UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Term 2 2020

MMAN4953

Research Thesis C

Contents

1. Staff contact details 2
Contact details and consultation times for course convenor 2
2. Important links 2
3. Course details 2
Credit points 2
Contact hours 3
Summary and Aims of the course 3
Aims 3
Organisation and prerequisites 3
B+C in one Term 3
Laboratory Activities and Staff 4
Workshop 4
Student learning outcomes 5
4. Teaching strategies 6
5. Course schedule 6
6. Assessment 6
Assessment overview 7
Marking 7
Marking criteria and rubrics for Thesis Presentation 8
Marking criteria and rubrics for Participation 9
Marking criteria and rubrics for Final Thesis Report 10
Submission 14
Confidential Submission 14
Late submission 14
Extensions and special consideration 14
Feedback and Template use 15
7. Consequences if you fail in Research Thesis C 15
8. Expected resources for students 15
9. Course evaluation and development 15
10. Academic honesty and plagiarism 16
11. Administrative matters and links 16
Appendix A: Engineers Australia (EA) Competencies 17

1. Staff contact details

Academic staff, sometimes together with some senior engineers from industry, act as supervisors to students undertaking Thesis work. Support is also provided by the workshop and laboratory staff. For any project-related issues, contact your thesis supervisor directly.

Contact details and consultation times for course convenor

Name: Professor Tracie Barber
Office location: Ainsworth building (J17)
Tel: (02) 9385 4081
Email: t.barber@unsw.edu.au (email is the easiest way to contact me)

Please consult the course Teams site first in case your questions have already been answered by information available online.

2. Important links

- Lab Access
- Health and Safety
- Computing Facilities
- Student Resources
- Course Outlines
- Engineering Student Support Services Centre
- Makerspace
- UNSW Timetable
- UNSW Handbook
- UNSW Mechanical and Manufacturing Engineering
-

3. Course details

Credit points

This is a 4 unit-of-credit (UoC) course and involves an unprescribed number of contact hours per week (h/w) with your supervisor. This varies on a case-by-case basis, as agreed with your supervisor.

Various factors, such as your own ability, your target grade, etc., will influence the time needed in your case.

This means that you should aim to spend not less than about 10 h/w on this course, including consultation with supervisor and workshop/laboratory staff and library/internet search. However, most students spend more time on their thesis work.

Contact hours

There are no set contact hours for thesis.

Summary and Aims of the course

Aims

The thesis provides an opportunity for the student to bring together engineering principles learned over their previous years of study and apply these principles to innovatively solve problems, such as the development of a specific design, process and/or the investigation of a hypothesis. Thesis projects must be complex, open-ended problems that allow room for student creativity, and the acquisition, analysis and interpretation of results. There must be multiple possible solutions or conclusions at the outset and sufficient complexity to require a degree of project planning from the student. The thesis requires the student to formulate problems in engineering terms, manage an engineering project and find solutions by applying engineering methods. Students also develop their ability to work in a research and development environment.

This course requires each student to demonstrate managerial, technical and professional skills in planning and executing an approved engineering project within a stipulated time limit. The student should show improved project management skills in the progression from Thesis A to B and C, as well as a deeper understanding of the specific research topic. Each student is guided by their supervisor, but successfully planning, executing and reporting on the project are the sole responsibility of each student.

It is not the responsibility of the supervisor to tell the student what to do, nor should it be assumed that the supervisor is an expert in all areas of engineering. They are there to offer guidance and advice, as are laboratory staff, workshop staff, and others in the school that may have expertise in the area of your project. The successful execution of the project is solely the responsibility of the student.

Organisation and prerequisites

The undergraduate Research Thesis is organised in three courses: Thesis A (MMAN4951), B (MMAN4952) and C (MMAN4953). By default, students must ordinarily take Thesis A, Thesis B and Thesis C in consecutive terms. Thesis A is therefore the first course you have to undertake for the completion of the Research Thesis and can be started in any of the three terms. Thesis A is a prerequisite for Thesis B, and Thesis B is a prerequisite for Thesis C. If you need to complete your Thesis in two terms only and your program allows it, then you should choose the Practice thesis stream (MMAN4010-MMAN4020).

B+C in one Term

With School permission and only in exceptional circumstances, students may apply to take Research Thesis A in one term, then Research Thesis B and C together in the subsequent term. This option is limited to students who have exceptional circumstances, have a compelling reason not choose the Practice thesis stream and can demonstrate an

outstanding ability to progress. Moreover, it requires a prerequisite waiver to waive the Thesis B requirement for Thesis C.

Laboratory Activities and Staff

COVID-19 NOTE: The School laboratory facilities are open to research thesis students in T2; however, access is limited. To comply with government's social distancing requirements, e.g., 4 square meters per person, each room has a maximum capacity limit, which will be monitored by the supervising professional staff. Please check with the laboratory officer in your area before accessing and observe the limit and all other safety precautions.

You must seek guidance and approval from your Thesis supervisor prior to any laboratory activities.

The laboratories are the responsibility of the staff-in-charge, and you must operate within the accepted practices of the laboratory concerned. You should not expect laboratory staff to take responsibility for your thesis or carry out work for you. Laboratory staff are highly skilled and helpful; take full advantage of their experience.

If your project involves laboratory work, contact the officer-in-charge (OIC) of the laboratory in which you will be working as soon as possible to discuss your requirements. They will issue you with a Laboratory Access Approval (LAA) form which you must complete and return to the OIC.

For more information about accessing the School's laboratories, including necessary safety precautions, please visit the School website:
https://www.engineering.unsw.edu.au/mechanical-engineering/resources/lab-access-how-to-forms

Workshop

You must seek guidance and approval from your Thesis supervisor prior to requesting any workshop activities.

All student activities requiring manufacture in the Mechanical and Manufacturing Engineering (MME) workshop should be discussed with the workshop personnel at the inception of the work. The workshop personnel must have the opportunity to advise and influence the design to help minimise assembly, manufacture or functional problems.

The workshop is usually in very high demand. If you require the workshop to manufacture equipment essential to your thesis, then make sure that you discuss your requirements as early as possible with the Workshop/Laboratory Manager. You should provide engineering drawings which are first approved by the laboratory OIC. You should make every effort to minimise the Workshop load by modifying existing equipment rather than building from new, and by keeping your designs simple.

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

Learning Outcome		**EA Stage 1 Competencies**
1.	Develop a design or a process or investigate a hypothesis following industry and professional engineering standards.	PE2.1, PE2.2, PE2.3, PE2.4
2.	Critically reflect on a specialist body of knowledge related to their thesis topic.	PE1.3
3.	Apply scientific and engineering methods to solve an engineering problem.	PE2.1
4.	Analyse data objectively using quantitative and mathematical methods.	PE1.2, PE2.1, P2.2
5.	Demonstrate oral and written communication in professional and lay domains.	PE3.2

4. Teaching strategies

There is no formal teaching, but students learn from both internal and external sources. The supervisor, other academics and laboratory/workshop staff are the internal sources, whereas the Library, internet and industry mentors are the external sources.

5. Course schedule

There are no set lectures for this course.

6. Assessment

Thesis A and B will initially carry a ‘satisfactory’ (EC grade) or ‘not satisfactory’ mark. Only students receiving a ‘satisfactory’ evaluation in Thesis A will be allowed to enroll in Thesis B, and only students receiving a ‘satisfactory’ evaluation in Thesis B will be allowed to enroll in Thesis C. After the successful completion of Thesis C, a student’s final Thesis mark will reflect the overall weighted percentage of marks achieved during all three courses (A, B and C), and the earlier EC grades will be replaced with the final mark achieved in Thesis C at that time.

There are three assessment items in Thesis C: the “Thesis Presentation”, “Final Thesis Report” and “Participation Mark” whose details are reported below. In order to pass Research Thesis C and complete Research Thesis in its entirety, the grade of your Final Thesis Report must be greater than 50% and the overall weighted mark of Thesis A + B + C must be greater than 50%. If you do not meet one or both of the aforementioned conditions, you will fail Thesis C.

Assessment overview

Assessment	Group Project?	Length	Weight (% of entire Thesis A+B+C grade)	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Thesis Presentation	No	5 minutes + 3 minute question time	10%	Mostly 5 (with components of 1,2,3 and 4)	Rubric below	Week 11, *more information TBA*	No late submissions allowed	Two weeks after presentation
Final Thesis Report	No	Max 50 pages *(excluding appendices and references)*	60%	1,2,3,4, and 5	Rubric below	5 PM Friday Week 10	5 PM Friday week 11	Two weeks after submission
Participation Mark	No	NA	5%		Rubric below	NA	NA	At the publication of grades

Marking

Final thesis report marks will be provided by two assessors independently, without collusion or knowledge of the other mark.

- For any mark difference less than or equal to 10 marks, the unweighted average.
- For any mark difference of 11-15 marks, the course convenor discusses with the two markers about why they gave their marks and assists the two markers to come to an agreement on a final mark.
- For any mark difference greater than 15 marks, a third assessor must be used. An unweighted average of the three marks will be used.
- If the situation arises that one mark is invalid, the course convenor has the discretion to eliminate that mark and average the other two (if they fail within the 10-mark difference). This includes theses involving 3 markers.

Marks for the thesis presentation and participation will be provided by your thesis supervisor.

Marking criteria and rubrics for Thesis Presentation

Aspect 1: Presentation skills (25%)

Criteria	**Grade**
Did the presenter speak with clarity (volume, speed, enunciation)?	/5
Did the presenter speak in an engaging way (tone, passion)?	/5
Did the presenter engage the audience (eye contact, body language)?	/5
Did the presenter deliver in a relaxed, confident manner?	/5
Did the speaker make good use of well-designed visual aids?	/5
TOTAL	**/25**

Aspect 2: Knowledge base (25%)

Criteria	**Grade**
Was proper background information on the topic given?	/5
Was the material selected for presentation appropriate to the topic?	/5
Was enough essential information given to allow the audience to effectively evaluate the work done in context?	/5
Was the talk free of irrelevant or filler information?	/5
Did the presenter demonstrate a clear understanding of the material presented?	/5
TOTAL	**/25**

Aspect 3: Critical thinking & planning (30%)

Criteria	**Grade**
Did the approach to the work demonstrate thought and planning?	/5
Were the strengths and weaknesses of the work, and the methods used to gather evidence/data, clearly explained?	/5
Did the presenter demonstrate they had completed progress on their topic?	/15
Did answers to questions show an understanding of the project and background?	/5
TOTAL	**/30**

Aspect 4: Overall impression (20%)

Criteria	**Grade**
Overall impression of the presentation	**/20**

TOTAL

GRAND TOTAL	**Grade**
Add up above 4 aspects for total presentation mark	/100

Marking criteria and rubrics for Participation

Note: The points in the marking criteria below will be scaled by the associated weighting.

Student's Name:	Student ID:	Program Code:
Thesis/Project Title:		

Important note: This assessment is to evaluate only one particular aspect of student's performance, namely the level of student's participation throughout the course of doing thesis/project work. The supervisor would have the best knowledge on this aspect and thus is the most appropriate authority to make this judgment. Please complete this assessment independently of the written report.

Criteria	Weightings	Marking Guide	Mark
Initiative and engagement: Did the student actively engage in the thesis work, take ownership of the task with enthusiasm, initiate own ideas to overcome various roadblocks along the journey?	1/3	0-49: Deficient – none or minimal effort across all areas, need a lot of pushing from supervisor to make things happen 50-64: Satisfactory – some evidence of student driving the project; student put in some effort but considerable need for improvement 65-74: Good – above satisfactory effort, clear evidence of student driving the project 75-84: Very good – student showed genuine interest and enthusiasm in the work, initiated many own ideas during the process 85-100: Excellent – superior evidence of effort; student intellectually and practically led the project all the way, went beyond what was expected of a student	… / 100
Sustained activity: for example, based on student's attendance in lab, regular meetings/contacts with supervisor throughout the term, etc	1/3	0-49: Deficient – irregular, sporadic engagement in the project 50-64: Satisfactory – regular engagement but only just adequate 65-74: Good – regular engagement; project progressing smoothly as planned 75-84: Very good – high level of sustained effort throughout the whole project 85-100: Excellent – superior evidence of effort, student attended all meetings or had regular weekly contact with the supervisor	… / 100
Diligence and competence in performing the task: for example, based on examination of relevant documentation (project diary, student's lab book detailing experiment activities or measurement records). Did the student put in serious effort? Was it meticulous, professional?	1/3	0-49: Deficient – careless or technically incompetent in doing the work 50-64: Satisfactory – you are fairly sure results from project are useable and trustworthy 65-74: Good – you closely monitored the work and are confident with student's results 75-84: Very good – work is professionally, meticulously performed and recorded 85-100: Excellent – very persistent and unrelenting in performing the task, demonstrate superior level of knowledge and applied thinking to solving an engineering problem	… / 100

Total mark = Average of the three criteria = … / 100

Comments: _____

_____

Marking criteria and rubrics for Final Thesis Report

Note: The points in the marking criteria below will be scaled by the associated weighting.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	**75-84%**	**65-74%**	**50-64%**	**0-49%**
Literature review/ background and putting the results in context	10%	In addition to meeting the quality at the previous band the student has made a critical assessment of the literature in the context of their research project to a depth and breadth that is of the quality that could be anticipated to be seen in a journal review paper.	The most significant areas of literature relevant to the proposed work have been reviewed (including recent works) and the student has clearly identified one or more knowledge gaps. The student will have shown that they understand the conceptual relationships between reviewed works and between reviewed works and the student's research project, i.e., the student makes intellectual connections between the different parts of the review and puts their work in context.	The most significant areas of literature relevant to the proposed work have been reviewed (including recent works). There are no major "holes". What is generally missing in this band, but present in higher quality work, is the student showing that they understand the conceptual relationships between the different reviewed works.	The literature reviewed is sufficient to inform the proposed research (including recent works), although it is likely that further review will be required as the work progresses. What distinguishes work at this level from work at the next level up is quantity: an adequate review of the literature sketches enough that the reader can see what the picture is about but neglects significant aspects. i.e., are there significant holes in this review?	Deficient work may be characterised by a number of features, including inappropriate reliance on sources not peer reviewed (such as the internet), not reviewing what should be the core of the literature in a particular area, or not reviewing any recent work (within, for example, the last 5 years although this will depend somewhat on the field). The student has not taken into account the feedback received in Thesis A and B to improve the Literature review.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	**75-84%**	**65-74%**	**50-64%**	**0-49%**
Execution of the research project, quality of analysis, discussion of results	50%	Student would have to have achieved as at the previous level but additionally has achieved something unexpected, thoughtful and original, such as a novel perspective or theory. This requires deep thinking of the student.	At this level the student has assembled the pieces of their research project (which could include literature, different sets of experiments or measurements, simulations or analyses) into a coherent scientific story. Overall, you are left with a clear and convincing picture of what the research question was and what the answer is (along with its caveats). A student is generally not going to be able to achieve this if there are conceptual or methodological problems with their work, or if their review of literature is inadequate.	The student probably has a number of components to their research, such as literature, experiments, designs, simulations etc. They have interpreted meaning from the results but have overall not succeeded in linking the components of their research together as a coherent scientific story. There's no clear "big picture".	The student has completed a body of work and presented some results but not succeeded in interpreting meaning from them (=intellectual input is largely absent from the discussion, which is essentially equivalent to observation of the results). Performance at this level may also indicate a lack of engagement with the project, sometimes evidenced as a "thin" or "one-dimensional" investigation characterised by attempted padding.	Work at this level is clearly deficient - in not addressing the stated project aims or in containing major problems that the student should reasonably have been aware of but did not address in the thesis.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	**75-84%**	**65-74%**	**50-64%**	**0-49%**
Conclusions and value added	20%	This work can easily form the basis of a peer-reviewed journal publication, or other form of professional dissemination/presentation appropriate to the field (i.e. patent application, best practice document at a company, trade publication, workshop, etc.).	The results and discussion can eventually form the core of a research publication or change in industry practice (It may have already been included in a conference publication during the course of the thesis). However, further work will first be required – such as repeated experiments – before the work is truly sufficient. The student has included good, thoughtful discussion of limitations and provided insight into future work on this project or new avenues of research which could be followed.	The presented work adds some value in some way – improvement of "local knowledge" such as techniques, additional data points in a larger design or hypothesis etc. The student worked well but did not push themselves harder to make any real new discoveries or interpretations, therefore the conclusions are limited, and discussions of future work are predictable extensions of the work completed.	The presented work is not at all challenging and yields entirely expected results – the student does not appear to appreciate this. The work doesn't really add any significant value.	There are obvious and substantial problems with what was presented – the work as it stands has no value because it doesn't convince of its correctness or it presents major deficiencies.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	**75-84%**	**65-74%**	**50-64%**	**0-49%**
Document presentation	20%	The document follows a clear and logical structure indicated using headings and other conventions. The report is very easy to read: well- written, with good spelling and grammar, and appropriate language style. Text spacing aids readability. All aspects of formatting are consistent throughout the document. Graphical and tabular presentation of data is appropriate, clear, consistent and economical. Discernment is shown in the placement of graphical elements (figures, tables, etc.), whether in the body of the work or in the appendices. References in text match reference list (and vice versa) and are cited properly.	The document makes good use headings, sub-headings and other stylistic conventions to indicate document structure. The report is easy to read: writing is clear enough, with good spelling and grammar, and reasonable choice of language style. Graphical elements (figures, tables, etc.) are labelled, largely formatted consistently and cited correctly. References in text match reference list (and vice versa) and are cited properly.	The document makes some use headings and other stylistic conventions to indicate document structure. The report is reasonably easy to read: there may be some issues with spelling, grammar or style but it doesn't affect comprehension. Figures and diagrams are generally fine, although there may be some issues with the graphical presentation of data - poor choice of axes, overcrowding, poor use of chart space, etc. References in text match reference list (and vice versa) and are cited properly.	Document is not at a professional level but does make use of headings and sub-headings to indicate document structure. The report may be difficult to read: writing is just ok, broad idea comes across; spelling and grammar have some flaws, not quite appropriate language style. Although figures and tables are labelled, the formatting is unclear and/or inconsistent to the extent that the reader can lose track of the context when reading. References in text match reference list (and vice versa) and are mostly cited correctly.	The document is poorly structured, does not cohere or shows a lack of understanding of the purpose of its sections. Much effort is required to read and understand the report: writing is poor, many mistakes with spelling and grammar, and possibly inappropriate language style (e.g. too informal) Presentation is poor to the extent that it impedes reading of the document. Examples include inconsistent formatting, and unlabeled figures or tables. References are either not cited or cited inconsistently.

Submission

Please submit your report electronically, directly through the submission inbox which will be made available, unless you have been granted “confidential submission”.

Presentations do not require document submission, as they will be assessed by the academics at your oral delivery.

No document submission is required for participation assessment item.

Confidential Submission

Confidential submission of reports can be granted by the course convenor in case of confidential projects (i.e. with sensitive data from company partners). This must be requested from the course convenor at the beginning of Project A (not later than Week 4 of Project A) by the student and have the support of the supervisor (email explaining reason). If you have been granted “confidential submission”, you should SUBMIT DIRECTLY TO YOUR SUPERVISOR by means of a medium agreed with your supervisor, still within the same assignment deadline.

Please note that Project C will require two markers, so you and your supervisor will need to propose a solution that satisfies your confidentiality constraints. The convenors will have to approve your proposed solution before the beginning of Project C.

It is always the student’s responsibility (in discussion with the primary supervisor) to ensure that the confidentiality constraints are met in the processes of submission, marking and thesis document management.

Late submission

Reports submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day that the assessment is overdue (weekends and public holidays count as days). There is no pro-rata of the late penalty for submissions made part way through a day. The penalty applies until the marks for the course decrease to 50, and further lateness does not result in failure of the course, until the deadline for absolute fail. Any report submitted after the ‘deadline for absolute fail’ is not accepted and a mark of zero will be awarded for that assessment item, thus resulting in the failure of the course. The penalty will be applied directly by the marker.

No late submission is accepted for the presentation (you have to present at the scheduled time).

Extensions and special consideration

Normal cases for special consideration (i.e. illness, misadventure) should be lodged through the formal UNSW system and dealt with accordingly.

Please note that UNSW now has a Fit to Sit / Submit rule, which means that if you attempt an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of consideration, please see the information on UNSW's Special Consideration page.

Other applications for extension of submission of thesis reports (e.g. equipment breakdown, etc.) must comply with the following:

1. The request for extension must come from the supervisor. That is, it is written by, and justified, by the supervisor.
2. Request must be lodged by week 7 of term.

Feedback and Template use

The supervisor (or a delegated marker in case of supervisor unavailability) will assess the assignments and grade the work. In addition, a second marker will normally mark the Final Thesis Report and the final mark will be moderated. The supervisor will provide feedback on the student's progress and may ask for additional material. It is up to you to discuss with your supervisor the exact layout of the report.

7. Consequences if you fail in Research Thesis C

If you Fail in MMAN4953 Research Thesis C, you have 3 options:

1. Enrol in MMAN4951 Thesis A, MMAN4952 Thesis B and MMAN4953 Thesis C again in 3 subsequent terms with a new project and supervisor with the permission of the course convenor.
2. Enrol in MMAN4953 Thesis C in the next term (on the same project with the same supervisor), with the permission of your supervisor and the course convenor.
3. Enrol in MMAN4010 Practice thesis in the next term.

Students taking B and C concurrently and failing both B and C cannot concurrently enrol in B and C again. Note that a failure in Thesis B for students doing thesis B+C concurrently means an automatic failure in C as well. Students failing only in C, but completing B satisfactorily, can then take Thesis C in the next term as stated above.

8. Expected resources for students

UNSW Library website: https://www.library.unsw.edu.au/
UNSW Teams course site

9. Course evaluation and development

This course is under constant revision in order to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course

convener. In our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods.

10. Academic honesty and plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here: www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

11. Administrative matters and links

All students are expected to read and be familiar with School guidelines and polices, available on the intranet. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership