SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

MASTERS PROJECT HANDBOOK

Contents

1 Introduction

Purpose of This Document

This handbook contains information about the ELECENG 7058 Masters Project. It is intended to serve as a first point of reference for any queries.

Who This Document is For

This document was written for students taking the ELECENG 7058 Masters Project course.

2 Course Description

ELECENG 7058 Masters Project (12 units)

Aims: The masters project aims to train students in research and development methodology and techniques, develop critical evaluation skills appropriate to their project topic, and provide project management experience.

Outcomes: At the end of this course, students are expected to have gained skills in engineering design, research and verification, critical evaluation of findings and project management.

Assumed Knowledge: ELECENG 7057 Engineering Communication and Critical Thinking or equivalent experience in professional and academic communication and analytical thinking.

Delivery Methods: Students shall work in groups on a two-semester research and development project under the supervision of an academic staff member. Students shall attend a school structured program in the first project semester. Students are expected to attend all EEE weekly research seminars throughout the course of the masters project.

Students shall meet the supervisor regularly to report the progress. The results of the project work shall be presented in written report form, by seminar and demonstration of the completed work.

Course Contents: The course consists of a project work, a structured program and a research seminar program.

The project work is to perform research and development to provide solutions to engineering problems related to industry or to school research, with emphasis on project management and effective communication.

The School structured program consists of the School Induction, the Barr Smith Library tutorial and the Masters Project tutorial.

The School Induction includes the following topics:

- layout of school and introduction to key staff
- building access and security
- access to computing facilities and policies on their use
- access to telephones and policies on their use
- Occupational Health and Safety issues, including evacuation procedures, location of first aid assistance, laboratory and workshop rules.

The Barr Smith Library tutorial is to be done in conjunction with library staff and includes an introduction to online search and database facilities.

The topics in the Masters Project tutorial include managing teamwork, project planning, report writing and presenting seminars.

The School research seminar program consists of attendance at weekly research seminars presented during the semester teaching weeks in the School of Electrical and Electronic Engineering.

Duration: Projects are to span the two full semesters. Each student is expected to work approximately 270 hours each semester.

Assessment: Students shall be assessed on the performance of research, planning, execution and management of the project, as well as on the quality of the project deliverables. The assessment is conducted in stages over the two project semesters. The project assessment consists of three modules. They are

- Project Performance Assessment
- Reports Assessment, and
- Seminars Assessment.

The assessors are the project supervisor and the moderator. The assessment role of the supervisor is to provide primary marks on all the three assessment modules. The role of the moderator is to provide secondary assessment to moderate the marks of the supervisor.

The contributions of the assessment components and the assessors are weighted as follows.

Table 2.1: Assessment components and weighting

	Individual/Group Mark	Supervisor	Moderator	Sub-Total
Project Performance				
First Semester	Individual	5%	-	
Overall	Individual	25%	5%	
Sub-Total				35%
Reports				
Project Plan	Group	5%	5%	
Mid-Project Design Document	Group	5%	-	
Final Report	Individual	5%	5%	
Research Paper	Group	5%	5%	
Final Project Design Document	Group	10%	-	
Sub-Total				45%
Seminars and Demonstration				
Project Plan Seminar	Individual & Group	2.5%	2.5%	
Final Seminar	Individual & Group	5%	5%	
Final Demonstration	Individual & Group	2.5%	2.5%	
Sub-Total				20%
TOTAL		70%	30%	100%

Course Schedule: The activity schedule for the two project semesters is shown below.

Table 2.2: Project schedule for the two project semesters

Date	Activity	Deliverable
First Project Semester		
Orientation Week	Projects open to students for selection	
Week 1, Monday, 9am	Project allocation	
Week 1	Meet supervisor and group members Sign Project Work Contract Begin project work	
Week 1– Week 3	Attend School Induction Attend Barr Smith Library Tutorial	
Week 1 – Week 12	Attend Masters Project Tutorial Attend all EE regular research seminars	
Week 6, Thursday, 2pm	Submit Project Plan§	Plan
Week 7	Present Project Plan seminar Project Plan report and seminar assessment by supervisor and moderator	Seminar
Week 12, Thursday, 2pm	Submit Mid-Project Design Document§ Submit project workbook	Document Workbook
Week 13	Review progress with supervisor End first part of project	
Week 14, Friday, 2pm	Project performance assessment by supervisor	
Second Project Semester		
Week 1	Begin second part of project	
Week 1 – Week 12	Attend all EE regular research seminars	
Week 11, Friday, 2pm	Submit Final Report (Individual)§	Report
Week 11, Friday, 2pm	Submit Research Paper§ Submit Final Design Document§	Research Paper Final Design Document
Week 12	Present final seminar and demonstration	Seminar
Week 12, Friday, 2pm	Submit project workbook Submit documentation CD	Workbook Documentation CD
Week 12	Perform project close-out Hold lessons-learned meeting Calibrate	
Week 14, Friday, 2pm	Project assessment by supervisor and moderator	

§ These reports shall be submitted to the EE School Office. A late penalty of 20% of the maximum report marks is applied for each day beyond the nominal submission date. Supervisors will vary this rule only in the most unusual circumstances, and then only with the approval of the Head of School.

Important Dates: The calendar dates of the activities in the activity schedule can be found on the University website: www.adelaide.edu.au/student/info/dates.

Course Notes: The main source is in the Masters Project Handbook and MyUni webpage.
Graduate Attributes: The course facilitates an environment in which graduates are encouraged to take personal responsibility for developing the following attributes.

GA1 An advanced level of knowledge and understanding of the theory and practice of engineering and the fundamentals of science and mathematics that underpin these disciplines.

GA2 A commitment to maintain an advanced level of knowledge throughout a lifetime of engineering practice and the skills to do so.

GA3 The ability to apply knowledge in a systematic and creative fashion to the solution of practical problems.

GA4 A commitment to the ethical practice of engineering and the ability to practice in a responsible manner that is sensitive to social, cultural, global, legal, professional and environmental issues.

GA5 Interpersonal and communication skills for effective interaction with colleagues and the wider community.

GA6 An ability to work effectively both independently and cooperatively as a leader, manager or team member with multi-disciplinary or multi-cultural teams.

GA7 An ability to identify, formalise, model and analyse problems.

GA8 The capacity to design, optimise, implement, test and evaluate solutions.

GA9 An ability to plan, manage and implement solutions that balance considerations of economy, quality, timeliness and reliability as well as social, legal and environmental issues.

GA10 Personal attributes including: perseverance in the face of difficulties; initiative in identifying problems or opportunities; resourcefulness in seeking solutions; and a capacity for critical thought.

GA11 Skills in the use of advanced technology, including an ability to build software to study and solve a range of problems.

GA13 An ability to utilise a systems approach to design and operational performance.

GA14 Understanding of the principles of sustainable design and development.

3 Project Assessment

The project assessment consists of three modules. Some of these modules have sub-modules. The modules are broken down as follows:

- Project Performance Assessment

- Reports Assessment, consisting of
  - Project Plan
  - Mid-Project Design Document
  - Final Report
  - Research Paper
  - Final Design Document

- Seminars Assessment, consisting of
  - Project Plan seminar
  - Final seminar

4 Project Performance Assessment

4.1 Requirements and Marking

The requirements to pass this part of the project assessment, and their associated activities and assessment measures, are listed below.

Table 4.1: Project performance requirements and assessment weighting

Requirement	Assessment Weight	Activity	Measure
1 The project shall begin properly.	10% (for first project semester only)	Begin the project promptly.	Observed initial meeting attendance.
		Understand the problem that is to be solved.	Observed meeting discussions, Project Plan & workbook entries.
		Set realistic objectives and deadlines.	Project Plan submission.
		Reach project team agreement with members.	Observed meeting behaviour & evidence of team agreement.
2. Students shall put in a consistent effort throughout the project.	20%	Work consistently and according to agreed timeline.	Consistency and quality of workbook entries. Consistency of dates on files submitted. Quality of hardware/software/ measurement /analysis produced. Description of project work in written reports and seminars. Observed behaviour in the laboratory.
		Attend and contribute to discussion at regular meetings.	Observed behaviour in meetings.
		Show enthusiasm for and commitment to the project.	Observed behaviour in meetings and/or the laboratory Degree of interaction with technical staff, team members, supervisor outside of mandatory meetings. Evidence of extra reading, insight, etc. in workbook.
		Keep a record of time spent on project activities.	Timesheet entries, workbook entries.

3. Project team shall track and communicate the progress of the project.	20%	Plan for and attend regular meetings.	Quality, quantity and consistency of progress reports/minutes.
		Submit regular progress reports and/or meeting minutes.	Quality, quantity and consistency of progress reports/minutes.
		Maintain a workbook to record work done or in progress. Place software & document under version control in software project.	Workbook entries. Observed version control software usage.
		Evaluate the planned and actual schedules and update plans when needed.	Project Plan and Gantt charts revision.
4. Students shall adopt good engineering practices.	30%	Observe ethical practice. Perform project work with appropriate methods, techniques, tools, etc.	Meetings, progress reports, Design Document, observed behaviour in the laboratory and meetings.
		Manage changes when necessary.	Progress reports, meetings, updating of plans including Gantt charts, recording of decisions.
		Manage resources effectively.	Meetings, progress reports, observed behaviour in laboratory.
		Work as an effective team.	Observed behaviour in laboratory, meetings, e.g. providing constructive criticism, helping team members overcome obstacles, establish a communication channel.
		Demonstrate that you have gained technical and managerial knowledge during the project.	Quality of workbook entries. Written reports and seminars indicate how well the material has been understood.
5. Students shall produce deliverables according to agreed technical specifications at a minimally competent standard.	20%	Submit all required reports, present all required seminars, and produce and demonstrate the hardware, software and/or findings.	Quality of deliverables.
6. The project shall end properly.	10% (for second project semester only)	Conduct a project close-out session upon the completion of the project.	Submit required files & directories, documents, hardware and workbook. Return loan items.

			Conduct a 'lessons learned' session.

4.2 Guidelines

Additional guidelines can be found in Appendix B.

4.3 The Project Workbook

The project workbook shall be submitted as part of the project performance assessment. The workbook is a record of the work that you did for the project. Guidelines for the workbook are given in Appendix C.

5 Project Reports Assessment

The formal written documents for assessment are the project plan, mid-project design document, final project design document, final report and research paper.

5.1 Project Plan Assessment

The Project Plan document is a group report. That is, each project group will hand up a single document and the group will receive a single mark. All group members are expected to contribute to the writing of the document.

The Project Plan is to meet the following objectives.

1. It ensures that you understand what the "client" (in this case, your supervisor or project sponsor) really wants and provides a clear written set of requirements.
2. It allows your supervisor to evaluate your project execution plan and provide feedback.
3. It allows your assessors to make an assessment of your effort on the project.

5.1.1 Requirements for the Project Plan Document

The Project Plan requirements, assessment weights and activity details are listed below.

Table 5.1: Project Plan requirements and assessment weighting

Requirement	Assessment Weight	Details	Measure
1. The document shall establish a common understanding of the requirements with the client.	30%	Project requirements and specifications; project products.	Appropriateness of proposed requirements, specifications and products to the client's needs.
2. The document shall contain a project plan in accordance with engineering project management practices.	40%	Investigation methods; resources required; division of work; execution plan; timeline; analysis and management of risks.	Appropriateness of investigation methods, resources required, division of work, execution plan, timeline, and risk management.
3. The document shall be well-structured, coherent and polished.	20%	Structure and organisation; layout and format; expression, grammar and spelling; appropriate use of diagrams and tables; presentation of diagrams; appropriate length.	Quality of writing, diagrams, tables, etc.; Extent to which the document meets the requirement details.
4. The document format shall conform to the School's project document standards.	10%	A maximum length of ten pages of text, diagrams, tables and figures, not including the title page, executive summary, table of contents, references and any appendices. The format of 12 point font, 3.5cm left margin, 2.5cm margins on top, bottom and right side, one and a half (1.5) line spacing, printed only on one side. Inclusion of signed Assessment Cover Sheet. Include of an Occupational Health and Safety risk assessment of the work that will be carried out during the project. The document in hardcopy bound book form when submitted.	Extent to which the document meets the School's project document standards.

5.1.2 Additional Information

Additional guidelines and a suggested Project Plan layout are available in Appendix D.

5.2 Final Project Report Assessment

The Final Report is to meet the following objectives:

1. To describe what was done in the project.
2. To describe the management of the project.
3. To communicate the lessons learned during the project.

5.2.1 Requirements for the Document

The Final Report requirements, assessment weights and activity details are listed in Table 5.2.

Table 5.2: Final Report requirements and assessment weighting

Requirement	Assessment Weight	Details	Measure
1. The document shall describe the achievements of the project.	30%	The recording of research, designs, implementations, simulations, experiments, validations, testing, and result evaluation.	Quality of achievements.
2. The document shall describe the management of the project.	30%	The recording of Project requirements; work breakdown; milestones and timeline. Group management practices (meetings, division of work, resolution of problems). Comparison of achievements relative to objectives and explanation of significant variances.	Quality of the recording, comparison and explanation.
3. The document shall describe the lessons learned from the project.	10%	The recording of problems encountered; solutions found; recommendations for future work.	Quality of the recording.
4. The document shall be well-structured, coherent and polished.	20%	Structure and organisation; layout and format; expression, grammar and spelling; appropriate use of diagrams and tables; presentation of diagrams; appropriate length.	Quality of writing, diagrams, tables, etc.; Extent to which the document meets the requirement details.
5. The document format shall conform to the School's project document standards.	10%	A maximum length of 40 pages of text, diagrams, tables and figures, not including the title page, executive summary, table of contents, references and any appendices. The format of 12 point font, 3.5cm left margin, 2.5cm margins on top, bottom and right side, one and a half (1.5) line spacing, printed only on one side. Inclusion of signed Assessment Cover Sheet. Include of an Occupational Health and Safety risk assessment of the work that will be carried out during the project. The document in hardcopy bound book form when submitted.	Extent to which the document meets the School's project document standards.

5.2.2 Additional Requirements

Individual reports must be submitted by all project students.

An electronic copy of the whole report in pdf format must be submitted to the supervisor. Each group should hand up a single CD to their supervisor containing the electronic copies of all project reports, design documents, final seminar presentation materials, and copies of any software and other documentation.

5.2.3 General Information

The submitted report will not be returned. It is recommended that students make an additional hardcopy of the report for their own use. The School will provide each student two sets of front and back covers for the final report.

Additional guidelines and a suggested Final Report layout can be found in Appendix H.

5.3 Design Document Assessment

This section describes the assessment criteria for both the Mid-Project Design Document and the Final Design Document.

The Design Document is to meet the following objectives:

1. To give a full account of the design of the project products.
2. To allow your assessor to assess your approach to the design.
3. To allow your assessor to assess the quality of the design documentation.

5.3.1 Requirements for the Design Document

The Design Document requirements, assessment weights and activity details are listed below.

Table 5.3: Design Document requirements and assessment weighting

Requirement	Assessment Weight	Details	Measure
1. The document shall describe the design.	40%	The recording of previous work, requirements, methodology, the design proper, verification, validation, and test.	Quality of the content.
2. The document shall comply with current practice in engineering design documentation.	30%	Software-based design documents should adopt the recommendations in the IEEE Std 1016-1987 document [1]. Hardware and systems design documents should adopt the guidelines described in Appendix F.	Extent to which the document meets the engineering standards.
3. The document shall be well-structured, coherent and polished.	20%	Structure and organisation, layout and format, appropriate use of diagrams and tables, presentation of diagrams, appropriate length.	Quality of the content.
4. The document format shall conform to the School's project document standards.	10%	A maximum length of 40 pages of text, diagrams, tables and figures, not including the title page, executive summary, table of contents, references and any appendices. The format of 12 point font, 3.5cm left margin, 2.5cm margins on top, bottom and right side, one and a half (1.5) line spacing, printed only on one side. Inclusion of signed Assessment Cover Sheet. The document in hardcopy bound book form when submitted.	Extent to which the document meets the School's project document standards.

Reference

[1] ANSI/IEEE Std 1016-1987, IEEE Recommended Practice for Software Design Descriptions. New York: IEEE, 1987.

5.3.2 Additional Requirements

Both the Mid-Project Design Document and the Final Design Document are group reports. All group members are expected to contribute equally to the writing of the document.

5.3.3 Guidelines

Additional guidelines and a suggested Design Document layout can be found in Appendix F.

5.4 Research Paper Assessment

The Research Paper is to meet the following objectives.

1. To communicate the results of your project at the level of a technical journal paper.
2. To allow your assessors to assess your ability in writing research papers.

The Research Paper requirements, assessment weights and activity details are listed in the table below.

Table 5.4: Research Paper requirements and assessment weighting

Requirement	Assessment Weight	Details	Measure
1. The research paper shall adhere to the guidelines for preparing papers for IEEE Transactions and Journals.	25%	See the guidelines for preparing papers for IEEE Transactions and Journals.	Extent to which research paper adheres to the guidelines for preparing papers for IEEE Transactions and Journals.
2. The paper shall be at a minimally competent standard suitable for publication at a technical journal.	75%	Does the introduction state the purpose of the paper? Is the significance of the paper, relative to the existing literature, explained? Is the paper clearly written and organised? Are there adequate references to other research? Is the paper cogent? Do the authors explain well what was done? Do the authors explain well why it was done? Relative to its content and scope, is the length of the paper appropriate? Is the English satisfactory?	Quality of writing.

The Research Paper is a group document. All group members are expected to contribute equally to the writing of the document.

Additional guidelines and suggested layout can be found in Appendix G.

6 Project Seminars Assessment

There are two seminar presentations during the course of the project. The Project Plan seminar is presented in the first project semester and the Final seminar in the second project seminar.

6.1 Project Plan Seminar Assessment

The Project Plan Seminar is to meet the following objectives.

1. To communicate the contents of the Project Plan.
2. To allow your assessors to assess your technical presentation skills.

6.1.1 Requirements for the Project Plan Seminar

The Project Plan Seminar requirements, assessment weights and activity details are listed below.

Table 6.1: Project Plan Seminar requirements and assessment weighting

Requirement	Assessment Weight	Details	Measure
1. The presentation shall describe a project plan.	40%	Project requirements, project products, investigation methods; a project plan in accordance with engineering project management practices.	Appropriateness of proposed requirements, project plan, investigation approaches.
2. The presentation shall be well-structured, coherent and polished.	30%	Structure and organisation; appropriate use of diagrams; presentation of slides; appropriate length; eye contact; voice projection; neatness of dress.	Quality of content of speech and slides; Extent to which the presentation meets the requirement details.
4. The presentation format shall conform to the School's project seminar standards.	10%	See Table on time allocation for Project Plan Seminar.	Extent to which the presentation meets the School's project seminar standards.
5. The presentation shall include time for discussion at the end.	20%	Confident, relevant, succinct responses to question, even sharing of questions. See Table on time allocation for Project Plan Seminar.	Quality of answers to audience questions.

Table 6.2: Time allocation for Project Plan Seminar

Group Size (Students)	Presentation Time Per Speaker	Discussion Time	Total Seminar Length
1	10 mins	10 mins	20 mins
2	7.5 mins	10 mins	25 mins
3	5 mins	10 mins	25 mins
4	5 mins	10 mins	30 mins

6.1.2 Additional Requirements

Students shall create seminar presentations in an electronic slide format and they shall be brought to the seminar on a portable memory medium (eg USB memory device).

Each group should provide a hard copy of their presentation (printed six slides per page) to their assessors at the start of the presentation.

Students shall be assessed for their time management during the seminar.

Sessions shall start and finish on time as the assessors have to move between streams, but sessions shall not start until the assessors are present.

An attendance roll will be passed around at each session. The group presenting the seminar is responsible for passing this roll to the next group presenting a seminar in their stream. The last project group in a stream is responsible for returning the roll to the School Office.

Students shall attend the other seminars in the stream in which their seminar is scheduled. No changes in the schedule for seminars are permitted except in special circumstances.

6.1.3 Assessors and Roles

The assessors shall be the project supervisor and the project moderator. The supervisor will introduce the group members at the beginning of the seminar. The supervisor will chair the discussion session.

6.1.4 Seminar Time and Location

The seminar timetable shall be posted on the course website 5 working days before the seminar series begins. The timetable provides the date, time and room of your seminar.

Digital projectors shall be available in every seminar room. If you have any requirements apart from a basic electronic slide presentation (i.e. MS Powerpoint and Adobe Reader), you must consult the Laboratory Manager at least one working day prior to your seminar presentation.

6.1.5 Practice Sessions

Practice sessions will be arranged before the presentations. More information on this will be provided on the course website shortly before the start of the presentations.

6.1.6 Presentation Guidelines

Additional guidelines can be found in Appendix E.

6.2 Final Project Seminar Assessment

The Final Seminar is to meet the following objectives.

1. To present the results of the project.
2. To describe the management of the project.
3. To allow your assessors to assess your technical presentation skills.

6.2.1 Requirements for the Final Seminar Presentation

The Final Seminar requirements, assessment weights and activity details are listed below.

Table 6.3: Final Seminar requirements and assessment weighting

Requirement	Assessment Weight	Detail	Measure
1. The presentation shall describe the results of the project.	20%	Purpose of project; applications; background; what was done and why; problems found; solutions; further work; recommendations; conclusion.	Quality of the speech content.
2. The presentation shall describe the management of the project.	20%	The description of: Project requirements; work breakdown; milestones and timeline. Group management practices (meetings, division of work, resolution of problems). Comparison of achievements relative to objectives and explanation of significant variances.	Quality of description, comparison and explanation.
3. The presentation shall be well-structured, coherent and polished.	20% (includes 10% group mark)	Logical order; even distribution of load; cohesion; posture; voice clarity and projection; eye contact; engagement with audience; use of aids (slides).	Quality of the speech and aids.
4. The presentation format shall conform to the School's project seminar standards.	10%	See Table on time allocation for Final Seminar.	Extent to which the presentation meets the School's project seminar standards.
5. The presentation shall include time for discussion at the end.	10%	Confident, relevant, succinct responses to questions, even sharing of questions. See Table on time allocation for Final Seminar.	Quality of answers to audience questions.
6. The presentation shall include a demonstration of the project products (unless assessors give permission for this to be omitted)	20% (group mark)	Well prepared; effective; completed within time allowed. See Table on time allocation for Final Seminar.	Extent to which the requirement details are met.

Table 6.4: Time allocation for Final Seminar

Group Size (Students)	Presentation Time Per Speaker	Discussion Time	Demonstration Time	Total Presentation Length
1	20 mins	10 mins	15 mins	45 mins
2	15 mins	10 mins	15 mins	55 mins
3	15 mins	15 mins	20 mins	1hr 20 mins
4	15 mins	15 mins	20 mins	1hr 35 mins

6.2.2 Additional Requirements

Students shall create seminar presentations in an electronic slide format and they shall be brought to the seminar on a portable memory medium (eg USB memory device).

Each group should provide a hard copy of their presentation (printed six slides per page) to their assessors at the start of the presentation.

Students shall be assessed for their time management during the seminar.

Sessions shall start and finish on time as the assessors have to move between streams, but sessions shall not start until the assessors are present.

An attendance roll will be passed around at each session. The group presenting the seminar is responsible for passing this roll to the next group presenting a seminar in their stream. The last project group in a stream is responsible for returning the roll to the School Office.

Students shall attend the other seminars in the stream in which their seminar is scheduled. No changes in the schedule for seminars are permitted except in special circumstances.

6.2.3 Assessors and Roles

The assessors shall be the project supervisor and the project moderator. The supervisor will introduce the group members at the beginning of the seminar. The supervisor will chair the discussion session.

6.2.4 Seminar Time and Location

The seminar timetable shall be posted on the course website 5 working days before the seminar series begins. The timetable provides the date, time and room of your seminar.

Digital projectors shall be available in every seminar room. If you have any requirements apart from a basic electronic slide presentation (i.e. MS Powerpoint and Adobe Reader), you must consult the Laboratory Manager at least one working day prior to your seminar presentation.

6.2.5 Practice Sessions

Practice sessions will be arranged before the presentations. More information on this will be provided on the course website shortly before the start of the presentations.

6.2.6 Presentation Guidelines

Additional guidelines can be found in Appendix E.

7 Resources for Projects

7.1 Computing Facilities

The School Computing Laboratory in EM211 provides around 50 PCs for project work. This equipment carries specialised software packages. The Computing Engineer in N236 can offer detailed advice on available packages.

To use these PCs, the project group/student should

1. seek permission from your project supervisor
2. contact the Operations Manger in N129 for obtaining EM211 access card
3. contact the Computing Engineer in N236 for obtaining computer access account.

7.2 Electronic Components

The Store in N226 provides commonly needed electronic components. If a special purchase is required, you will need permission from your supervisor. To submit a request for a special component order, use the component request form on the store website http://store.eleceng.adelaide.edu.au. Note that the Store Website cannot be accessed outside the University.

7.3 Equipment

You have access to a pool of general purpose test equipment in the School. The Storeman in N226 provides advice on availability and arranges equipment loan.

If you require special equipment which is not accessible from the store, you should discuss with your supervisor your need. If the equipment is available in the School, contact the Operations Manager in N129 for access permission. He will require you to have permission from your supervisor and the nominal "owner" of the equipment.

7.4 Laboratories and Workshop

There are numerous research laboratories and a mechanical workshop in the School. If you need to access any of these facilities, contact the Operations Manager in N129 for access permission. He will require you to have permission from your supervisor and the laboratory supervisor.

7.5 Literature Resources

The following references are useful when preparing reports and seminar presentations.

1. D. Beer, D. McMurrey, *A Guide to Writing as an Engineer*, 2nd ed. New Jersey: John Wiley & Sons, Inc., 2005.

   This book contains guidelines and tips for engineering writing (Chapters 2 and 3), report writing (Chapter 6), information search (Chapter 8) and seminar presentation (Chapter 9).

2. http://www.mhhe.com/mayfieldpub/tsw/toc.htm Accessed Nov.24, 2005.

This website contains details guidelines for writing reports.

Additional guidelines for writing reports and presenting seminars can be found in the Appendices of the Masters Project Handbook and the course website.

Appendix A: Getting Started

This appendix contains some general advice for undertaking your project.

A.1 Project Startup Checklist

Contributed by Mr. Charlie Green

Getting your project off to a good start is an important step to a successful outcome. The following information gives you a guide on how to start your project. Note that you should be spending about 12 – 15 hours per week on your project. It is important that you make this time available, especially at the start of the project.

The M.E. noticeboard is located outside EM318.

1. Determine Supervisor and Meeting Information (M.E. Noticeboard)

Find out who your supervisor is, and the details of the first meeting time and location (see the M.E. noticeboard). This information will be available on Monday morning of the first week of the semester.

2. Enrol For and Attend a Literature Search Seminar (M.E. Noticeboard)

An important part of the project is a critical survey of existing published material relating to your project investigation. This involves locating, reading and analysing the relevant material. To help you locate such material, a Literature Search Seminar will be arranged with the Engineering Research Librarian at the Barr Smith Library. She will explain how you can find out more information about your particular topic using the electronic resources. See the M.E. noticeboard to sign up for a slot in one of the seminars which will be held in the first or second week of the semester.

3. Attend Talk on Laboratory and Computing Facilities (M.E. Noticeboard)

All project students are required to attend a talk by the Laboratory Manager and the Computing Engineer in Week one, at a time and date to be advised on the M.E. noticeboard. The Laboratory Manager will discuss the use of the laboratories, store and workshop, and safety in the workplace. The Computing Engineer will outline the computing facilities in the School and the CATS, and will discuss the rules and regulations when using the facilities.

During the planning stage of your project, you can seek advice on computing facilities or equipment availability from the Computing Engineer and the Laboratory Manager. They may direct you to other members of the technical staff for more detailed discussions.

4. Purchase a Laboratory Notebook and Bring to First Meeting

Each student must maintain a project workbook. This should be a daily diary of your progress and should include notes from all meetings, problem encountered, decisions made, design ideas and sketches, references to data sources, calculations, equipment settings, experimental results etc.

A good workbook forms a valuable record of your work which you can refer to in later parts of your project and is an excellent source of information for your final report.

Workbooks are submitted with your project report and are taken into account in assessment. They should always be brought to the project meetings.

5. Meet Your Supervisor

At the first meeting you will obtain group and project allocation information. Your supervisor will explain the aims and objectives of the project, and the deliverables expected on completion of your project work. The supervisor will also give you some background information and pointers for starting your literature investigation.

The supervisor's role is to provide advice and guidance, and to ensure that your project proceeds in a fruitful direction. You should not expect your supervisor to do your thinking for you, or give you detailed step-by-step instructions on what to do. You are expected to generate your own ideas, to seek out information for yourself, and to make your own decisions about what to do and how to do it.

At this first meeting, arrangements are normally made for regular (usually weekly) meetings. Note that it is the responsibility of the student to keep the supervisor informed of progress on the project.

6. Meet Your Group Members

At the first meeting you should collect contact information (email, telephone) from your other group members and also to compare timetables to determine when you are all available to have group meetings or work together.

7. Begin Writing Your Project Plan

The project plan forms your roadmap for the project. It should describe why the project is important, what has been done before, and clearly explain what you are aiming to achieve and how you plan to go about it. More information on the content of the project plan is described separately.

Note that the project plan is only an initial plan and the actual course of the project may change during the year. Major changes are possible but they should be carefully discussed with your supervisor before proceeding.

8. Begin Preparing Your Final Report and Research Paper

It is a common mistake to begin your final report a week or two before it is due. It is at this time that you may be busy doing the technical work on your project and can least spare the time required.

The best practice is to write up your report as you go along. A good technique is to create a word processor document at the beginning of the year as your "electronic workbook". As you progress through the project, you should draw key figures and store them in this document. You can also include key results from simulations and experiments, and photos of equipment etc. This will save you substantial effort at the end of the project, as you will already have the majority of the figures and data for your report.

As you complete each section of work, which may form a chapter in your final report, it is worthwhile highlighting important aspects to be covered in this chapter of your final report.

Using the above technique, you will find it much easier to complete your final report at the end of the year. You will also easily recognise if you are missing important information from the report.

A.2 Some Good Advice

Contributed by Dr. Braden Phillips

Take your project plan very seriously. The work you do planning and researching your project at the start can make an enormous difference to the quality of your project.

Break the project into small tasks (no bigger than 2-week).

Assign a deliverable (or milestone) to each task. Make sure they are things you can demonstrate.

Do not just assign blocks of time to 'learning', 'researching', or 'choosing'. Specify what the demonstrable, useful, outcomes of this activity will be for example:

If you need to learn a new piece of software then use it to do something useful. For example:
'*Use Protel to design a prototype PCB containing the power supply components only.'*

If you need to learn a new programming language then specify a small, useful program you will write in the language. If you need to do some research then specify the questions you will answer and how you will present the answer for example:
'Review the theory of LDPC codes and produce an interim report showing the equations used by an LDPC coder and decoder.'

If you need to make a decision then produce an interim report which compares the alternatives and justifies the decision. For example:
'Review available microcontrollers, compare them on the grounds of availability, cost and suitability for the project, and select a microprocessor for order. The results will be presented in an interim report'

Identify who will be doing each task. Remember that it is really very hard for 2 people to work on the same thing at the same time.

Do not just put 'documentation' or 'writing-up' as a big task performed in parallel with the rest of your project. Break the documentation down into smaller steps with deliverables. (The interim reports suggested in the previous points are one way of writing your report as you go. Each interim report can eventually form a section of your final report.)

Breaking up a project like this is hard, especially at the start when you do not fully understand the project, but that is when you must do it. If you do not have a plan at the start of the project, you will not have one until it is too late.

Do not get bogged down with the background or the theory.

In your reports, consider breaking the background into 2 sections, motivation and background theory.

In the motivation sections you need to describe the context (or big picture) of the project. You need to write just enough to allow the reader to understand why your project is important and interesting and what the likely constraints of the project are. Exciting and interesting as it may be, you must not present any more than these bare essentials. For example, you may be building a motor drive unit for a surgical robot. You do not need to spend any more than a short paragraph explaining the history of surgical robots and why they are better than the alternatives.

It is sometimes helpful to present background theory in your reports.

You should present enough theory to help the reader (e.g. one of your classmates) understand the report.

When things go wrong with your project:

If you fall behind your schedule you must either re-design your schedule or work hard to get back on track.

If the project is not going well, make a noise. Let your supervisor know. Let your project team know. Do not leave it to the last minute to try and get things back on track.

Do not let anyone or anything hold you up. You may have to wait for software to be installed. You may have to wait for parts to be delivered. You may have to wait for your supervisor to answer your questions. Do not let these things stop you. Find something else to do, find a way around, get help from someone else or fix the problem yourself.

Things will go wrong. How you handle problems is an important aspect of the project. Fix the problems and don't just blame other people.

Appendix B: Project Performance Guidelines

The project is a miniature version of projects which you may encounter in your working environment. It is an opportunity for you to learn new technical skills and also learn to work effectively in a team. The project requires that you use your own initiative. You are required to plan out what is required and then execute it.

The first semester project performance is based on your progress, the meetings with your supervisor and your project workbook. This workbook must be kept up to date and submitted to the supervisor at the end of the first semester and at the conclusion of the project.

Enthusiasm and initiative are important. This is your project and you need to take responsibility for it. It is not uncommon that as you progress through the project that you will encounter unexpected difficulties. It is from overcoming these challenges that you will learn the most about research from your project. The methods which you use to solve these problems can form a significant part of your final report and seminar.

When you encounter difficulties, the key thing is not to panic. You should assess the issues, develop a plan (and maybe a back-up) and then discuss this with your supervisor. Especially at the later stages of the project, if you feel that you will probably not be able to complete all the objectives, then you should discuss priorities with your supervisor.

Remember that the aim of the course is not simply for you to accomplish all the goals your supervisor has set out for you (though clearly this is important!). The aim is to give you an opportunity to learn and demonstrate key research skills such as self motivation, methodical approach to research, time management and ability to tackle challenging problems. If you demonstrate that you are dedicated and diligent in tackling your project, you should do well even though you may not achieve all the original project goals.

Appendix C: Project Workbook Guidelines

The project workbook is a record of the work that you did for the project. The workbook is sometimes referred to as the log book or lab book.

Choose a notebook you are comfortable with. An A4 hardback bound book with numbered pages would be a good choice.

Write your entry in English. Your supervisor and moderator may read the workbook to assess your performance.

Date each entry, including time of day.

Record all your ideas developed. The workbook can indicate the progression of your thoughts.

Record all work performed. Even mistakes are useful to enter so that they are not repeated by your successor.

Record any assumptions made.

Record all references used.

Record all problems and bugs encountered.

Record all precautions and procedures taken.

Record from where or whom you obtain equipment, devices, special tools, etc.

State model number and make of all equipment and devices used.

State software and version used.

Include sketches, drawings, diagrams, and schematics. Label diagrams and graph axes.

At the end of each project semester, write a two-page summary.

Appendix D: Project Plan Guidelines

At the first project meeting, your project supervisor will explain the aims of the project. The project plan is a chance for you to clearly explain back to your supervisor what you think is required. It should clearly state the aims and objectives of the work, the project requirements, the required tasks, and state as precisely as possible what the desired final outcome(s) of the project are. It should also give a list of milestones with corresponding dates and clearly separate the required task into individual roles.

You should discuss with your supervisor the content of the project plan as different projects may require different aspects to be covered.

After submission of the project plan, your supervisor will provide feedback on it and may suggest changes before the project proceeds further. You should update your project plan to document any agreed changes.

During the course of the project you may find that you will need to make major changes to your project plan. In this case you should consult with your supervisor before proceeding. Managing changes in an orderly manner is a key part of project management.

D.1 Suggested Project Plan Layout

Title Page: This should include the project title, the words Project Plan, followed by the group number and member names, and the date submitted.

Executive Summary: In 100 to 200 words of plain language, summarise the aims of the project plan. Briefly, what is the project trying to achieve?

List of Definitions and Acronyms: The definitions of all terms, acronyms and abbreviations required to properly interpret the document are provided in this section.

Table of Contents

Introduction: This section briefly explains what the document is and why it has been produced. The introduction should include:

- identity of client – the organisation for whom the work is to be done
- a short description of the project – no more than three lines

Background: This includes:

- the important of the project
- description of the existing hardware and software environment
- circumstances leading to the current project
- work already carried out in the area of the project
- applications of the project results
- the critical issues of the project

Project Objectives: The objectives must define what is to be achieved and the method of measuring the extent of the achievement.

Constraints: This sets out the constraints that affect the project decision and management. Constraints include:

- externally imposed time scales
- limitations on the people who can be approached for information.

Methods and Techniques: This section describes and justifies the development strategy chosen for the project. It describes the approaches, methods and techniques to be used during the requirements specification, implementation, verification, validation and test.

The necessary environment and equipment for testing should be described. During testing, considerable pressure will normally be put on the test equipment. Therefore, this activity should be planned carefully. After unit testing, the various sub-systems are to be integrated in some order. The order in which sub-systems are integrated and tested should be stated explicitly.

Your project team will produce a large amount of the technical documentation during the project lifecycle. You thus should state how to take care of the documentation and the revision of documents. You may choose to place the documentation and software under version control. The project plan should then contain a brief configuration management plan describing which tool you plan to use (see Note 2), how you will name versions and milestones, any check-in requirements (such as filled-in file headers), and when you will check files in.

Project Requirements: This is a numbered list of identified project requirements. As far as possible, give a detailed description of the required hardware/software interface(s), operation and performance. The numbered list of requirements will be used to verify requirement traceability in the design document.

Project Products: This is a numbered list of all the products or deliverables that the project will produce, such as hardware assemblies, software modules, documentation and reports. The numbered list of deliverables will be used to associate with the activities in the work breakdown structure.

Work Breakdown: This describes the work breakdown of the project into activities and identifies milestones and deliverables associated with each activity. For each activity, define:

- pre-requisites: what has to be done before this activity can start
- dependent activities: activities that need this one to be completed first
- estimated time/effort: this may be a range of values
- quality checks: details of how you are going to verify and validate the product of the activity

Project Schedule: This describes the dependencies between activities, the estimated time required to reach each milestone and the allocation of people to activities. You should aim to ensure that the allocation of tasks is fair and equitable.

Show a block diagram of proposed system/algorithm/approach to meet the requirements. Discuss each part including particular issues or risks. If you foresee that there may be difficulties using your planned approach, do you have a back-up approach? Here you are showing that you have thought about what is necessary to meet the requirements and understand possible issues and risks. Use pictures/diagrams to illustrate your ideas.

What are the key milestones/tasks during the course of your project? Who is responsible for each part of the project? When do you expect to accomplish these milestones? Can tasks be done in parallel? How can the project be organised to make the most efficient use of the time available (what is the critical path)? This information is helpful for both you and your supervisor to keep track of your progress on the project as it allows you to compare your progress versus your original schedule.

Resources: This describes hardware/software tools, laboratory facilities and library resources needed to support the project work. You have a limited budget. What hardware, software, test equipment etc will you need to complete the project? Are these already available in the school? If not, how much will these cost? It is important to take into account that certain specialised parts may take a significant time to purchase and this should be factored into your timeline.

Risk Analysis: This describes possible project risks. Typically this might include:

- unavailability of resources
- damage to key hardware components
- technical problems (such as software bugs or faulty hardware parts).

You should give a priority ranking to each potential risk. A simple method is to allocate to each risk a probability rating (1-10) and a seriousness of impact rating (1-10). Multiplying the two gives an overall score for priority purposes. For the most serious risks (those with the highest scores), preventive measures to reduce or remove the risk should be specified. You can use other methods to rank risks.

Monitoring Mechanisms: This describes the project monitoring, reporting and control mechanisms used.

References: Include a list of references and web links related to the project. Use IEEE style formats for references.

D.2 Additional Information

1. You may choose to place the software and documentation under version control. The Subversion version control system has been made available for this purpose. To use it, you must nominate a single member of your group to submit a support request to Mr. David Bowler to set up a repository for members of your group. The book 'Version control with subversion' should be used as a reference.

2. All documents should be written following the guidelines found at
   http://www.mhhe.com/mayfieldpub/tsw/toc.htm

3. Books on project plan document:
   B. Hughes and M. Cotterell: Software Project Management, 3rd ed, McGraw-Hill, London, Ch 13.
   P. Martin and K. Tate: Getting Started in Project Management, John Wiley, NY, Ch 5-Ch10.

Appendix E: Seminar Presentation Guidelines

Seminars should be aimed at the technical level of the student audience. As they may be unfamiliar with the topic, clear explanation should be given to the overall background, nature, scope and aims of the project.

Even distribution of load of the group, logical order of presentation and cohesion are part of the assessment criteria. Careful preparation will be necessary to ensure that this is successfully achieved in the time allocated.

It is preferable that each group member speaks on only one occasion. This produces a smoother presentation.

As a general rule, the number of slides should not exceed the number of minutes allotted for presentation. Thus for a 15 minute presentation, no more than 15 slides should be used.

Digital projectors shall be available in the seminar rooms. You shall follow the instructions on the digital projectors for turning them on and off. If these instructions are not followed, the projector lamp could be damaged and the projector may not be available for use during the seminar period. If you have any questions about the use of these projectors please see the Laboratory Manager.

Hints on the Presentation

- Plan out your talk coherently and well in advance before the presentation.
- Establish eye contact.
- Project confidence.
- Dress neatly.
- Use large print on slides.
- When you show a graph, explain the axes first.
- Project your voice clearly.
- Read Chapter 9 of D. Beer and D. McMurrey when planning your talk.

Appendix F: Design Document Guidelines

The Design Document shows how the system will be structured to satisfy the project requirements. It is a translation of requirements into a description of the system structure, system components, interfaces and data necessary for the implementation phase. Each requirement must be traceable to one or more design entities.

The proposed guidelines for the Mid-Project Design Document and Final Design Document are as follows.

- The design document provides a design that describes the system architecture and its states.
- The design document provides detail about the various modules and sub-modules in your design and their chosen interfaces.
- The design document provides traceability between parts of the design and the requirements that they satisfy.
- Software Design Documents should observe the recommendations in the IEEE Std 1016-1987 document [1] as a way to organise and format the design views and associated information.
- Systems and Hardware Design Documents may adapt the suggested Design Document layout provided in Section F.1.
- All documents should be written following the guidelines found at http://www.mhhe.com/mayfieldpub/tsw/toc.htm, Sections 2.4.4, 3.4.4.

Reference

[1] ANSI/IEEE Std 1016-1987, IEEE Recommended Practice for Software Design Descriptions. New York: IEEE, 1987.

F.1 Suggested Design Document Layout

Title Page: This should include the project title, the words Mid-Project Design Document, followed by the group member names, and the date submitted.

Executive Summary: In no more than 100 words of plain language, summarise the aims of the project design document.

Table of Contents:

Introduction

- Overview - Describe what the rest of the Design Document contains. Briefly explain how the document is organized.
- Purpose - Describe the purpose of the Design Document and state the intended audience.
- Scope - This section gives the identifier name of the product that is being developed (for example, the identifier name may be called *Multi-Channel Receiver System*). A brief description of the application of the product that is being developed is given with relevant information on objectives and goals as accurately as possible.

Definitions and Acronyms - The definitions of all terms, acronyms and abbreviations required to properly interpret the design document are provided in this section.

System Level Design - Describe the system architecture and the requirements

- System Architecture
  Hardware Decomposition Description - A description of the product in terms of its hardware modules.
  Software Decomposition Description - A description of the product in terms of its software modules.

- Requirements and Products - Provide a numbered list of identified project requirements and a numbered list of products that the project must produce. The lists shall be based on the Project Plan document. The lists serve to provide traceability between parts of the design and the requirements that they satisfy.

Detailed Hardware Design

- Hardware Module 1
  The module may have an identifier name. If, for example, it is called *Direct Digital Converter*, then Hardware Module 1 becomes *Direct Digital Converter*.
  This section provide a description of the module and may contain the following:
  Functional description
  Design and chosen interfaces between modules
  I/O signals
  Specification & constraints/limitations
  Verification, validation and test
  Detailed supplement I: summary of algorithm (for example)
  Detailed supplement II: performance calculation (for example).
- Hardware Module 2
  …
- Detailed Software Design
  Software Module1
  The module may have an identifier name. This section provides a description of the software module.
  …
- System Integration
- Next Stage Design Plan
  This section describes the planned work in the next phase of the project design, for example, design work for the second project semester.
- References
  This section provides a complete list of all documents referenced in the design document.

Appendix: This section shall contain any general information that aids in understanding this document, e.g. background information, glossary, formula derivations, datasheets.

Appendix G: Research Paper Guidelines

Research papers must follow the guidelines for preparing papers for IEEE Transactions and Journals. The guidelines may be found at http://www.mhhe.com/mayfieldpub/tsw/toc.htm

G.1 Suggested Layout

Title: Use a clear, specific and descriptive title. The title should be detailed enough to give a specific idea of the scope of the paper.

Authors and affiliations

Abstract: This is a brief summarizing statement in the form of a paragraph, usually with 5-10 sentences. It gives the reader a synopsis of the problem, method, results, and conclusions of your paper.

Introduction: This usually does the following: (1) state the subject of your paper, (2) define the problem you are addressing, your approach to the problem, and the importance of this problem, (3) state the purpose of your paper, (4) define the scope of your paper, and (5) provide necessary and relevant background information.

Background: This may include (1) a historical summary of the problem being addressed; (2) a brief summary of previous work on the topic, and (3) the specific reasons the paper is being written.

Theory, modelling or design section: This section covers models, architectures, design, relevant theoretical formulae, techniques by which any investigation and experimental results are predicted.

Experimental or simulation section

Results: Present data, estimates of their accuracy and critically evaluate your findings

Discussion: When writing this section, bear the following points in mind.

- Identify significant patterns in the data and relationships between variables. Provide possible explanations for these patterns and relationships.
- Compare the actual results with any predictions or questions posed in the introduction or theory section of the paper.
- If any of the results differ from the expected results, offer possible explanations for the discrepancies.
- Consider how well the data answer any questions posed in the paper's introduction.
- Qualify the scope of your explanations, discussing in what cases your explanations apply and in what cases they may not.

Conclusion: Relate your findings to the general problem and any particular objectives described in your introduction. Summarize what the paper does and does not demonstrate. Include specific recommendations for further research.

References: Include a list of sources used in your paper. Use the format suggested in page 238 of D. Beer and D. McMurrey.

Appendix H: Final Report Guidelines

H.1 Suggested Layout

Title Page: This should include at the centre of the front cover the project title, the words Final Project Report, followed by the group member names, the commencement date and the submission date.

Executive Summary: In between 100 to 200 words of plain language, give a concise summary of the project aims, background, general approach and key results.

Acknowledgements

List of Definitions and Acronyms: The definitions of all terms, acronyms and abbreviations required to properly interpret the document are provided in this section.

List of Figures (optional)

List of Tables (optional)

Table of Contents: A Chapter/Section/Subsection numbering scheme should be used and thus Section 4.3 will be the third section in the fourth Chapter. Chapter 1 is normally the introduction. The page numbering should start from page 1 as the first page of the Introduction.

Introduction: This contains the aims/objectives, background to project, requirements/specifications, results from a literature survey, system description and organisation of the document. It should contain a sub-section on individual contribution claims towards the team project and details of work split amongst the group member.

Several chapters covering your technical contributions to the report, describing
The system models if appropriate

- the analysis methods and simulations if appropriate
- the method used to solve the problems
- the implementation and system integration if appropriate
- the experimental testing and results if appropriate

Project management description : timeline, key milestones, budget, discussion of any differences between the project execution and the original plan due to aspects such as technical difficulties/changes in project aims, discussion of other project management issues faced, how they were overcome and lesson learned.

Conclusions: summary of key results from the project, possible future work, advice to students continuing project (if appropriate).

References: use of other people's research and work must be properly and accurately acknowledged. This means including a complete reference list and indicating within the text where use has been made of items in the reference list. A large part of our knowledge is taken as known standard work for which references are not expected - be guided by the actual use you make of published work. Use the format suggested in page 238 of D. Beer and D. McMurrey.

Appendices: These give information which may be useful for reference purposes and may include items like copies of key reference papers, datasheets, experimental data, full circuit diagrams, software listings, detailed analytical derivations, mechanical drawings etc.

H.2 General Comments

The project report will be assessed not only on its technical content, but on its effectiveness in communicating information. The standard of written expression, including sentence construction, grammar, spelling, organisation into paragraphs, as well as the overall arrangement of the subject matter will be taken into account.

The above information covers general project reports, as each project is different, it is recommended that you discuss the particular reporting requirements of your project with your supervisor. It is often helpful for you to draft out a table of contents showing the chapter titles and sections and check this with your supervisor.

The captions for figures should be placed below the figure and the captions for tables should be placed above the table.

Appendix I: Grade Descriptors

(approved by the Vice-Chancellor on behalf of Council, 9 March 2005 on the recommendation of the Academic Board at Meeting 1/05, 2 March 2005)

Generic grade descriptors

The descriptors are to be interpreted within the context of the year-level of the course and within the scope of the assessment task. (Assessment tasks include examinations, essays, assignments, etc.) The descriptors provide a general guide to the standard of work that is expected at each grade level. Schools and departments should develop discipline-specific elaborations of these descriptors and more detailed descriptions of what students are expected to do to achieve at the various levels. In developing discipline-specific descriptions, schools and departments might find it useful to refer to taxonomies such as Bloom's taxonomy or the Structure of Observed Learning Outcomes (SOLO) taxonomy. (One useful on-line reference to the SOLO taxonomy is http://www.dmu.ac.uk/~jamesa/learning/solo.htm. Information about Bloom's taxonomy can be accessed at: http://www.nwlink.com/~donclark/hrd/bloom.html.)

	High Distinction *	Distinction	Credit	Pass	Conceded Pass	Fail
General description	Outstanding or exceptional work in terms of understanding, interpretation and presentation	A very high standard of work which demonstrates originality and insight	Demonstrates a high level of understanding and presentation and a degree of originality and insight	Satisfies the minimum requirements	Just fails to satisfy the minimum requirements	Fails to satisfy the minimum requirements
Reading	Strong evidence of independent reading beyond core texts and materials	Evidence of reading beyond core texts and materials	Thorough understanding of core texts and materials	Evidence of having read core texts and materials	Some evidence of having read core texts and materials	Very little evidence of having read any of the core texts and materials
Knowledge of topic	Demonstrates insight, awareness and understanding of deeper and more subtle aspects of the topic. Ability to consider topic in the broader context of the discipline	Evidence of an awareness and understanding of deeper and more subtle aspects of the topic	Sound knowledge of principles and concepts	Knowledge of principles and concepts at least adequate to communicate intelligently in the topic and to serve as a basis for further study	Some knowledge of principles and concepts but insufficient to communicate intelligently in the topic or to serve as a basis for further study	Scant knowledge of principles and concepts
Articulation of argument	Demonstrates imagination or flair. Demonstrates originality and independent thought	Evidence of imagination or flair. Evidence of originality and independent thought	Well-reasoned argument based on broad evidence	Sound argument based on evidence	Some ability to argue coherently	Very little evidence of ability to construct coherent argument
Analytical	Highly	Clear	Evidence of	Some	Little evidence of	Very little

and evaluative skills	developed analytical and evaluative skills	evidence of analytical and evaluative skills	analytical and evaluative skills	evidence of analytical and evaluative skills	analytical and evaluative skills	evidence of analytical and evaluative skills
Problem solving	Ability to solve very challenging problems	Ability to solve non-routine problems	Ability to use and apply fundamental concepts and skills	Adequate problem-solving skills	Some evidence of problem-solving skills but skills inadequate	Very little evidence of problem-solving skills
Expression and presentation appropriate to the discipline	Highly developed skills in expression and presentation.	Well developed skills in expression and presentation.	Good skills in expression and presentation. Accurate and consistent acknowledgement of sources.	Adequate skills in expression and presentation	Some skills in expression and presentation Inaccurate or inconsistent acknowledgement of sources.	Rudimentary skills in expression and presentation Inaccurate and inconsistent acknowledge-ment of sources.

* Conceded passes are not used in all academic programs.

Appendix J: Laboratory Rules – A

J.1 Rules Applicable to All Students Working in the School of Electrical and Electronic Engineering.

The attention of all students is also drawn to the by-laws made under the University of Adelaide Act Amendment Act, which are published in the University Calendar.

1. No student enrolled in the degrees will be permitted to perform a practical unless he/she has provided evidence of adequate preparation for the practical according to the written specifications provided. Failure to produce such evidence will result in automatic preclusion from the practical session.
2. The head of the school may exclude any student from any laboratory program for any cause deemed sufficient and shall report every such exclusion, and the grounds for it, to the Council through the Chairman of the Board of Discipline. The Council may reverse, vary or confirm the exclusion upon such terms as it shall think fit. The fees paid by any student so excluded shall not be refunded unless the Council shall otherwise determine.
3. For students taking regular courses involving laboratory work in the School an appropriate laboratory will be open daily during term time (weekends and holidays excepted) at such hours as shall be considered necessary by the head of the school concerned. Persons engaged in advanced work or research may work at such additional times as the head of the school may arrange. Undergraduate students will not be permitted in laboratories or work areas outside scheduled timetabled times.
4. Whenever necessary and possible, each student will have a definite working place assigned, which may not be changed without permission. To avoid congestion or disruption, students must not move about the laboratories unnecessarily or make undue noise.
5. Paper and refuse of any kind must be placed in the receptacles provided for the purpose. No solid material of any kind shall be thrown into sinks.
6. Students are responsible for the cleanliness of their apparatus and work places or benches, which must be left clean and tidy after each practical session. Equipment and apparatus put out for student use should not normally be put away in the cupboards by students. Bags are to be stowed under benches or in nominated areas. Aisles are to be kept free from obstructions.
7. All preparations and equipment made from materials supplied by the School shall remain the property of the School.
8. Students may be held responsible for damage to equipment and apparatus, on such basis as the head of the school may determine.
9. No experiments of a dangerous nature may be performed in laboratories.
10. Any accident must be reported at once to the person currently in charge of the laboratory.
11. The use of floor-level open-bar heaters and floor-level fan-heaters in laboratories is prohibited.
12. Close fitting closed-toe shoes must be worn in workshop and laboratory areas. Shirts that cover the back and shoulders must be worn in workshop and laboratory areas. In particular sandals, thongs, backless or loose fitting shoes, tank tops and sleeveless T-shirts are not permitted. Long hair must be tied back out of the way.
13. Eating, drinking and smoking are not permitted in laboratories and other places as specified.
14. Any student may be excluded from any laboratory session if deemed to be insufficiently prepared or to have infringed any of the above rules. Any student refusing to obey a reasonable order given by a demonstrator or by a member of staff, in regard to any safety issue or in regard to infringements of any of the above rules, shall be reported to the head of school for possible disciplinary action.

15. Students are reminded that the constraints of Copyright legislation apply to some of the material issued for laboratory work. In the case of computer software it is illegal to make unauthorised copies of proprietary software and illegal to take any such copies of software away from the University. Heavy fines may apply under the relevant legislation.

J.2 Soldering Components

If it is ever necessary to solder components onto circuit board you must use the filter units provided and remember that soldering irons are extremely hot and should be treated with due care and attention at all times.

J.3 Qualified First Aid Personnel

The qualified first aid personnel in the School are as follows

Engineering North Ground Floor	Workshop Supervisor (NGO7)	tel. 35301
Innova21 Level 3	Operations Manager (3.18)	tel. 35467
Engineering North 2nd Floor	Computing Services Technician (N227)	tel. 35749

J.4 Evacuation Procedure

On hearing the evacuation signal please leave the building in an orderly manner and assemble at the designated assembly point.

Under no conditions must you re-enter the building until the chief warden informs you that it is safe to do so.