purchases up to £15, your supervisor up to £50 and above £50 the Project Coordinator must authorise. The total maximum budget per project is £100. Check whether we have parts already before you order anything, and we prefer that parts can be re-used. Any items purchased yourself cannot be reimbursed. The project remains property of QMUL and should be returned to the Lab upon completion of project.

Be careful about the package that integrated circuits use. Standard DIL packages are good for development on breadboard and strip board, but surface mount parts must have adequate adapters or fabrication of a suitable PCB must be considered before purchasing. If you need to have a PCB manufactured, also see the PCB technician to discuss complexity and lead times for manufacture. All purchasing and fabrications need to have been authorised appropriately before purchase or works are commenced.

You can check a general guide to the items stocked in the lab at: http://services.eecs.qmul.ac.uk/eecs-laboratories/electronics-labs/components/.

All components not available in the carousel still need to be ordered, even if stocked.

To request a cupboard/order form email electronicslab@lists.eecs.qmul.ac.uk and copy your supervisor.

If you are using microcontrollers, check that we have access to a software development environment and programming capability for your chosen part.

Note: The project budget is only hardware-based projects, where you require electronic components to build a system, as opposed to purchasing off the shelfs products to be an add-on to your system.

6.2 SOFTWARE

Final year students have access to all ITL floors when there are no scheduled labs (check lab timetables via your landing page). This is booked space, hence you will need to book a space before going to work in the ITL. Even when there are labs, you may be able to access the unused machines. However, you must always be considerate of labs that are running in the ITL.

All the software you need should be available, but if you think you need something else please consult the EECS services support staff and your supervisor.

7. ETHICS AND PROJECTS THAT INVOLVE HUMAN PARTICIPANTS

The obvious ethical issues are fraud (e.g. passing off work that was done by someone else as your own) and plagiarism (which will be discussed further in Section 8.4). However, projects that involve human participants, e.g. user studies or experimental evaluations, also involve ethical issues. The principal issues are ensuring that participants have given informed consent and ensuring that personal details are protected in accordance with the Data Protection Act. You will find a checklist for ethical issues concerning projects that include human participants on the project QMPlus pages. If your project involves human participants, please discuss these issues with your supervisor.

8. REFERENCING AND PLAGIARISM

8.1 REFERENCING

There are standard ways of referring to documents that you have accessed when you want to show the source of the information in your reports. The two main systems are the Harvard and Vancouver styles. The Harvard system has the author's name and year appearing in the text, which links to a list at the end of the document. The Vancouver system has a number appearing in the text as a superscript or in brackets, which links to a list at the end of the document. Our Faculty requires students to use the Harvard system.

8.2 THE HARVARD SYSTEM (REQUIRED)

In the text

In his recent article, Leyden (2005) claimed that…

Google's new IM service has had a less-than-enthusiastic reception (Leyden 2005) "Early reaction to the service has been lukewarm." (Leyden 2005)

Reid and Dunlop (2003 stated that…

Beymer et al (2005) stated that... (3 or more authors)

Fig. 1. Audio classification framework (Divakaran 2004, p.29)

Web references

Leyden, J. (2005) Google Talks Up IM Service. The Register [on-line].

Available from http://theregister.co.uk/2005/08/24/google_talk/ [Accessed 7 November 2014]

Department of Health (2006). Fluoridation of drinking water [online].

Available at: http://www.dh.gov.uk/assetRoot/04/13/60/15/04136015.pdf [accessed 13/9/2006].

Book reference

Naisbitt, J. (1984). Megatrends. New York: Warner Books.

Periodical (journal) reference

Raikkonen, K., Pesonen, A.K., Jarvenpaa, A.L. & Strandberg, T. E. (2004).

Sweet babies: chocolate consumption during pregnancy and infant temperament at six months. Early Human Development, 76 (2), 139-145.

Conference proceedings reference

Beymer, D., Russell, D. and Orton, P. (2005) Wide vs. Narrow Paragraphs: An Eye Tracking Analysis. **In:** Costabile, M.F. and Paternò, F. eds. Human- Computer Interaction – INTERACT 2005. Proceedings of the Tenth IFIP TC13 International Conference, LNCS. Vol. 3585. pp. 758 - 792. Heidelberg: Springer-Verlag.

8.3 THE VANCOUVER SYSTEM (FOR INFORMATION)

In the text

Mean opinion scores do not correlate well with PSNR values for video [43]. Or Mean opinion scores do not correlate well with PSNR values for video [43].

The reference

43. Sotelo R, Joskowicz J, Anedda M, Murroni M, Giusto DD. Subjective video quality assessments for 4K UHDTV. 2017 IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB): 1-6.

Full details on referencing can be found in the Reference It! Section of the **Find It! Use It! Reference It! QMUL Information Literacy Skills 2017/18** on QMPlus. There are various guides available to the Harvard and Vancouver styles on the Internet.

8.4 PLAGIARISM

Plagiarism effectively means presenting the work of others without stating where it has come from (sourcing), or to put it simply, trying to pass off someone else's work as your own. The formal definition from the College is:

" *QMUL defines plagiarism as presenting someone else's work as one's own irrespective of intention. Close paraphrasing; copying from the work of another person, including another student; using the ideas of another person without proper acknowledgement; and repeating work that you have previously submitted – at QMUL or at another institution - without properly referencing yourself (known as 'self plagiarism') shall also constitute plagiarism.*" (Academic Regulations 2.103, page 36, available at http://www.arcs.qmul.ac.uk/media/arcs/policyzone/academic/Academic-Regulations-2018-19-FINAL.pdf)

Unfortunately, including material without proper acknowledgement has become far too common and QMUL takes a **very firm line** on any such offences.

If you are suspected of plagiarism, you will be reported to the Academic Registrar for an examination offence under the QMUL *Regulations for Assessment Offences*. Under these Regulations, students found to have committed an offence may have their whole diet of assessments invalidated or be expelled from the College.

A range of methods, including special software tools such as TurnItIn, is used to detect plagiarism, and project reports are routinely put through an electronic plagiarism detection system.

9. PROJECT MARKING POLICY

Project marking policy for postgraduate projects:

- The pass mark for the project is 50%.
- The final report and viva are worth 100% of the final project mark, which is assessed by two examiners (supervisor and second examiner).
- When there is a discrepancy of 10% or less between the marks of both examiners then the average is taken as the final mark; unless marks span pass/fail.
- When there is a discrepancy of 10% or less between the marks of both examiners and the marks span the pass/fail borderline, then both examiners will discuss for agreement, if no agreement then the project will be assessed by a third examiner.
- When there is a discrepancy of greater than 10% between the marks of both examiners, but is within the same grade i.e. Distinction or Fail, then the average is taken as the final mark.
- When there is a discrepancy of greater than 10% between the marks of both examiners, across different grades then both examiners discuss for agreement. However, if no agreement is reached then the project will be assessed by a third examiner.
- Third examiner marks will account for 95% of the final project mark, as the 5% of the viva mark (average mark of both examiners) would have already been assessed, hence the marks from this component will remain the same.
- Normally the third examiner mark remains within the original two examiner marks.

10. RESITTING A PROJECT

Resit projects follow separate procedures - you will receive information by email. You are entitled to feedback on your previous attempt and on your revised draft report from your supervisor (or another appropriate member of staff, if your supervisor is not available). Assessment is by project report and viva. Your overall resit project mark is capped at the minimum pass mark of 50%.

11. CALENDAR - IMPORTANT DATES

Semester	Week Commencing	Week	Session	Activity	Project Deliverables
1	18th Oct 2021	4	Introductory Lecture 20th Oct 2021		
	22nd Nov 2021	9		Supervisor selection/adoption window opens 22nd Nov 2021	
2	24th Jan 2022	1		Supervisor selection/adoption window closes 28th Jan 2022	
	7th Feb 2022	3		Supervisor Allocation Complete 7th Feb 2021	
	14th Feb 2022	4	Project Definition and Research Methods TBC		
	28th Mar 2022	10			Project Title Approval 28th March 2022 **DA Students ONLY** Project Definition 28th March 2022
	4th Apr 2022	11	Literature Review and Plagiarism TBC		
	11th Apr 2022	12	Project Deliverables and Ethics TBC		
3	11th July 2022	-			Draft Dissertation Paper 11th July 2022
	15th Aug 2022	-			Dissertation Paper and Reflective Essay 15th August 2022 Video Submission 17th August 2022
	22nd Aug 2022	-			Viva Period 22nd August to 2nd September 2022
	29th Aug 2022	-			

APPENDICES

APPENDIX A - MARKING SCHEMES

MSC MARKING SCHEME – DISSERTATION PAPER, REFLECTIVE ESSAY AND VIVA

	%	0 – 49% Poor	50-59% Satisfactory	60-69% Good	70-79% Very Good	80-89% Excellent	90-100% Outstanding
PROBLEM DEFINITION, BACKGROUND, LITERATURE REVIEW, AIM AND OBJECTIVES • Clarity of problem definition • Critical analysis of the literature, which leads to new insights • Critical awareness of current problems • Demonstration of established research techniques to create and interpret knowledge • Clarity of the project aims • Clarity and relevance of project objectives ***Determined by dissertation paper and viva***	**25**	The problem is not substantial for a master's project. The report has an adequate overview of a few relevant papers with no critical analysis or new insights. The student has not defined the aims and objectives of the project.	The problem definition has very little substance, as it is informed by anecdotal experiences, as opposed to research. The report has a satisfactory review of relevant papers with limited critical analysis. The student has partially demonstrated established research techniques to create and interpret knowledge. Limited awareness of current problems. The student has defined the aims of the project, however the objectives are vague.	The problem definition is informed by research. The student has also defined a series of research questions. The report has a review of relevant papers with some critical analysis, but no new insights. The student has demonstrated established research techniques to create and interpret knowledge. There is awareness of current problems, with limited critical analysis. The student has clearly articulated the aims of the project, with a series of relevant objectives.	Meets the 'Good' criteria and the following: Very good, concise review of relevant papers with critical analysis, relevant to the context of the project. This also includes a few new insights. Objectives clearly support the project aims.	Meets the 'Very Good' criteria and the following: Excellent literature review with a concise critical review relevant to the context of the project, which also identifies gaps in knowledge and new insights.	Meets the 'Excellent' criteria and the following: Evidence of extra-curricular academic reading, critical thinking and original interpretation.

	%	0 – 49% Poor	50-59% Satisfactory	60-69% Good	70-79% Very Good	80-89% Excellent	90-100% Outstanding
ACHIEVEMENT • Achievement of aims and objectives • Use of advanced methodologies, tools and techniques • Understanding and application of the concepts relevant to the discipline • Evidence of advanced problem-solving skills • Originality in tackling and solving problems • Quality of output/solution (including creativity and innovation – forefront of the specialisation) ***Determined by dissertation paper and viva***	**30**	The student failed to achieve the aims and objectives of the project. The student did not use advanced methodologies, tools and techniques. There is no evidence of use of problem-solving skills. The student has not produced sufficient deliverables. Quality and completeness of work is poor.	The student has partially achieved the aims and objectives of the project. The student has provided limited evidence of advanced methodologies and tools for the practical element for this project. Some evidence of problem-solving skills, but they are not advanced for the level of study or founded on solid and sound discipline knowledge. Evidence of effort, but implementation may be only partially functional. Lack of originality in solving the problem.	The student has provided clear evidence of achieving the aims and objectives of the project. The practical element is good; however, it lacks rigour and has not been implemented correctly. Evidence of advanced problem-solving skills.	Meets the 'Good' criteria and the following: The student has adopted a sound methodology to solve the project problem. Advanced problem-solving skills steeped in discipline knowledge are demonstrated throughout the project. Achievement not substantial enough to warrant top mark, e.g. it may contain some ambiguities or faults. Student has demonstrated originality in solving the problem.	The student has adopted a rigorous methodology to solve the project problem. Advanced problem-solving skills used both within and outside student's core discipline or skillset (developed by the degree program). The student has produced a considerable output in terms of creativity and innovation. There may be some minor faults in execution or understanding.	Meets the 'Excellent' criteria and the following: Project objectives have been exceeded. The project demonstrates depth of conceptual thinking and methodological rigour. The project has made a contribution to the field.

	%	0 – 49% Poor	50-59% Satisfactory	60-69% Good	70-79% Very Good	80-89% Excellent	90-100% Outstanding

QUALITY OF WRITING/REPORT
 	
• Clarity of ideas
  ○ Style – technical precise, concise and formal wording
  ○ Logic – reasoning
  ○ Flow – the purpose of each section is clear. The links between and within sections are established
• Communicate conclusions to specialist and non-specialist audiences.
• Quality of figures and legends
• Correct referencing
 	
Determined by dissertation paper
	14	The write-up is unclear or written badly.
		
		It is very difficult to understand core ideas.
		
		The write-up is disorganised.
		
		Figures and figure legends are of insufficient quality.
		
		There is no referencing/ done incorrectly.
			The write-up is somewhat incoherent, rushed, contains important omissions, or irrelevant material.
			
			Figures and figure legends are of satisfactory quality.
			
			Referencing is satisfactory, but incomplete for some claims or sections.
				Adequate write-up, lacking clarity or detail in places, or containing irrelevant material. Good use of technical language.
				
				Figures and figure legends are of good quality, as they are helpful for understanding the project.
				
				It is easy to understand the core ideas.
				
				Referencing supports claims well, is used well, and uses consistent format throughout.
					Clear write-up with logical structure and good flow. Precise, technical, formal style.
					
					Figures and figure legends are of very good quality. Graphs are clear, fully annotated, easy to read and used appropriately to support claims.
					
					Referencing is good and follows a standard consistently.
						Very good write-up with a logical structure, good flow, technically precise and concise style.
						
						Figures demonstrate conceptual thinking; graphs are fully annotated, are easy to read and interpret, provide insight, and fully support claims and conclusions; figure legends are concise and informative.
						
						Referencing is employed throughout and follows the prevailing or recommended discipline standard.
							All criteria for “excellent” met. Only very minor faults in execution, depth of understanding or write-up.
							
							Close to faultless in execution and write-up.

	%	0 – 49% Poor	50-59% Satisfactory	60-69% Good	70-79% Very Good	80-89% Excellent	90-100% Outstanding
EVALUATION, TESTING AND ANALYSIS • Adequacy and rigour of testing • Quality of the documentation of testing • Critical analysis of results • Analysis of strengths/weaknesses • Presentation of possibilities for further work • Critical analysis of the relationship between theory and practical work produced • Awareness of Legal, Social Ethical Issues and Sustainability • Critical evaluation of the project process ***Determined by dissertation paper, reflective essay and viva***	**16**	For **implementation-*based*** projects, testing is insufficient or poorly designed, so that it does not support the claims. For a ***research-based*** project, there is no critical analysis of the results. Weaknesses and improvements are not considered. For both types of projects, critical analysis is not attempted. Documentation is poor. There is no reference to the legal, social and ethical issues and sustainability.	For **implementation-*based*** projects, testing is attempted but is not complete or has design flaws. Testing documentation lacks detail or is incomplete. For a ***research-based*** project, the critical analysis of the results is trivial. Weaknesses are only partially identified. For both types of projects, the the evaluation is limited, e.g. it is primarily based on informal observations or the results do not fully bear out the conclusions. Documentation is patchy; it provides information but not insight. Description of procedures lack detail. Result tables do not support drawing of conclusions. There is a very brief reference to the legal, social and ethical issues and sustainability.	For **implementation-*based*** projects, testing may be designed and planned well, but it is not comprehensive, or it may lack rigour. Not all requirements are fully verified by testing. For a ***research-based*** project, critical analysis of results is presented but may lack rigour or may present some reasoning flaws. Weaknesses and improvements have partially been considered, but some gaps remain. For both types of projects, the evaluation lacks rigour in execution and reasoning. Documentation enables replication of tests. Tables are used appropriately to document test conditions and results and support drawing of conclusions. There is awareness of the legal, social and ethical issues and sustainability, but complex issues are not explored.	For **implementation-*based*** projects, testing verifies majority of requirements using rigorous and well-documented procedures with only minor flaws. For a ***research-based*** project, there is evidence of critical analysis of results. Weaknesses and improvements have been considered to some depth. For both types of projects, documentation provides the detail that enables scrutiny and replication of tests. For both type of projects, the student adopted rigorous evaluation process and the results fully support conclusions. There is awareness of the legal, social and ethical issues and sustainability that goes beyond the obvious or the trivial.	For **implementation-*based*** projects, there is evidence of thorough and flawless testing. For a ***research-based*** project, there is critical analysis of the results. Weaknesses and improvements have been fully thought out with well-supported arguments. For both types of projects, the evaluation provides an evidence-based critical analysis of the project, drawing strongly on deep discipline knowledge. Documentation is detailed, methodical, rigorous, and clear, enabling replication of tests and proper scrutiny of results. There is a clear awareness of the legal, social and ethical issues and sustainability, with some complex issues teased out.	For **implementation-*based*** projects, there is comprehensive testing. Analysis of strengths & weaknesses are present. Documentation is outstanding (includes details to allow replication). For a ***research-based*** project, there is critical analysis of methods and results. Weaknesses and possible extensions are argued well and offer further interest in the topic. Documentation is outstanding (includes details to allow replication). There is a very clear awareness of the legal, social and ethical issues and sustainability.

	%	0 – 49% Poor	50-59% Satisfactory	60-69% Good	70-79% Very Good	80-89% Excellent	90-100% Outstanding
DIFFICULTY LEVEL AND AMBITION • In light of the student's prior knowledge, level of difficulty of the project in terms of understanding and implementation • Demonstrate self-direction in planning and implementing project tasks at a professional level ***Determined by dissertation paper, reflective essay and viva***	**10**	Level of difficulty is insufficient. E.g. the project may have replicated existing work without adding contribution, or execution is trivial for the level of study within the student's core discipline. The student has produced very limited or incomplete deliverables (code, hardware, paper). No evidence of troubleshooting or seeking work-arounds when problems were encountered.	The level of difficulty is basic and satisfactory. The project produced a working solution with only basic functionality. Novelty and contribution are minor or trivial. Some evidence of troubleshooting or seeking work-arounds when problems were encountered.	Project not particularly ambitious, however the student has implemented a good project or a working solution to the problem. Evidence of resourcefulness: student proactively sought alternative routes to solving issues in the project. Evidence of good troubleshooting skills.	The challenge that was set was met with correct and confident application of the scientific or engineering methods. Evidence of resourcefulness: Student proactively sought alternative routes to solving issues in the project. Evidence of good troubleshooting skills. Evidence of critical thinking in all stages of the project, including when tackling unforeseen difficulties.	Meets the 'Very Good' criteria and the following: The student has produced a considerable body of deliverables in terms of both software/hardware and write up. Excellent troubleshooting skills. Evidence of lateral thinking and proactive engagement with challenges.	Meets the 'Excellent' criteria and the following: Challenging goals, and substantial deliverables, which have the potential to inform further development or study (e.g. publication).

	%	
VIVA PRESENTATION VIDEO AND Q&A SESSION	**5**	• Quality of Video – organisation, presentation and does not exceed the maximum time of 10 minutes (+/- 10%). • Contribution - The video highlights the contribution that this project makes. • Ability to answer questions - synthesis and ability to defend • Confidence in answering questions related to the practical/implementation (i.e., code) aspect of the project • Demonstration of knowledge and understanding