Student Guide for
Engineering Research Preparation
(41029)
And
Engineering Capstone
(41030)

Autumn 2019

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Email: FEITCapstone@uts.edu.au
Capstone webpage: uts.edu.au/capstone-project
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This subject outline should be read in conjunction with the relevant UTS: Engineering Course Guide and the UTS Coursework Assessment Policy and Procedure Manual (which is required reading for all UTS subjects). These documents will contain additional relevant information.

All University Rules and Policies apply in this subject. If they are not referenced in this Guide that does not imply that they are not applicable.

The subject coordinator for the Capstone Project subjects may change. You should address all email correspondence to FEITCapstone@uts.edu.au, not to a specific academic staff member’s email address.

The information in this subject outline was correct at the time of printing. Amendments will be announced and posted on UTSOnline only.

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1 What is Capstone Project all about?

Capstone Project is a very special subject, quite unlike any that you will have done previously. You undertake it in the final session(s) of your studies and it is your opportunity to demonstrate that you can indeed meet the levels of performance expected of a professional engineer. It is a subject in which you will have individual responsibility for the timely completion of a significant engineering project under the guidance of a member of academic staff. You will be expected to do much more than “get something working”. You will be expected to demonstrate a professional level of preparation, planning, execution, testing and documentation. You will be expected to meet a number of strictly enforced milestones and to take considerable initiative in overcoming obstacles. The Capstone Project is our way of determining whether you are ready to graduate. If you miss milestones or submit work that is not of a professional standard, your course completion may be delayed by one or more sessions.

YOU are responsible for getting your project done on time to an acceptable level. Your supervisor helps you but is not responsible for your performance. In particular, the submission of your final report (also called Thesis or Dissertation) is the equivalent of a final exam in a subject.

The Capstone Project has important educational objectives. Although each project is different and the relative emphasis will vary, the subject will involve you in:

- Integrating knowledge and skills gained in the course as a whole;
- Reinforcing and developing competencies that have not been sufficiently emphasized in your choice of subjects or engineering practice to date;
- Defining a substantial engineering study or design task and carrying it to completion within a specified time and to a professional standard;
- Completing a comprehensive written report that places the project in context, defines its objectives, and describes the work done and the resulting conclusions or recommendations;
- Bridging the gap between your undergraduate studies and your professional future, and demonstrating professional competencies and capabilities; and
- Demonstrating initiative and creativity, and taking pride in the achievement of a difficult task.

Doing the project will assist you in developing many of the attributes expected of a UTS engineering graduate. For example:

- Values and social and community contexts - the report should describe the project’s value to society;
- Maturity - personal responsibility for the identification and formulation of a substantial problem or objective and writing a major formal report of the work;
- Information literacy - projects will extend and further develop information retrieval, analysis, synthesis, argumentation and communication skills;
- Problem posing and solving - projects will identify a significant engineering problem and describe a solution to that problem;
- Management skills - project management, self-management and time-management skills will be needed for the completion and reporting of a substantial project within an agreed timeframe;
- Technical expertise - application of design method, technical expertise and research skills to a real, substantial and complex problem to which the solution is not known in advance; and
- Academic literacy, numeracy, oral comprehension and presentation skills - formal reporting, presentation and language skills will be developed by the requirement of writing a comprehensive, formal, structured report, correctly employing technical, mathematical and non-technical terminology.

Further reading: Engineers Australia Australian Engineering Competency Standards Appendix B (Stage 1 Competency Standards for Professional Engineers). See the page referenced at …

1.1 Enrolment

1.1.1 Capstone subject numbers
Capstone subjects are essentially two, 6 credit point (cp) subjects which you will complete over two consecutive sessions making a total of 12cp.

If you do not complete your project in the nominated session then you will continue enrolling in the subject that you previously enrolled for, in the subsequent sessions until the project is complete. Refer to the “When things go wrong” section for further information.

CAPSTONE PROJECT SUBJECT NUMBERS

<table>
<thead>
<tr>
<th>Subject number and name</th>
<th>Description</th>
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<tr>
<td>41029 Engineering Research Preparation And 41030 Engineering Capstone</td>
<td>You enrol in 41029 (6cp subject) in one session and in the following session enrol in 41030 (6 cp subject) to complete the 12 cp capstone over two sessions</td>
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1.1.2 Enrolment via My Student Admin
You enrol in the capstone subjects via My Student Admin in the same way you enrol in any other subject, the same procedures and deadlines are applicable. Also, you should be aware that My Student Admin enforces subject prerequisite constraints. Refer to the UTS: Engineering Handbook for details of prerequisite and co-requisite subjects. Special Consideration and/or Late Withdrawal may not be considered in cases where students have not completed prerequisite and co-requisite subjects.

All capstone project subjects are run in Autumn and Spring sessions, and may run over Summer. Please contact FEITcapstone@uts.edu.au to confirm summer availability.

If you are not officially enrolled, you cannot be awarded a mark/grade for the subject.

It is your responsibility to ensure you are enrolled in the correct subject number. The numbers are described in the table above.

Graduation
Capstone Subjects are undertaken in your final sessions of study prior to graduating. You are reminded that you can check your requirements/eligibility for graduation via the Student Centre prior to your final session of study. This will provide time for your graduation status to be confirmed, and for any administrative issues to be addressed to reduce the risk of delaying your graduation.

1.1.3 Online Project registration
You are required to register your project by completing an online form. Further information in section 2.3

1.1.4 Individual Capstone Project number
After you have submitted your Capstone Registration Form online and it has been approved by your Capstone Supervisor, the faculty will issue a Capstone Project Number. This number links you, your project and your supervisor and is a requirement of the subject. If you cease one project and commence another, you will be required to apply for a new number.

You will receive an email with your Capstone Project Number, in the form, A19-NNN. You should email FEITcapstone@uts.edu.au if you have submitted your online Registration form and have not received the capstone project number email, a week after close of online registrations.

You are advised to quote this number on all correspondence, it is also required on your final report. Correspondence that does not include your Project Number may not receive a response, or at best will be delayed.
The same format is required for all Capstone Project administration-related email inquiries which should be directed to FEITCapstone@uts.edu.au.

1.2 Documentation control

After reading the section “What is capstone project all about?” you should have a clear idea about the educational objectives and attributes you will need to demonstrate as a professional engineer and documentation control is considered normal practice for the same.

You are required to maintain a copy (paper and/or soft copy) of everything related to this subject until the end of Week 4 of the session after you complete this subject. You may be required to produce this material at any time during this period to verify your work.

This subject requirement will assist you, your supervisor, and the subject coordinator to manage a wide range of scenarios that routinely arise. For example, your supervisor may become unavailable for the final few weeks of session at short notice. A new supervisor will be allocated, and will require information such as an up-to-date project plan and deliverables detailed in your assessment tasks. The subject coordinator would be unlikely to support a claim by you that you were disadvantaged if you were unable to produce this documentation.

Keeping a logbook or journal

As identified above, documentation control is considered normal practice for any professional engineer. During the course of your work, a project logbook (journal) would normally be used to serve as a record of the way in which the project progressed during the course of the session. Salient points discussed at meetings with the supervisor (i.e., suggestions for further meetings, changes to experimental procedures) should be recorded by the student in order to provide a basis for subsequent work. This logbook is not a substitute for the written report; its purpose is to accurately document work as it is carried out.

For these reasons it is recommended that you maintain in your project logbook; your planning; your “designs”; their decisions and the basis for them; records of relevant meetings, telephone conversations etc. e.g. records of agreements, actions, changes to intentions, scope, plans and designs (and the reasons for them). It is a record of the progress of the project as it occurred, together with a personal journal outlining any significant learning which has occurred for you during the course of the project - illustrated by any critical incidents which stimulated that learning. The project logbook and journal are “working” documents and as such are not expected to be necessarily “pretty”. Clarity (e.g. in organisation and structure) and legibility is all that is required. The logbook may be formally assessed; it is your record and should be shown to your supervisor prior to assessment.

If required, the logbook serves a very useful purpose as evidence that the content of the submitted report is in fact your work.

1.3 Capstone Project Awards

People’s Choice Award for Best Exhibit

The People’s Choice Award for Best Exhibit is presented to two students whose exhibit is voted as the best at the Capstone Showcase organised for potential D/HD students who are nominated to present at the showcase. This award encourages and rewards excellence in engineering communication and the importance and need of engineers to be able to communicate their technical ideas, concepts and projects in a manner that can be easily understood by an audience that may not have their level of technical expertise and at the same time not losing their content. See Appendix D for the criteria for the People’s Choice Award for Best Exhibit. The award value is $500 along with a certificate which is presented on the day of the Capstone Showcase.
Alan Chappel Award for Engineering Innovation

The Alan Chappel Award for Engineering Innovation is a very prestigious award which is presented to one student whose Capstone Project embodies an innovation deemed by a selection panel, to have the greatest potential for commercial development.

The Prize was created to honour Alan Chappel on his retirement from the Faculty’s Industry Advisory Network (IAN) and to recognise outstanding and innovative achievement in an engineering Capstone Project. Alan Chappel is an expert in tunnel design and construction and was the NSW Manager of Connell Wagner until his retirement. He was one of the founding members of the IAN and a generous supporter of the Faculty.

The schools nominate students for this award and the recipient is selected from all the students nominated and presenting at the Capstone Showcase by the Prize Committee, which consists of the Dean (or nominee) plus a minimum of two other people with at least one UTS staff member. Industry representatives may also be included in the Prize Committee. The award value is $800 along with a certificate. The winner is announced on the day of the Showcase and the award is presented at the faculty awards night. See Appendix D for the criteria for the award.

Judges Choice Award

The Judges Choice Award is presented to one student who has undertaken a project which has impressed and inspired the judges the most on a personal level. The student may have done something involving great effort, interesting and worthy of recognition. Nominations for this award are made by the schools and the winner is decided by the same committee judging the Alan Chappel Award for Engineering Innovation. See Appendix D for the criteria for the Award. The award value is $500 and a certificate which is presented on the day of the Capstone Showcase.

2 The phases of Capstone Project

In this section the process of doing a project is broken down into a number of distinct phases. The activities that you need to be doing in each phase are outlined below.

2.1 The Exploration Phase (in the 12 months leading up to commencing your project)

The essential aim of the exploration phase is to search for a suitable topic for your project. You have the option of proposing a topic which should be approved by your supervisor. Being able to pose questions worthy of investigation is an important skill that all engineers should cultivate, as out of such questions come innovations, new product ideas, and solutions to long-standing problems. Topics may be suggested in many ways. In your everyday activities you interact with countless systems that have been designed by engineers - try to identify weaknesses in these systems and come up with ideas for improvements. Many innovations come about when individuals make the connection between a new technology developed for a particular purpose, that has an application in quite a different area. For example the GPS satellite navigation system was developed to provide missiles with location information. You might pose the question “could GPS and radio communications replace conventional railway signalling as a means of separating trains”?

Another important source of topics will be your Engineering Experience placements. Most employers recognize the significant value to them of a student undertaking a project that is related to their business. Therefore the topic may be suggested by your employer, or it might be something that you notice as needing to be done, that you in turn suggest to your employer. It might, however, simply be an idea that occurs to you in the context of your work. Your academic subjects may also have projects or assessment tasks in them that lend themselves to being extended into a project. Talking to academic staff or other engineers you meet at work or elsewhere about their interests may also trigger ideas.

The trick is to find a topic that is challenging yet doable. Many possible topics will no doubt occur to you. You should explore each - some you may dismiss as being impractical, or requiring equipment or knowledge that it is simply not viable for you to access in the time you have available. With others you may find a goldmine of useful sources and a “sponsor” either employer or academic who is interested in the outcome.

During the session before your intended enrolment in capstone project you should be fairly clear about your intended topic area. Having done so, you are ready to begin the Preparation Phase.
2.2 Preparation Phase

In the months leading up to commencing your project, the better you are prepared the easier you will find it to meet the deadlines and successfully complete the Capstone Project when you finally enrol in it. You may also want to do certain subjects as electives or even undertake short courses as preparation for your project. For example, with electronics projects, a course on Protel printed circuit board development tools might be extremely useful. It is highly likely that you will use a specialist software package in your project - you could learn this package either on your own or Online based tutorial or short course.

Another important preparation phase activity is securing an academic supervisor. It is your responsibility to secure a UTS: Engineering academic as your supervisor. Staff from other areas of the University (e.g. IT, Nanotechnology, DAB) may also be available to supervise your project, and this will require the approval of the Capstone subject coordinator.

Obviously you would like to have a supervisor who is highly knowledgeable in the area of your topic, and you will become aware of this through contact with staff in later stage subjects. All academic staff supervise Capstone Project students, and most will want to confirm their students as soon as they can so they can plan work commitments for the following session. You may need to chat with a number of potential supervisors to see how comfortable they would feel about supervising your topic.

So the earlier you make contact with potential supervisors, the more likely you will secure the staff member you want. If you miss out on who you wanted, your supervisor will still guide you through the Capstone Project process even if they’re not necessarily an expert in your topic area.

There will be start-of-session briefing videos available on UTSOnline for 41029.

Students are also encouraged to review past students’ Capstone Projects which can be borrowed via emailing feitcapstone@uts.edu.au. For details see “Capstone library” on the Capstone webpage.

2.3 Capstone Project Registration Form - Online

The online registration form is the Faculty’s way of linking you, your project, an academic supervisor, and the project number which is allocated.

Importantly, completing the Registration form online does not mean you are formally enrolled as far as the University is concerned! Refer to the Enrolment section in this guide for details on how to enrol in capstone project.

You should submit your Capstone Registration Form online via clicking on the “Registration form” link found under Enrolment procedure at www.uts.edu.au/current-students/feit/undergraduate/capstone-project by the end of Week 1.

If your supervisor accepts your registration, you will receive an “approved” email. If you miss the deadline or your nominated supervisor “rejects” your registration, please withdraw by the census date.

Students should be aware that the only circumstances in which an academic would be prepared to take on a late capstone project student would be when the proposed topic is of such interest to them that they are prepared to not only forgive the lateness but to take on the extra work load.

If your project will require Intellectual Property Agreements or Confidentiality Agreements, these should be prepared and signed by the relevant parties identified and sent to feitcapstone@uts.edu.au for record. Please be aware that the Subject Coordinator is required to have all such documents reviewed by UTS: Legal before signing. This may take some time, so act as early as possible to reduce the risk of delays. Refer to Section 4.3 of this guide for further information.

2.4 Weeks leading up to the start of session for 41029

When you enrol into 41029, you will automatically have access to the subject on UTSOnline which has resources to help you prepare for the subject and the project as a whole. In essence you should have secured a supervisor much before the actual start of the subject and you can start viewing the resources online and focus on developing your problem analysis brief, project management plan and finally a substantial research proposal. During this subject, you will be guided by both the teaching staff in the subject and your supervisor.
2.5 Undertaking 41029

41029: Engineering Research Preparation, emphasises the development of the theoretical framework and the associated project plan for a student's capstone project. The subject is followed by the implementation phase in 41030.

- You will be required to submit 3 tasks within this subject which will prepare you to take on the next subject of 41030 and to successfully complete your capstone project. Task 1 & 2 will be marked by the subject coordinator/tutors and Task 3 by your project supervisor. You however, must be in constant touch with your supervisor throughout the session to ensure you are on track with how your project will shape up.
  - Task 1 - Problem Analysis Brief
  - Task 2 - Project Management Plan
  - Task 3 - Research Proposal

Further details of the tasks and deadlines can be found in section 4.2 and on UTSOnline.

- You need to identify the site where it is proposed to undertake the work and any special facilities or equipment required should be identified together with the proposed provider or source. A letter of agreement to use site, facilities or equipment, and Intellectual Property Agreements or Confidentiality Agreements, is to be provided on the organization's letterhead and signed by an officer of the organization having the responsibility and authority for such matters.

- A UTS EHS Risk Assessment is required to be completed for all Capstone Projects and submitted on UTSOnline. Please note that in case you have an industry supervisor he/she needs to sign the EHS form as well. It is your responsibility to carry out your project to time and to specification. You must consider all factors that could cause problems such as dependencies on component deliveries or on other people, other subject workloads, your social situation etc. As a professional engineer you cannot say the fault was with other people! Possible areas of uncertainty and risk are to be identified with proposed strategies and contingency plans for avoiding, minimizing or otherwise taking account of them.

- An ethics approval form is required to be filled in for all projects. In case of a low risk project (where you have said ‘no’ to all questions in the form) you and your supervisor needs to sign the form and upload to UTSOnline submission folder. In case any of your question is answered ‘yes’, your supervisor will need to fill in a separate ethics approval form which can be obtained by emailing feitcapstone@uts.edu.au. This form will be approved by the UTS Human Research Ethics Committee. Due to short time frame of the projects undertaken, we recommend the projects to be low risk.

- All submission will be made on UTSOnline in respective folders set out for the session. Signed Intellectual Property Agreements or Confidentiality Agreements need to be submitted via email to feitcapstone@uts.edu.au.

2.6 Undertaking 41030- Working on the Project

You will now carry out your project in accordance with the plan you worked out in 41029. The method and frequency of your communication with your supervisor should be agreed as part of the proposal phase and you should follow whatever arrangements you agreed upon. Typically you will communicate with your supervisor at a minimum of once a fortnight, either by email or face-to-face. If it is a work or community-based project you may have a local supervisor as well as a UTS supervisor. It is highly desirable that all three of you have at least one meeting on site.

Enrolment in 41030 is not automatic, and you should complete your enrolment in the usual manner. However, you do not need to submit the online registration form that you would have done for 41029.

Refer to the Timeline in section 4.2 and UTSOnline for details.

2.7 Capstones Distinction or High Distinction Nomination –For students in 41030

Monday Week 9 is the deadline to decide whether you are aiming at a Distinction or High Distinction grade (for students in 41030). This will be a decision made with your supervisor, you must have their support. You and your supervisor should complete a ‘trial assessment’ using the Capstone Assessment Form; this will help to confirm your assessment criteria indicators, and confirm your D/HD candidacy.
If you wish to be examined as a potential D or HD candidate, you are required to submit a 250-300 word abstract of your project by Monday week 9. The abstract must be submitted in electronic format on the template provided in forms on UTSOnline. Submit completed abstract through https://my.feit.uts.edu.au/projects/forms/dhd.

Your supervisor must review and approve your abstract prior to submission. It is recommended that you discuss the exact wording of this abstract with your Supervisor prior to the actual submission to ensure it encapsulates the essence of your project and only requires minimal amendment. Students that do not comply with these requirements may be excluded from the D/HD Capstone Showcase.

D/HD candidates will be shortlisted by their respective schools to decide whether they will be invited to present their project at the Capstone Showcase held in week 12. In case a D/HD student is not invited to present at the showcase he/she will still be required to present their project to their supervisor in week 12 and inform feitcapstone@uts.edu.au of the day/time. Refer to the Timeline and UTSOnline for details of the Showcase.

2.8 Capstone Showcase

Students nominated for a potential D/HD grade are shortlisted by their respective schools and invited to present their project at the Capstone Showcase. The showcase is an exhibition style event and students have the flexibility to present their project in a manner that best suits their work. They are provided with a table and a display board on the day. This special event is attended by industry representatives, students and UTS Engineering Staff. You are encouraged to invite your industry supervisors, mentors, colleagues, parents, fellow students and friends.

Your supervisor will be required to attend your stall, assess your work and provide feedback that you may incorporate in your final report. The industry partners, academics and other D/HD students will also provide appreciative feedback.

Examples of what you might use to showcase your work include:

1. Working model (Please note that usually due to the size of the venue, availability of electrical power etc, we will not be able to support any special set up requirements. In case your project has special set up needs, we encourage you to prepare a video)
2. Poster (Preferable size A1 (594 mm width X 841 mm height)
3. 2 to 3 minute video
4. 2 to 3 minute Power Point Presentation

Detail plan for the day is prepared in week 10 & 11 and finalised a few days before the Showcase Day. Refer to the UTSOnline Capstone Project pages for further details.

If your project is covered by a confidentiality agreement, you may need to request a “closed” presentation to a restricted audience. Discuss this with your supervisor and email FEITCapstone@uts.edu.au to request this as needed.

A show reel of the last Capstone Showcases can be viewed at https://www.uts.edu.au/current-students/current-students-information-faculty-engineering-and-it/undergraduate/capstone-1.

2.9 Final report submission

Monday Week 1 of the final assessment period is final report submission day. This date has the same significance as an exam – if you miss it you have a high risk of failing.

For the majority of projects, you will only submit an electronic copy of your report (PDF format) through UTSOnline TURNTITIN. However, if your project work is covered by a non-disclosure agreement (eg. confidentiality or restricted IP) then you should submit your report directly to the supervisor and inform the admin team ay emailing to FEITCapstone@uts.edu.au. The reason for this is that once submitted to TURNTITIN we cannot guarantee confidentiality.

In all cases you need to submit a filled in Capstone Self-Assessment Form (Appendix B) directly to your supervisor via email. Refer to Appendix C for details.
2.10 Consent Form for uploading final reports to UTS library site

The faculty uploads all D/HD grade reports to the UTS library site which is available for UTS staff and students to view. By filling in a consent form D/HD students allow the faculty to upload their report. If you do not wish for your report to be uploaded you must indicate that in the form that you submit. Details of how to submit the form will be sent to the D/HD grade students closer to the time. If you do not submit a filled in form the faculty reserves the right to upload your report. Please note, in case an existing confidentiality agreement exists for your project and you have informed feitcapstone@uts.edu.au your report will not be uploaded to the library site.
For form details see Appendix 7.7.

2.11 Final report assessment

Your project is assessed by your supervisor and, where requested, another member of staff confirmed by the subject coordinator. Further, appropriate moderation processes are used in project assessment. In all cases, the assessment is based on the material that is submitted online.
Your supervisor may wish to interview you about your report as part of the assessment process. This may be necessary, for example, if the specific contribution that you have made to solve the problem is not made explicit. If you have met regularly with your supervisor this is unlikely to be a problem.
The indicators you have identified on your Capstone Assessment Form will provide the basis of your final assessment. Critical to this process is your requirement to document in the table (of indicators) exactly where or when or how you have met the criteria described by the indicator. You must be specific – include section numbers and/or page numbers from your report.
You are required to include your self-assessment of your project work. It is your assessment of how well you believe you have met your project assessment criteria. You will use the following scale: (0) not at all; (1) unsatisfactory; (2) passable; (3) creditable; (4) with distinction; (5) with high distinction.
As a guide, these assessments (out of 5) would align with marks/grades of (say) 40Z, 50P, 55P, 60P, 65C, 70C, 75D, 80D, 85H, 90H, 95H, 100H and are consistent with the UTS descriptors.
Further, as per UTS Assessment Guidelines, High Distinction grades are awarded to work which is considered outstanding in all assessment criteria. This work is of a depth, academic rigor and quality that they may be published in refereed conference or journal publications.
Students may appeal the grade awarded via the normal UTS procedures.

3 When things go wrong

Capstone Project offers you an opportunity to challenge yourself in a relatively safe learning environment. There are two different safety nets which may afford a mechanism in case things go wrong during your project:
- Subject based mechanisms, administered within the Faculty:
  - Renegotiation of intended outcomes;
  - Extension of time.
- UTS based mechanisms, administered by the University:
  - Late withdrawal;
  - Special Consideration.

3.1 Renegotiation of intended outcomes

Inevitably, in any project, particularly where research and investigation are involved, obstacles will come up that can only be negotiated by redefining the plan and possibly the intended outcomes. This is acceptable if the circumstances truly warrant it.
Should this occur, you should advise your supervisor immediately in writing – email preferably, unless your supervisor has indicated an alternative preferred means of written communication. The circumstances will always include consideration of the remaining time available. The outcome should be a renegotiated research proposal that is documented and signed-off by you and your supervisor. Refer to the Documentation Control section above for reasons why this may be important.
3.2 Extension of time

Should this be required, you should advise your supervisor immediately in writing (email preferably) who will make a recommendation which is forwarded to the Subject Coordinator who will action it. A supervisor may support a short extension for the delivery of your report that may assist you to fully deliver on the intended goals. Note that although an extension may be supported by your supervisor, it must still be approved by the subject coordinator. For tasks within 41029 which are marked by the subject coordinator or tutors in the subject, you must directly write to the subject coordinator for an extension. Please refer to subject outlines for details.

Importantly, you must clearly identify why the circumstances you find yourself in, may be beyond what would be considered reasonable contingency planning or control by a professional engineer. You are required to provide sufficient evidence with your letter (email) so your supervisor can make a recommendation. This evidence may include dates and details, letters (emails) from employers, industry supervisors, or other project stakeholders.

You should be aware that in these cases, the burden of extension falls directly on your supervisor to complete the assessment of your work in a shorter time frame at an already very busy time of session. As a result, such extensions are rare and do not exceed 5 days, and would not be considered for D/HD project work after Week 9 of session.

Some events that normally do NOT qualify for an extension include:

- non-delivery of components ordered in the final weeks of session;
- additional workplace responsibilities in the final weeks of session;
- inability to contact your supervisor during planned absences

Events that MAY qualify are those that are genuinely disruptive and could not be reasonably accommodated in a professional task schedule:

- overseas workplace responsibilities for several weeks late in session;
- legal, safety, resource surprises that reasonable enquiries could not have foreseen.

3.3 Late withdrawal

All requests for Late Withdrawal – with or without academic penalty (and with or without financial penalty) are to follow the UTS procedure and should be submitted via the Student Centre. Further information is available from the Student Centre.

3.4 Special Consideration

You can apply for special consideration using the University procedures. Special consideration is used in cases such as: serious illness or psychological condition – such as hospital admission, serious injury or illness, severe anxiety or depression; loss or bereavement – such as death of a close family member, family/relationship breakdown; hardship/trauma – such as victim of crime, sudden loss of income or employment, severe disruption to domestic arrangements. Further information is available here https://www.uts.edu.au/special-consideration

3.5 Querying marks/grades and Final Results

If students wish to query their result in an individual assessment task or the final examination, the process to follow can be found at Querying a mark or grade. The deadline is five working days from the date of release of the result. If students wish to query their final overall result in a subject, they may request a review of final subject assessment result. The deadline is five working days from the date of release of the result.
4 Related matters

4.1 Your Supervisor
Once your supervisor has been confirmed, they will be your first contact in dealing with all academic and the majority of administrative matters associated with the Capstone Project subject. However, the initiative must come from you to make appointments and meet the published deadlines. The subject is designed to prove that you are capable of independent work at a professional level. Your supervisor will not necessarily have expert knowledge in the technical area of your topic. Their role is to guide you through the process and to challenge your assumptions. You should seek assistance from wherever it is available - fellow students, engineers at work, postgraduate students and academic staff.

4.2 The timeline
The tables on the following pages set out the phases involved in the project and include key deadlines. Tables shown are:

- For students enrolled in 41029 in current session
- For students enrolled in 41030 in subsequent session
- For students enrolled in 41030 in current session

Students should check the ‘Announcements’ on the Capstone UTSOnline page at regular intervals in case dates or deadlines are varied.

The timeline may be too restrictive in some circumstances (such as completing project work off-shore). Supervisors can recommend individual timelines for particular students provided the timeline is approved by the Subject Coordinator. These details must be included in the written research proposal.

Students must obtain the approval of their supervisor before undertaking work on their project outside of the Autumn and Spring sessions. For example, a student may wish to complete preliminary work (e.g. literature review) over the summer period prior to enrolling in the subject in Autumn. In all such cases, students and supervisors must document and sign-off on the proposed work and a review of this work must also be reported in the research proposal.
### Capstone Project Timeline

#### For students enrolled in 41029 in Autumn 2019

(continued below for 41030 in Spring 2019)

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity/Task</th>
<th>Important notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to the session</td>
<td>Exploration phase: using your own experience (in course and at work) come up with a number of ideas that may lead to a worthwhile project.</td>
<td>Ideas could surface at any time during the course with Engineering Experience 1 and 2; and UTS and other University webpages are particularly fruitful sources.</td>
</tr>
<tr>
<td>December- 2018</td>
<td>Commence a broad based literature survey, refine a short list of potential proposals. Ascertain interests of staff and identify and speak with potential academic supervisors. Secure your supervisor.</td>
<td>Any time before Capstone subject enrolment If you leave this too late you may find it difficult to find staff prepared to discuss/engage in your project.</td>
</tr>
<tr>
<td>3 weeks before start of session</td>
<td>Add correct subject number for capstone project to your UTS enrolment (i.e. 41029- Engineering Research Preparation)</td>
<td></td>
</tr>
<tr>
<td>Week 1</td>
<td>View the subject briefing and videos posted on UTSOnline</td>
<td>Available on UTSOnline</td>
</tr>
<tr>
<td>Week 1</td>
<td>Continue work on Task 1. Refer Subject Guide and UTSOnline</td>
<td>Continue to maintain regular contact with your supervisor. Arrange laboratory access, IP and confidentiality agreements if applicable</td>
</tr>
<tr>
<td>Sunday 17-03-2019 (11:59 pm)</td>
<td>Complete your Capstone Registration Form (Appendix A) online via clicking on the “Registration form” link found under Enrolment procedure at <a href="http://www.uts.edu.au/current-students/feit/undergraduate/capstone-project">www.uts.edu.au/current-students/feit/undergraduate/capstone-project</a></td>
<td>Secure a UTS academic supervisor using the Capstone Registration Form (Appendix A) – supervisor must approve your submitted form. Submission of the registration form signifies your agreement of the Student and Supervisor Declaration. Retain your approved Capstone Registration Form email for your records</td>
</tr>
<tr>
<td>Week 2 Monday &amp; Friday</td>
<td>Attend drop in session if required (Not compulsory) Check timetable for details</td>
<td>This is an opportunity to meet with the teaching staff face to face</td>
</tr>
<tr>
<td>Monday 25-03-2019</td>
<td>Last day to add 41029 to your enrolment</td>
<td>Ensure you are enrolled in the correct capstone project subject (i.e. 41029)</td>
</tr>
<tr>
<td>Week 4</td>
<td>Submit Task 1 on UTSOnline submission folder</td>
<td>Task 1 (10% weightage) – marked by subject teaching staff</td>
</tr>
<tr>
<td>Sunday 07-04-2019</td>
<td>Check UTSOnline for details</td>
<td></td>
</tr>
<tr>
<td>Week 5 Monday &amp; Friday</td>
<td>Attend drop in session if required (Not compulsory) Check timetable for details</td>
<td>This is an opportunity to meet with the teaching staff face to face</td>
</tr>
<tr>
<td>Wednesday 10-04-2019</td>
<td>Census Date</td>
<td>Last day to withdraw from subjects without academic and financial penalty</td>
</tr>
<tr>
<td>Week 9 Sunday 19-05-2019</td>
<td>Submit Task 2 on UTSOnline submission folder</td>
<td>Refer to Appendix E for details Refer to Appendix F for details</td>
</tr>
<tr>
<td></td>
<td>Submit EHS form on UTSOnline submission folder</td>
<td>Task 2 (20% weightage) – marked by subject teaching staff</td>
</tr>
<tr>
<td></td>
<td>Submit Ethics Approval form on UTSOnline submission folder</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check UTSOnline for details</td>
<td></td>
</tr>
<tr>
<td>Week 10 Monday &amp; Friday</td>
<td>Attend drop in session if required (Not compulsory) Check timetable for details</td>
<td>This is an opportunity to meet with the teaching staff face to face</td>
</tr>
<tr>
<td>Week 12 Sunday 09-06-2019</td>
<td>Submit Task 3 on UTSOnline submission folder</td>
<td>Task 3 (70% weightage) – marked by capstone supervisor</td>
</tr>
<tr>
<td></td>
<td>Check UTSOnline for details</td>
<td></td>
</tr>
<tr>
<td>Thursday Week 12  06-06-2019</td>
<td>Capstone Showcase</td>
<td>Refer to subject guide for details, website for schedule – you may choose to attend this event</td>
</tr>
</tbody>
</table>

See over for Capstone Project Timeline for 41030 in Spring 2019
## Capstone Project Timeline

*For students enrolling in 41030 in Spring 2019*
*(Continued from 41029 above)*

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity/Task</th>
<th>Important notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Add 41030 to your UTS enrolment – this is not automatic, you must do this yourself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continue work on project, meet regularly with supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Important notes</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Week 3</strong> Monday 05-08-2019</td>
<td>Last day to add 41030 to your enrolment</td>
<td></td>
</tr>
<tr>
<td><strong>Week 5</strong> Friday 23-08-2019</td>
<td>Census Date</td>
<td>Last day to withdraw from subjects without academic and financial penalty</td>
</tr>
<tr>
<td><strong>Week 8</strong></td>
<td>Draft capstone report and demonstrate prototype to supervisor. Decide whether a D or HD grade is a possibility, prepare draft abstract</td>
<td>D/HD grades must be supported by your supervisor.</td>
</tr>
<tr>
<td><strong>Week 9</strong> Monday 23-09-2019</td>
<td>Potential D/HD grade projects submit 250-300 word abstract</td>
<td>Refer to Capstone pages on UTSOnline for submission details. This is a compulsory requirement for D/HD grade projects</td>
</tr>
<tr>
<td><strong>Week 12</strong> Thursday 17-10-2019</td>
<td>Capstone Showcase</td>
<td>Refer to subject guide for details, website for dates and schedule – This is a compulsory requirement for D/HD grade projects</td>
</tr>
</tbody>
</table>
| **1st week of Final Assessment period** Monday 28-10-2019 | Submit:  
  - Final Report in PDF format to UTS Online – turn-it-in submission link  
  - Filled in Capstone Assessment Form directly to your supervisor  
  - Filled in consent form to UTS Online submission folder | Refer to Appendix B, C & F for details |

For students enrolling in 41030 in Spring 2019 (Continued from 41029 above)
## Capstone Project Timeline

For students enrolled in 41030 in Autumn 2019

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity/Task</th>
<th>Important notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Add 41030 to your UTS enrolment – this is not automatic, you must do this yourself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continue work on project, meet regularly with supervisor</td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>Last day to add 41030 to your enrolment</td>
<td></td>
</tr>
<tr>
<td>Monday 25-03-2019</td>
<td>Census Date</td>
<td>Last day to withdraw from subjects without academic and financial penalty</td>
</tr>
<tr>
<td>Week 5</td>
<td>Draft capstone report and demonstrate prototype to supervisor. Decide whether a D or HD grade is a possibility, prepare draft abstract</td>
<td>D/H grades must be supported by your supervisor.</td>
</tr>
<tr>
<td>Wednesday 10-04-2019</td>
<td>Potential D/HD grade projects submit 250-300 word abstract</td>
<td>Refer to Capstone pages on UTSOnline for submission details. This is a compulsory requirement for D/HD grade projects</td>
</tr>
<tr>
<td>Week 9</td>
<td>Capstone Showcase</td>
<td>Refer to subject guide for details, website for dates and schedule – This is a compulsory requirement for D/HD grade projects</td>
</tr>
</tbody>
</table>
| Monday 13-05-2019 | 1st week of Final Assessment period | Submit:  
  - Final Report in PDF format to UTS Online – turn-it-in submission link  
  - Filled in Capstone Assessment Form directly to your supervisor  
  - Filled in consent form to UTS Online submission folder | Refer to Appendix B, C & F for details |
| 06-06-2019 | 17-06-2019 | |

For students enrolled in 41030 in Autumn 2019
4.3 Intellectual property and confidentiality

All projects will have some intellectual property; however, for most projects the economic value of this will be negligible. For a small number of projects intellectual property may be an issue because you, your employer, and/or your supervisor may seek ownership to some or all of the intellectual property associated with your project. For these projects, an intellectual property agreement and/or confidentially agreement is suggested. This must be signed by all relevant parties and a copy provided sent to feitcapstone@uts.edu.au.

To assist, UTS: Legal has prepared a Confidentiality Deed Pole template which is available from the Engagement Team on request by emailing FEITCapstone@uts.edu.au briefly outlining the pertinent facts: likely signatories, type of IP and owner, who is requesting the agreement, other information. For example:

- Signatories: workplace supervisor, UTS supervisor, UTS student;
- IP: database of names and data or in-house IP…;
- Requested by: my workplace (please name the company);
- Other: we may need to discuss security of final report in the future as well.

If your company wishes to have the results of your work kept confidential, your final report can be kept secure by the faculty.

Further information on the UTS Intellectual Property policy is available at http://www.gsu.uts.edu.au/policies/intelectualproperty.html

4.4 Academic Misconduct

Students are referred to the University Rules regarding Academic Misconduct, including Cheating and Plagiarism.

4.5 Ethics Approval

If on filling an ethics approval form (Appendix F) your project is categorised as a higher than low risk project, your supervisor will need to fill in a separate ethics approval form which can be obtained by emailing feitcapstone@uts.edu.au. This form will be approved by the UTS Human Research Ethics Committee. Due to short time frame of the capstone projects undertaken, we recommend the projects to be low risk. For further information students are referred to the University HREC Policies: http://www.gsu.uts.edu.au/policies/hrecguide.html

4.6 Use of laboratories

In principle a student may have the use of laboratory areas in the Faculty, but permission must first be obtained from the relevant Laboratory Supervisor. This is a formal procedure. It is not a casual procedure of just bumping into an academic or support staff member in the corridor. The resources are limited and these limited resources need to be controlled and managed.

Students must be formally accredited via the induction program, and this is carried out by the relevant Lab Supervisor. Refer to your supervisor for a copy of the induction program, or ask the Lab Supervisor. Importantly, the induction program includes UTS EHS Risk Assessment and Management procedures, and Safe Work Method Statements which you will need to discuss with the Lab Supervisor, as well as your capstone project supervisor.

On completion of the induction program, your supervisor may arrange access to particular labs. Students are expected to do their own fabrication. Request for special workshop or laboratory services will be limited to special cases where skilled craftsmanship or special facilities are required. Technical staff assistance will normally be limited to the maintenance or explanation of laboratory equipment.

Students are also expected to furnish all small hand tools that they will require for use on their project. Some large tools and certain specialised hand tools may be available for loan through your supervisor. Some basic test and measurement equipment can be made available for use during normal operating hours.

Equipment must not be removed from its location without the permission of the Lab Supervisor. If the equipment is to be used outside the Faculty you will need to seek permission with sufficient advanced notice. The necessary insurance cover may be arranged at the request of the academic supervisor. You will be asked to sign a form acknowledging receipt of the equipment and specifying the date it is to be returned.
4.7 Faculty support for Projects

The FEIT Technical Services Group offers a variety of services which may be beneficial to your Capstone.


The WORKSPACE portal provides access to selected FEIT lab applications from any device any time across the internet. Need more help? Log a job on ServiceConnect or call the UTS IT Support centre on x2222. Make sure you tell them the issue relates to WORKSPACE.

Develop dot Eng (http://develop.eng.uts.edu.au)

A Version Control repository (Subversion) and a wiki and issue tracking system (Trac) are available for software development projects. These repositories are useful for any project involving code development or for collaboration projects. These projects are backed up nightly (Weekdays). Repositories can be requested by going to http://develop.eng.uts.edu.au and requesting a new project.

Funding

In general, there are no Faculty funds available for Capstone Projects. However, some staff can provide funding support for their own research area projects. In these instances, all expenditure/costs will be controlled by your supervisor, or member of staff nominated by them, and the Faculty will retain the outcomes of the project work.

Other resources, such as the Faculty photocopy machines, laser printers are not available for reproducing your report. Phones in laboratories may be available at the discretion of the relevant laboratory manager and there use should be restricted to making internal calls and receiving external calls only.

4.8 Doing a Project at Work

If your Capstone Project is based on a project whose purpose is to primarily serve the interests of another entity (e.g. person or organisation), such as a workplace project, you must carefully distinguish between your Capstone Project and the other entity’s project. The purposes, scope, imperatives, timeline, performance, quality and reporting requirements and criteria, etc. of each are quite distinct. Satisfactory performance on one will not necessarily guarantee satisfactory performance on the other.

The expectations of you on your performance on your Capstone Project are stated in the aims, objectives, and graduate attributes in section 1 of this Student Guide. In addition to those differences nominated above there are other obvious differences e.g. the requirement to submit a Capstone Project Report and, if you are a Distinction or High Distinction nomination, present your project at a Capstone Showcase. Less obvious differences may be:

- The necessity to identify and make visible why the project is worthwhile to society; e.g. who are the stakeholders; who is advantaged; who is disadvantaged; what are the criteria by which benefits and ‘costs’ (not just financial, but also e.g. social and environmental) and ‘success’ are to be determined; how are short- and long-term considerations affected?
- The extent of your delegation e.g. the extent to which you are individually responsible for the definition, planning, monitoring, control, design, implementation, verification, validation, and documentation of the project.
- The extent to which you work autonomously or are supervised on the project, and how closely supervised.
- Identification of the knowledge and skills you have applied on the project.
- Identification of the competencies you have developed through the project.
- You are also expected to demonstrate maturity, information literacy, problem-solving, and academic literacy, in addition to technical expertise and management skills.

If your project is undertaken at a location outside the University, then you should supply details regarding an external co-supervisor who will be overseeing your work. Your research proposal should accompany a letter of support on a company letterhead and signed by your external co-supervisor. A UTS EHS Risk Assessment must also be signed by the external supervisor.

There will be initial liaison between your UTS supervisor and external co-supervisor to arrive at an acceptable mode of operation that ensures your work is properly credited and other assistance is well-defined. The external co-supervisor will normally be expected to attend the Capstone...
Showcase if you present is one, and be involved in the assessment in an advisory role. The UTS supervisor may visit your project site at appropriate time(s) to assess the context of the project and to liaise with your external co-supervisor.

For an on-going work-related project, the Subject Coordinator and UTS supervisor must be satisfied that the proposed project has sufficient elements of definition, contextual analysis and specification to allow opportunity for full and fair assessment of your performance on an Engineering task. This requires mechanisms to be in place which allow your contribution to the project to be visible and traceable and clearly distinguished from the contributions of others in your work place.

4.9 Indemnity, insurance and EHS matters

There may be opportunities for you to undertake your capstone project in a workplace other than UTS. If you are not an employee of the company responsible for the workplace, you may not be covered by their insurance cover (in case something happens to you). Further, you may not have indemnity cover (in case something you do causes damage or injury).

You should contact the capstone subject coordinator at feitcapstone@uts.edu.au before you go on-site to check if UTS insurance will cover you.

Further, in these cases the EHS information and training should be provided by both the UTS project supervisor and the external supervisor. The UTS supervisor must:

- provide EHS information/training about any aspect of the work that is within that supervisors control;
- Be assured that the external supervisor has adequate EHS management system in place before sending the student to the external workplace. This can be done by requesting evidence that demonstrates the external supervisor/organisation has adequate systems (eg. information, training, consultation, risk management, records) or ask for a declaration that this is the case. The extent that you would go to would be commensurate with the risk. Copies of this documentation must be forwarded to the Capstone Project Subject Coordinator at feitcapstone@uts.edu.au.

Additional information is available from feitcapstone@uts.edu.au.

4.10 Adding value

Your final report will be a valuable addition to your portfolio of achievements that you will want to table at employment interviews. You can get even more value from your efforts by writing up your work as a paper and submitting as an entry in one of the many student paper competitions run by the various professional bodies. Check out their websites. Students are encouraged to approach their supervisor and suggest developing the project material into a co-author publication for publication at a conference or within a Journal. Students of distinction in this subject are eligible for prizes and other accolades.
5 Requirements for Undertaking Group Projects

5.1 Preliminary
These requirements apply when two or more students are working on a project.

Some advantages of the Group Project:
• the project can be more complex and demanding;
• allows for debate and discussion of process and substance;
• enriches learning through discussion and group synthesis of knowledge;
• provides opportunities to develop team leadership skills.

Some disadvantages of the Group Project:
• maintaining an equitable distribution of tasks/activities between group members;
• resolution of process related problems/issues as they arise;
• inherent dependency on other group members;
• tendency for tasks/activities to degrade into ‘hand-holding’ (e.g. two people claiming contribution for work which requires only one person to complete);
• maintaining fair and equitable assessment across the student cohort.

Further, there is an expectation (by the accrediting body for UTS: Engineering courses - Engineers Australia) that:

A Stage 1 graduate should have undertaken and completed two or more construction projects, at least one investigative project and at least one major design project. At least one substantial project should be conducted individually, and at least one as part of a team. Accredited degree programs should provide and require such project work for all students.

Ref: Engineers Australia Australian Engineering Competency Standards Appendix B to the Guide to Assessment of Eligibility for Membership (Stage 1 Competency) for Candidates not holding an Accredited or Recognised Qualification; Indicator PE2.5(a).

Students should be aware that the assessments awarded to individuals may vary greatly within one group, even to the point where some students may not pass while others achieve distinctions. Each student will be individually assessed on their performance as a professional in the field.

5.2 Group Structure and Division of Work
Each group must document and implement a management structure. Group leadership roles must be clearly identified including who has responsibility for monitoring project deliverables and group coordination. This role could be shared amongst group members at various times during project. It must be noted that the leaders’ management skills often determine the degree of success of the project.

A group project may be interdisciplinary, with students enrolled in different engineering degrees, or in Engineering plus other faculties such as computing science, industrial design, or business studies.

Before commencing the project there must be an agreement amongst all persons involved as to the division of tasks within the project. This agreement will form an integral part of the research proposal as well as part of the final report itself. Appropriate contingency plans must be considered.

5.3 Registration forms, Proposals, Final Report
Because students will be individually assessed on their performance, each student must submit separate documentation – i.e. Individual Registration Forms; separate tasks within 41029 which clearly identify those aspects of the project which are the students’ responsibility, and those which are shared responsibilities; and separate individual final reports which should include references to the other group members project work where appropriate.
5.4 Supervision
Each student in a group project must have the same supervision. Different supervisors for different students are not acceptable. It is recognized that some projects have a complexity, or are interfaculty, so they may require more than one academic supervisor.

5.5 Contingency planning
A group project gives the opportunity for a major project to be undertaken, but there is the significant disadvantage that poorly performing members of the group can adversely affect the grades achieved by the other members. Poor performance can be the result of the demands of work, family or illness, and the possibility must be considered when proposing such a project.

In the event of a group member withdrawing, it is the responsibility of the remaining group member(s) to negotiate/redefine project outcomes with the supervisor. The project should be set up from the start with this contingency plan in place so as not to adversely impact individual students.

5.6 Assessment principles for individual contributions
It is necessary to effectively assess the professional contribution of each person in the group. These guidelines provide additional criteria for evaluating individual contributions in group projects.

The body of the report will clearly indicate the work attributed to other group members where applicable. As a guide, this should be clearly identified in the Introduction chapter, as well as reiterated in the opening introduction section to each subsequent chapter.

Included in the student’s report will be a personal reflection of at least 1500 words in length, addressing the following:

- The particular contribution of the student, in detail;
- How the group was structured and managed;
- The greatest technical challenge solved by the student;
- The greatest management challenge faced by the group;
- Lessons learned in how to complete a group project to time and specification;
- An estimate of the relative contribution to the overall project by each group member; and
- Timesheets showing all hours spent on the subject and the task done in those hours.

Students should make references to published material (journal articles, subject reading material from core subjects, text books etc.) when writing their reflection.

In the situation where one or more of the students in the group are to be considered D/HD candidates, these students are required to discuss with the subject coordinator if a combined exhibit can be approved for the Capstone Showcase.

As noted above: Students should be aware that the assessments awarded to individuals may vary greatly within one group, even to the point where some students may not pass while others achieve distinctions. Each student will be individually assessed on their performance as a near graduate in the field.
6 Capstone Project is … a very special subject.

Capstone Project is a very special subject, quite unlike any that you will have done previously.

This is the first sentence in this student guide, and is repeated here again as a reminder about the diversity of the subject. For example, around 500 students complete the capstone project subject each year, with over 100 different supervisors, some in overseas institutions, working on a wide range of project topics – the best of which compete on a national level in thesis competitions, or present at international conferences. Hence, it’s quite likely that you will believe yours is a very special project within this context, and have expectations about your particular circumstances.

Because of this diversity, it is sometimes difficult for a document such as this subject guide to accommodate the range of needs, or flexibility, that you feel is appropriate to your project or situation. Occasionally, this places all stakeholders in difficult positions. The guiding principle is to make decisions at a professional level, to perform as if you were already a graduate engineer.

For a range of reasons, there is a requirement for this student guide to provide a benchmark or level playing field that everyone can refer to, and adhere to. For this reason, the material presented in this student guide, or announcements posted on the capstone webpages, will provide the precedence when required. So, if you are in any doubt about a particular requirement, look for confirmation in writing – either in this guide, or the webpages.

Further, here are two examples that include both ethical and equity related issues. They are intended as ‘food for thought’ – many other scenarios could be developed. To assist, we’ve translated the situation from the university capstone project context into a workplace context for comparison, and included a number of stakeholders. The question becomes: as a graduate engineer, what would your response be if you were (either) the capstone project subject coordinator or workplace employer in the following situations?

<table>
<thead>
<tr>
<th>UTS Capstone Project Context</th>
<th>Workplace Context</th>
<th>... around 500 students complete the capstone project subject each year, with over 100 different supervisors...</th>
</tr>
</thead>
<tbody>
<tr>
<td>A capstone project supervisor advises a pair of students they only require a single project proposal and single project report. The students are aware of the requirements for individual proposals and reports for their group project, but choose to ignore this requirement and submit a single document because their supervisor advised them differently.</td>
<td>While on site, a client of your company advises one of your staff to install a cheaper alternative component to the one you, and Standards Australia, specified. Your staff member is fully aware of this dilemma, and the implications for workplace safety and your company. But they choose to ignore this and install the cheaper solution because the client advised them to.</td>
<td>The material presented in this student guide, or announcements posted on the capstone webpages, will provide the precedence when required.</td>
</tr>
<tr>
<td>A capstone project student has enrolled in 12cp one session project, has seen their supervisor just a couple of times, and writes to them at the end of the session seeking an extension of time. They claim their workload in other subjects was too great, and as they ‘want to do a good job on their project’, they don’t want to delay their graduation.</td>
<td>You ask one of your staff to prepare the tender for a contract worth around $13k (arguably around the same value as a 12cp capstone project). They consistently fail to meet milestones throughout the 6 months, and miss the tender closing date. With little or nothing to show, you have to make a recommendation for their continued employment.</td>
<td>... what would your response be if you were capstone project subject coordinator, or workplace employer, in the following situations?</td>
</tr>
</tbody>
</table>
APPENDIX A: Capstone Registration Form- Online

APPENDIX B: Capstone Self-Assessment: Overview & Form

APPENDIX C: Capstone Final Report

APPENDIX D: Evaluation Criteria for Prizes

APPENDIX E : EHS Risk Assessment

APPENDIX F : Ethics Approval Form

APPENDIX G: Consent Form
7.1 Appendix A: Capstone Registration Form- Online

Complete your Capstone Registration Form online via clicking on the “Registration form” link found under Enrolment procedure at [www.uts.edu.au/current-students/feit/undergraduate/capstone-project](http://www.uts.edu.au/current-students/feit/undergraduate/capstone-project).
7.2 Appendix B: Capstone Self-Assessment: Overview & Form

Overview

Table 1 below shows 21 indicators adopted from the *Engineers Australia Australian Engineering Stage 1 Competency Standards*.

The Competency Standards are divided into three Units: (PE1) Knowledge Base, (PE2) Engineering Application Ability, and (PE3) Professional and Personal Attributes. Each Unit has Indicators numbered PE1.1, PE1.2, PE1.3 etc.

In Capstone Project, you are required to identify a subset of Indicators that were applied in the assessment of your completed project. This includes choosing a number of indicators from each unit.

For example,

1. (PE1) Knowledge Base, choose 3 out of the 5 Indicators
2. (PE2) Engineering Application Ability, choose 5 out of the 11 Indicators
3. (PE3) Professional and Personal Attributes choose 3 out of the 6 Indicators

It is the responsibility of each student to decide which indicators they think they have applied, you may wish to consult your supervisor. You should identify your chosen indicators by putting an [X] in Table 1.

In this way, the assessment of them will most likely be a unique combination of indicators; as unique as your capstone project.

Instructions for using Table 1

Read through all of the indicators listed in Table 1 – determine your choice indicators by considering carefully how you believe you were able to deliver/demonstrate this competency by the end of your project.

Use the *Assessment Template* provided to list each of the indicators in the first column. You should complete a self-evaluation of the applicability of each indicator to your project. Use a simple scale – such as ‘0’ for not applicable (obviously there should be none which you choose that are not applicable) up to a ‘5’ for indicators which you consider were critical in your project work.
Table 1: Indicators adopted from  
*Engineers Australia Australian Engineering Stage 1 Competency Standards.*

It is recommended to use this form to assess your capstone project against all 22 indicators. Use the results of this initial assessment to choose 3 indicators from PE1, 5 indicators from PE2 and 3 indicators from PE3.

<table>
<thead>
<tr>
<th>PE1</th>
<th>KNOWLEDGE BASE</th>
<th>Chosen Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE1.1</td>
<td>Demonstrated use of sound knowledge of the engineering discipline at a phenomenological level, mathematics, natural and/or physical sciences for systematic investigation, interpretation analysis and solution of complex problems of engineering practice</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE1.2</td>
<td>Advanced knowledge in a technical area in the student’s engineering discipline to a level that requires conceptual understanding of mathematics, numerical analysis, statistics, and computer and information sciences related to investigation, analysis, interpretation, assessment characterisation, prediction, evaluation, modelling, decision making, measurement, evaluation, and knowledge management techniques pertinent to the engineering discipline.</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE1.3</td>
<td>Demonstrated in depth understanding and ability to develop mathematical and/or physical models to use for analysis and design</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE1.4</td>
<td>Demonstrated ability to identify and critically appraise current developments, advanced technologies, emerging issues and interdisciplinary linkages, and to interpret and apply selected research literature to inform engineering applications in student’s engineering discipline.</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE1.5</td>
<td>Demonstrated knowledge of materials and resources relevant to a student’s discipline and the ability to select the most appropriate materials and techniques to meet a particular objective.</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PE2</th>
<th>ENGINEERING APPLICATION ABILITY</th>
<th>Chosen Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE2.1</td>
<td>Demonstrated ability to identify the nature of a technical problem, make appropriate simplifying assumptions, achieve a solution, and quantify the significance of the assumptions to the reliability of the solution</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.2</td>
<td>Demonstrated ability to investigate a situation or the behaviour of a system and ascertain the relevant causes and effects</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.3</td>
<td>Demonstrated ability to address issues and problems that have no obvious solution, involving uncertainty, imprecise information, conflicting factors and require originality in analysis</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.4</td>
<td>Demonstrated appreciation of the interactions between technical systems, safety sustainability and the social, cultural, environmental, economic and political context in which they operate, and the relationships between these factors.</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.5</td>
<td>Demonstrated ability comprehend, analyse and quantify the nature of risk, both of a technical kind and in relation to clients, users, the community and the environment and devise strategies for managing this risk</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.6</td>
<td>Demonstrated ability to utilise a systems-engineering or equivalent disciplined, holistic approach to incorporate all considerations</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.7</td>
<td>Demonstrated ability to partition a problem, process or system into manageable elements, for purposes of analysis or design; and of re-combining these to form the whole, with the integrity and performance of the overall system as the paramount consideration</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.8</td>
<td>Demonstrated ability to conceptualise and define possible alternative engineering approaches and evaluate their advantages and disadvantages in terms of functionality, cost, sustainability and all other factors to deliver an optimal approach and defend the selection.</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.9</td>
<td>Understanding of the need to incorporate cost considerations throughout the design and execution of a project and to manage within realistic constraints of time and budget.</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE2.10</td>
<td>Demonstrated ability to consider the commercial, financial, and marketing aspects of an engineering project</td>
<td>[ ]</td>
</tr>
</tbody>
</table>
PE2.11 Demonstrated proficiency in employing technical knowledge, design methodology, and appropriate tools and resources to design components, systems or processes to meet specified performance criteria [ ]

<table>
<thead>
<tr>
<th>PE3</th>
<th>PROFESSIONAL AND PERSONAL ATTRIBUTES</th>
<th>Chosen Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE3.1</td>
<td>Demonstrated effectiveness in discussion and negotiation and in presenting arguments clearly and concisely in both oral and written communication (including clear diagrams and engineering sketches or drawings)</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE3.2</td>
<td>Demonstrated ability to locate, catalogue and use relevant information, including proficiency in accessing, systematically searching, analysing and evaluating relevant publications</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE3.3</td>
<td>Demonstrated ability to apply creative approaches to identify and develop alternative concepts and procedures and identify opportunities for improvement.</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE3.4</td>
<td>Demonstrated intellectual rigour and an ability to recognise limits to one's knowledge and seek advice, or undertake research, to supplement it</td>
<td>[ ]</td>
</tr>
<tr>
<td>PE3.5</td>
<td>Demonstrated awareness of legislation, statutory requirements standards and codes of practice relevant to your project</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

**Instructions for using Table 2**

Once you have finalised your indicators, you will need to use Table 2 ‘Descriptors for Assessing Indicators’ listed below to complete a self-assessment of your work. The descriptors applied here are identical to the descriptors for (H)igh Distinction, (D)istinction, (C)redit, (P)ass, and (Z) Fail grades awarded in UTS subjects – so they should be well known to you, and your supervisor.

**Table 2: Descriptors for assessing indicators – based on descriptions for UTS grades of H, D, C, P, Z**

<table>
<thead>
<tr>
<th>Indicator Score</th>
<th>Descriptors for UTS grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Work of <strong>outstanding quality</strong> as for 4, but superior – at a standard worthy of publication</td>
</tr>
<tr>
<td>4</td>
<td>Work is of <strong>superior quality</strong>, including a capacity to demonstrate a competency/indicator at a level well above what is expected from late stage UG coursework; demonstrates learning at a superior level</td>
</tr>
<tr>
<td>3</td>
<td>Work is of <strong>good quality</strong> demonstration of a competency / indicator at a level higher than what is expected from late stage UG coursework AND presents a clear rationale / critique / discussion for the appropriateness / validity of the technique or tool or methodology used / applied</td>
</tr>
<tr>
<td>2</td>
<td>Work is <strong>satisfactory</strong> demonstration of a competency / indicator at a level equivalent to what is expected from a late stage UG coursework. Note, in capstone projects – we should have expectations that students are delivering at a level greater than 2 out of 5!</td>
</tr>
<tr>
<td>1</td>
<td>Work is less than satisfactory demonstration not sufficient to demonstrate competency / indicator at level expected from late stage UG coursework material, or perhaps satisfactory demonstration of only early stage foundation level engineering science material</td>
</tr>
<tr>
<td>0</td>
<td>This Indicator is not applicable to or not demonstrated in the capstone</td>
</tr>
</tbody>
</table>

**Instructions for using Table 3 and Table 4**

Table 3 lists evaluation criteria which considers the overall (holistic) aspects of the project rather than specific components assessed by the indicators. Your supervisor will use this, as well as Table 4 in determining your overall recommended project mark/grade. Again, table 2 ‘Descriptors for Assessing Indicators’ listed above are used to score each evaluation question out of 5.

Table 4 provides a guide showing how assessment (out of 5) of your chosen indicators (from Table 1) are combined with the overall evaluation (Table 3) to provide a recommended grade for your project. You supervisor will use Table 4 to confirm a final mark/grade for your project.
Table 3: Overall Project Evaluation Criteria

<table>
<thead>
<tr>
<th>Evaluation question</th>
<th>Supervisor evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td></td>
</tr>
<tr>
<td>Does the candidate clearly identify a question to be answered or problem to be solved?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate present the results of the project in a succinct and cogent form, with suitable illustration where appropriate?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate demonstrate significant engineering judgement at a level that would be reasonably expected from a recent engineering graduate?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Is the content sufficiently substantial and broad ranging to allow coverage of the chosen assessment indicators?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the report contain sufficient material suitable for publication?</td>
<td></td>
</tr>
<tr>
<td>H (5): Peer Reviewed Conference Paper D (4): Editor Reviewed Conference Paper (IEEE standard) C (3): Engineering Paper / Seminar for graduate audience P (2): Engineering application note (provide graduate engineers to help them to learn about / gain an appreciation of subject material.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Knowledge / Ability</td>
<td></td>
</tr>
<tr>
<td>Does the candidate exhibit sufficient knowledge of the research topic and familiarity with the discipline it embraces for a final report at this level?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate demonstrate a capacity for clear thinking?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate demonstrate significant techniques of analysis and/or evaluation as outlined in the chosen assessment indicators?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Has the candidate demonstrated an understanding of project management techniques and applied them effectively in their capstone project.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Has the candidate demonstrated an ability to manage their own time and processes effectively, prioritising competing demands to achieve the required goals and objectives</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Presentation</td>
<td></td>
</tr>
<tr>
<td>Does the work represent a well planned approach to the subject matter?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Is the report structured appropriately?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate appropriately orient the reader to the ground to be covered and the arguments made?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Is the presentation of the report, in matters of grammar, spelling, punctuation and general appearance, adequate?</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>

Table 4: Combining assessment and evaluation criteria to recommend a mark/grade.

<table>
<thead>
<tr>
<th>Chosen assessment indicators requirement</th>
<th>Overall evaluation criteria requirements</th>
<th>Final Mark/Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A total of: 3 × 5’s in PE1 Knowledge Base, and 5 × 5’s in PE2 Engineering Ability, and 3 × 5’s in PE3 Professional Attributes</td>
<td>AND Work demonstrating outstanding quality in ALL Evaluation Questions (ie: 5’s in all questions in Table 3)</td>
<td>High Distinction [85, 90, 100]</td>
</tr>
<tr>
<td>At least: 1 × 5’s in PE1 Knowledge Base, and 1 × 5’s in PE2 Engineering Ability, and 1 × 5’s in PE3 Professional Attributes, and the remaining indicators should be 4’s</td>
<td>AND Work demonstrating superior quality in ALL Evaluation Questions (ie: 4’s or 5’s in all questions in Table 3)</td>
<td>Distinction [75, 80]</td>
</tr>
<tr>
<td>4’s in at least 7 of the 11 chosen indicators</td>
<td>AND work demonstrating good quality showing more than satisfactory achievement in ALL evaluation criteria (ie: 4’s in at least 8 of the 14 questions in Table 3)</td>
<td>Credit [65,70]</td>
</tr>
<tr>
<td>At least 3’s in ALL chosen indicators</td>
<td>AND work demonstrating satisfactory achievement in ALL evaluation criteria (ie: at least 3’s in all questions in Table 3)</td>
<td>Pass [50, 55, 60]</td>
</tr>
<tr>
<td>2’s in any of the chosen indicators</td>
<td>OR work demonstrating unsatisfactory achievement in ONE or more of the evaluation criteria (ie. 2’s in any of the questions in Table 3)</td>
<td>Fail [less than 50]</td>
</tr>
</tbody>
</table>
Capstone Self-Assessment Form

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>Supervisor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Name</td>
<td>Project Title</td>
</tr>
<tr>
<td>Student No.</td>
<td>Major (eg. civil eng)</td>
</tr>
<tr>
<td>Subject No.</td>
<td>External supervisor:</td>
</tr>
</tbody>
</table>

Preparing your Capstone Self-Assessment Form

Use this template to document your assessment indicators. You should download this template and use a different font to highlight the relevant indicator. On a new line, add sufficient detail; no more than 50 words per indicator, identifying exactly how or where or when you have delivered/demonstrated this indicator. Be clear and specific; include cross-references to relevant sections and/or page numbers in your report, quote actions/activity that you undertook and when. Use Table 2 Descriptors for assessing indicators to self-assess the extent to which you believe you have been able to deliver/demonstrate each indicator.

You should then email a copy of this form directly to your supervisor. The form will be used as basis to mark your final capstone project report.

Student Self-Assessment Summary

Write your self-assessment (a score out of 55 as there are 11 indicators worth 5 each)

Student signature  Date

Supervisor Assessment Summary

Write your assessment (a score out of 55 as there are 11 indicators worth 5 each)

Supervisor signature  Date
Assessment Template

<table>
<thead>
<tr>
<th>Indicator</th>
<th>In undertaking your project, identify how or where or when you have delivered/demonstrated this (choice) indicator</th>
<th>self assessment (out of 5) based on descriptors in table 2</th>
<th>supervisor assessment (out of 5) based on descriptors in table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE1. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE1. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE1. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE2. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE2. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE2. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE2. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE2. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE2. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE3. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>PE3. _</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>

total (out of 55)  

Additional assessment comments:
Example: Extract from Assessment Template for a final report submission.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>In undertaking your project, identify how or where or when you have delivered/demonstrated this (choice) indicator</th>
<th>self assessment (out of 5) based on descriptors in table</th>
<th>supervisor assessment (out of 5) based on descriptors in table</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE 1.4</td>
<td>Demonstrated ability to identify and critically appraise current developments, advanced technologies, emerging issues and interdisciplinary linkages, and to interpret and apply selected research literature to inform engineering applications in student's engineering discipline. The inverted pendulum control system will be modelled to produce a control system block diagram including values for system parameters. This mathematical model will then be used to develop a digital feedback control system capable of maintaining the 'pendulum' in the vertical position.</td>
<td>4 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>PE 2.2</td>
<td>Demonstrated ability to investigate a situation or the behaviour of a system and ascertain the relevant causes and effects. The project has implemented trials in which some physical properties are measured. A correlation can be found between mix design and particular parameters e.g. flowability. Other material properties such as strength are not tested therefore correlations remain uncertain</td>
<td>4 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>PE 3.1</td>
<td>Demonstrated effectiveness in discussion and negotiation and in presenting arguments clearly and concisely in both oral and written communication (including clear diagrams and engineering sketches or drawings). This report is presented in succinct, accurate professional/academic language throughout. Illustrations (Table 1, 2 and Fig. 2.1, 3.1) are adequate and clear to enhance communication of research findings.</td>
<td>3 0 1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

The student needs to cross-reference sections of the reports to demonstrate clearly where this indicator is addressed.

The description of indicator PE1.4 has been included and highlighted in italics.
7.3 Appendix C: Capstone Final Report

Overview

The faculty only requires a soft copy submission of the final report on UTSOnline.

Document structure/layout
The final report body text size of the characters shall be 12 point in a serif font (such as Times New Roman); the line spacing shall be 1.5 spacing.

The number of pages in the report will depend to an extent on the nature of the work undertaken. Your supervisor will be able to offer relevant advice. As a guide you could expect to write a maximum of 100 pages for your report (not including appendices). A better guide is the number of hours you must dedicate to your project. For example, around 360 hr for a passing grade 12cp project would be typical.

Your final report must conform to the following structure. The first page will be a title page as shown in the example below.

Example Format for Final Report Title page

The second page should be a signed Statement of Originality in which you declare that you are the sole author of the report, that you have not used fragments of text from other sources without proper acknowledgment, that theories, results and designs of others that you have incorporated into your report have been appropriately referenced and all sources of assistance have been acknowledged. If your Capstone extends work you undertook in (say) another subject then you must declare this and clearly identify the extent of this material in your report. The subject coordinator reserved the right to fail any student who does not sign a statement of originality.

The statement of originality is available here: https://my.feit.uts.edu.au/pages/course/undergraduate/assignment_cover_sheets_forms/FEIT_Assignment_Cover_Sheet.pdf
The **third page of the report must contain an abstract of the work**, of not more than 300 words. It should first give the project title, your name and the session. It must then describe the problem giving rise to the project, the method adopted by the student to solve it, the resulting achievements and their significance to the field of study.

The **fourth page may be an Acknowledgment page** making specific reference to the sources of help, in material or human terms, which you have valued during the course of the work.

The **next pages should include the Contents, List of Figures, and List of Tables sections**. These sections should include appropriate numbering right justified.

These pages should be followed by a **Nomenclature** section that lists symbols and abbreviations used in the text.

The remainder of the written report may be arranged in Chapters as follows:

**Introduction**: The problem is defined and the contents of each Chapter discussed briefly.

**Literature Review**: This Chapter includes the results of the literature survey on or related to the report topic (see References example below).

**Two or three Chapters**: These should appropriately describe, under suitable headings and subheadings, the main theory behind the work done, the experimental results, techniques and equipment used. In particular, aspects which demonstrate the quality of the work done should be emphasised (e.g. how problems were overcome, the theoretical model of the problem tackled).

**Conclusion**: Results are evaluated and recommendations for future work made.

**References**: Others works that have been used for information should be listed. They should be listed alphabetically by author. The Faculty uses the Harvard or author/date referencing style. UTS Library has a clear guide to this style at:


The following is an example of references in a text and their associated bibliography in the Harvard style which was created using EndNote. EndNote is a bibliographic software program for managing references. Information about EndNote is available at http://www.lib.uts.edu.au/help/referencing/endnote

Publicly funded research institutes in most countries have been pressed by economic (Tomkovick & Miller, 2000) and political pressures through the 1990s to become more financially independent (Porter, 1998), to be more accountable and to adopt more businesslike principles and practices. In this context, the occupational roles and career options for scientists and research managers in these organizations have undergone considerable change (Duta, 2000). As the research cultures of these institutions take on a more commercial perspective (Bell, 1999, p. 73), new and critical career path choices for both researchers and the organizations themselves have emerged. The changing occupational roles of research scientists and research managers in the Australian Commonwealth Scientific and Industrial Research Organization, one of the world's largest research organizations, are important examples of this phenomenon (Walker, 2001).

**References**


**Appendices**: Material of interest that would be a distraction if it was placed in the main text. The appendices may include details of design calculations, theoretical analysis and data sheets and so on.

Your report should not contain any material that cannot be justified as either contributing to your explanation of the problem that you are tackling or explaining the chosen solution.
Softcopy submissions to TURNITIN (UTS Online)

A PDF (portable document format) copy of the final version of the report must be submitted via UTS Online on the final report submission day. Results for this subject will be released after you submit a soft copy report which your supervisor will download and mark.

Requirements include:

- The file size of your final document should be less than 40MB and number of pages less than 400.
- The pdf document must not have any security or protection enabled; printing, changing, assembly, extraction, commenting, etc must all be permitted. Rationale: often we want to be able to print or extract or comment on material from these documents for other purposes (ongoing projects).
- The pdf must be created from the relevant application (eg. WORD) – it must not be a scanned image. Rationale: obviously we can’t search for key terms in a scanned image.
- The pdf must include all material (including drawings, charts, appendices). Rationale: we want one complete document, not multiple files from various applications.
- In cases where confidentiality agreements are already in place, you should submit a report directly to your supervisor and inform feitcapstone@uts.edu.au.
- Most applications should have no difficulty producing a PDF version of your submitted material (eg. word document, spreadsheet, CAD application, etc). You should use the ‘image-compress’ feature (especially with photographs and scanned images) to further reduce the size of the final pdf.
- Acrobat Professional V9 can be used to collate the individual pdf documents together (very simple - start by opening your ‘main’ pdf and then use Documents /Pages / Insert to add other pdf’s where you want them in the main file).
- please do not lock or block or password protect the pdf file
- Your pdf should have the following filename format: <A18-xxx Final Report FamilyName>. For example: A18-321 Final Report Jarman
- We recommend you forward your supervisor a copy of the pdf submission so that they have a copy as well.
Capstone Final Report Assessment Form

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>Supervisor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Name</td>
<td>Project Title</td>
</tr>
<tr>
<td>Student No.</td>
<td>Major</td>
</tr>
<tr>
<td>Subject No.</td>
<td>External supervisor:</td>
</tr>
</tbody>
</table>

Please outline here key assessment criteria for this project (other than those identified in Capstone Assessment Form):

---

**Supervisor to complete:**

| Has the student maintained a journal or log book? | .......................................................... |
| What has been the frequency of contact with the student? | .......................................................... |
| What has been the frequency of contact with the external supervisor? | .......................................................... |
| Additional comments: | |

---

**CHECKLIST:** Supervisor to download the report from UTS Online – Turnitin submissions and ensure that the following are complete

- A statement of originality signed by student is included in the report
- Capstone Self-Assessment Form has been completed by student and submitted to the supervisor
- Correspondence from subject coordinator approving extension of deadline is submitted (if applicable)
- Other (please specify):

---

THE SUPERVISOR MUST SUBMIT A COMPLETED FORM TO THE ENGAGEMENT TEAM OR SEND AN EMAIL WITH THIS FORM ATTACHED TO feitcapstone@uts.edu.au
Supervisor (and assessor if required) to complete:

You should use the completed Capstone Self-Assessment Form provided by the student to assess the project indicators. Table 2 in Appendix B of the student guide provides a description of the ‘level’ expected for a score of 0 to 5. Complete and sign the assessment summary on page 1 of the Capstone Self-Assessment Form.

Your overall evaluation of the project is required to be documented by completing the table 3 – reproduced below. The evaluation considers the overall (holistic) aspects of the project rather than specific components assessed by the indicators. Your response to the questions below should be scaled using the same criteria described in table 2.

<table>
<thead>
<tr>
<th>Evaluation question</th>
<th>Supervisor/Assessor evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td></td>
</tr>
<tr>
<td>Does the candidate clearly identify a question to be answered or problem to be solved?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate present the results of the project in a succinct and cogent form, with suitable illustration where appropriate?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate demonstrate significant engineering judgement at a level that would be reasonably expected from a recent engineering graduate?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Is the content sufficiently substantial and broad ranging to allow coverage of the chosen assessment indicators?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the report contain sufficient material suitable for publication?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td><strong>Knowledge / Ability</strong></td>
<td></td>
</tr>
<tr>
<td>Does the candidate exhibit sufficient knowledge of the research topic and familiarity with the discipline it embraces for a report at this level?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate demonstrate a capacity for clear thinking?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate demonstrate significant techniques of analysis and/or evaluation as outlined in the chosen assessment indicators?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Has the candidate demonstrated an understanding of project management techniques and applied them effectively in their capstone project.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Has the candidate demonstrated an ability to manage their own time and processes effectively, prioritising competing demands to achieve the required goals and objectives</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td><strong>Presentation</strong></td>
<td></td>
</tr>
<tr>
<td>Does the work represent a well planned approach to the subject matter?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Is the report structured appropriately?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Does the candidate appropriately orient the reader to the ground to be covered and the arguments made?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Is the presentation of the report, in matters of grammar, spelling, punctuation and general appearance, adequate?</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>

Finally, Table 4 in Appendix B of the student guide prescribes how your recommended final mark/grade for the project is determined.

I have reviewed the turnitin similarity report and am satisfied with the originality and academic integrity of this work.

I recommend the student is awarded the following mark/grade for Capstone Project:

..... Z, 50P, 55P, 60P, 65C, 70C, 75D, 80D, 85H, 90H, 95H, 100H  (circle mark)

Supervisor:......................................... Signature:..................................Date:..........................
7.4 Appendix D: Criteria for Prizes

7.4.1 People’s Choice Award for Best Exhibit

The People’s Choice Award for Best Exhibit is presented to two students presenting at the Capstone Showcase and it rewards excellence in Engineering Communication. The award is decided on the basis of voting that happens on the Capstone Showcase Day.

Who votes?
- Industry judges invited at the showcase
- Academics (including supervisors)
- D/HD students presenting on the day (D/HD students cannot vote for themselves)

Criteria: Student is able to communicate their technical ideas, concepts and project in a manner that can be easily understood by an audience that may not have their level of technical expertise and at the same time not losing their content.

7.4.2 Allan Chappel Innovation Award

All students nominated for a potential D/HD grade are shortlisted by the school for this award and it is mandatory for them to present at the Capstone Showcase to be considered. They are judged for this award by a panel comprising of the Dean (or nominee) plus a minimum of two other people with at least one UTS staff member. Industry representatives may also be included in the Prize Committee.

The criteria used is:
- **Innovation**
  - Innovation can be defined as something original and more effective and, as a consequence, new, that "breaks into" the market or society. (Wikipedia).
  - "I define the innovation process as a great idea, executed brilliantly, and communicated in a way that is both intuitive and fully celebrates the magic of the initial concept." (Pete Foley)

- **Potential for commercialisation**
  - Commercialisation is the process of introducing a new product or production method into commerce—making it available on the market. (Wikipedia)

- **Invention**
  - An invention is a unique or novel device, method, composition or process, within an overall engineering and product development process. It may be an improvement upon a machine or product or a new process for creating an object or a result. (Wikipedia)

7.4.3 Judge’s Choice Award

The Judges Choice Award is presented to one student presenting at the Capstone Showcase.

Criteria:
- Project impresses and inspires the judges the most on a personal level. The student may have done something involving great effort, interesting and worthy of recognition.

Process: Nominations for this award are made by the school and the winner is decided by the same committee judging the Alan Chappel Award for Engineering Innovation.
### 7.5 Appendix E: EHS Risk Assessment for Capstone Project

This form is based on UTS EHS Risk Assessment - For Undergraduate Practical Work. The form is to be completed for each student undertaking their UTS: Engineering Capstone Project. If there are subsequent changes to the details described below then an updated copy of the form should be submitted to the Capstone Project subject coordinator.

<table>
<thead>
<tr>
<th>Student Name</th>
<th>Supervisor Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student No.</td>
<td>Project Title</td>
</tr>
<tr>
<td>Major</td>
<td>Date of Assessment</td>
</tr>
</tbody>
</table>

**Note to academics regarding consultation:** Occupational health and safety legislation requires that staff involved with the subject (e.g. technical support staff) must be consulted during risk assessments when decisions are made about the measures to be taken to eliminate or control OHS risks and when risk assessments are reviewed.

Will the Capstone Project include work undertaken at a workplace external to UTS (eg. the student's workplace, or UTS Industry/Research partner)?

- NO → continue to the next question
- YES → the external works supervisor to complete the following:

An appropriate OHS Workplace Safety Program is in place at the location where the student will be working

<table>
<thead>
<tr>
<th>YES / NO</th>
</tr>
</thead>
</table>

Name of external supervisor:
Title:
Company Name:
Contact details:

External Workplace Supervisor signature Date

Does the project possess any of the EHS hazards listed below in step 2?

- NO → simply skip to step 6 and sign the declaration.
- YES → complete this form.

Please include any further notes/comments related to EHS matters for this Capstone Project
STEP 1: DESCRIBE THE HAZARDOUS ACTIVITIES/TASKS IN THE PRACTICAL SESSION

Describe the tasks - list the methodology and briefly describe the steps involved in carrying out the practical work. Attach additional pages/documentation as needed.

STEP 2: IDENTIFY THE HAZARDS

a) Are you using… (Tick boxes ☑ where applicable)
- plant/equipment
- ionising radiation sources or equipment 2,3
- plug-in electrical appliances 2
- lifts/hoists/cranes 3
- pressure vessels/boilers 3
- imported biological material, cytotoxins, genetic manipulation 2
- chemicals (hazardous substances/dangerous goods) 1
- sharps/needles
- pathogens/infectious materials 2
- compressed gas

b) Does the task involve… (Tick boxes ☑ where applicable)
- using tools/equipment with moving part(s)
- using tools/equipment that vibrate
- electrical wiring 3
- hazardous waste (biological or chemical)
- working with animals/insects
- working with fungi/bacteria/viruses
- exposure to bodily fluids
- fieldwork 2
- clinical/industrial placement
- working at a height
- working with lasers, microwaves or ultraviolet light
- working in isolation for extended periods
- working in a confined space
- manual handling: repetitive or awkward movements
- manual handling: lifting or moving awkward or heavy objects
- violent or volatile clients/interviewees

(c) Is there… (Tick boxes ☑ where applicable)
- noise 2
- dust/fumes/vapours/gases
- extreme temperatures
- a risk of fire/explosion
- slippery surfaces/trip hazards
- poor ventilation/air quality
- a work area that is not suited for the task
- other

1 Specific risk assessment must be completed for hazardous substances and dangerous goods – see Step 3
2 Specific control measures must be put in place for these hazards – see Step 3
3 Specific licences may be required for these hazards – see Step 3
STEP 3: EXISTING CONTROL MEASURES

a) Note strategies already in place to minimise the likelihood and/or severity of harm or loss.
- guarding/barriers
- biosafety cabinet
- fume cupboard/local exhaust ventilation
- lifting equipment/trolleys
- regular maintenance of equipment
- supervision
- training/information/instruction
- notes in laboratory/workshop manual or student handouts
- Personal Protective Equipment - gloves, boots, eye protection, hardhat, facemask, hearing protection, protective clothing

b) Note any specific risk assessments or licenses.
- chemical risk assessment (hazardous substances and dangerous goods)
- certification/licenses for operators of equipment
- test and tag plug-in electrical equipment
- monitor exposure levels (sound /substance/radiation)
- UTS Fieldwork Guidelines for overnight excursions in the field
- Biosafety Committee assessment for genetic manipulation, cytotoxins, pathogens, imported biological material, ionising radiation sources
- equipment licenses (pressure vessels, radiation equipment)

c) Note any emergency response systems.
- first aid kit
- chemical spill kit
- extended first aid kit
- evacuation/fire control
- safety shower
- eye wash station
- emergency stop button
- remote communication mechanism
- other risk control measures

STEP 4: ESTIMATED RISK LEVEL

Rate the level of risk, based on the LIKELIHOOD of harm or loss occurring and the CONSEQUENCE of that harm or loss, by marking the ‘risk matrix’ below.

When doing this, consider:
- The harm or loss (to people, physical environment, or the University) that might be caused by the hazards listed, &
- The existing controls measures listed above

<table>
<thead>
<tr>
<th>LIKELIHOOD</th>
<th>Insignificant</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
<th>Catastrophic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost certain</td>
<td>High</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Likely</td>
<td>Medium</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Possible</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Extreme</td>
</tr>
<tr>
<td>Rare</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>


High Risk and Extreme Risk activities must not be carried out.
### STEP 5: ACTION REQUIRED TO FURTHER CONTROL THE RISK

Are there any further actions required to reduce risk?

- [ ] YES
- [ ] NO (Go to Step 6)

If risk can be further reduced to a practicable level, then note further actions required. Base these on the priorities listed to the right. Also list any specific assessments required.

Refer to the example controls listed earlier. Also consider:

- Redesigning the workplace or activity
- Replacing the hazard with something less hazardous

Once the actions are complete, sign and date the form.

<table>
<thead>
<tr>
<th>Further Actions Required</th>
<th>Date Completed</th>
<th>Signed</th>
</tr>
</thead>
</table>

### STEP 6: ARE THE RISKS CONTROLLED?

To be signed when actions are completed as noted in Step 5.

<table>
<thead>
<tr>
<th>Student name (please PRINT)</th>
<th>Student signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Supervisor name (please PRINT)</th>
<th>Supervisor signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Due to the short timeframes available for the completion of these projects, it is recommended that undergraduate and honours students undertake projects that are of nil/negligible or low risk. Undergraduate and honours projects that are higher than low risk must be reviewed by the UTS HREC. This application form to be completed AFTER the project method has been discussed and confirmed with project supervisor/s.

### Section 1: General Information

<table>
<thead>
<tr>
<th>Full Project / Subject Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

1.1 Student details

<table>
<thead>
<tr>
<th>Name:</th>
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<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Student ID:</th>
</tr>
</thead>
<tbody>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Faculty:</th>
</tr>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Degree/Course:</th>
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<table>
<thead>
<tr>
<th>UTS student email address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Telephone number:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

1.2 Supervisor / Subject Co-ordinator details

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Position:</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Faculty:</th>
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<tbody>
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</tbody>
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<table>
<thead>
<tr>
<th>Email address:</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Telephone number:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
### Section 2: Ethics risk assessment

<table>
<thead>
<tr>
<th>Does your research involve any of the following? Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of a register or databank of identifiable data for possible use in future research projects</td>
</tr>
<tr>
<td>Collection, transfer and/or banking of human biospecimens</td>
</tr>
<tr>
<td>Any significant alteration to routine care or health service provided to participants</td>
</tr>
<tr>
<td>Interventions and therapies, including clinical and non-clinical trials, and innovations</td>
</tr>
<tr>
<td>Targeted recruitment or analysis of data from any of the vulnerable groups listed in Chapter 4 of the National Statement (or where any of these vulnerable groups are likely to be significantly over-represented in the group being studied)</td>
</tr>
<tr>
<td>Women who are pregnant and the human fetus (Chapter 4.1, page 46)</td>
</tr>
<tr>
<td>Children and young people (under 18 years) (Chapter 4.2, page 50)</td>
</tr>
<tr>
<td>People in dependent or unequal relationships (e.g. lecturer/student [except T&amp;L], doctor/patient, employer/employee) (Chapter 4.3, page 53)</td>
</tr>
<tr>
<td>People highly dependent on medical care who may be unable to give consent (Chapter 4.4, page 55)</td>
</tr>
<tr>
<td>People with a cognitive impairment, an intellectual disability, or a mental illness (may include the disadvantaged/homeless) (Chapter 4.5, page 58)</td>
</tr>
<tr>
<td>People who may be involved in illegal activities (including those affected e.g. victims of domestic violence) (Chapter 4.6, page 60)</td>
</tr>
<tr>
<td>Aboriginal and Torres Strait Islander Peoples (Chapter 4.7, page 62)</td>
</tr>
<tr>
<td>Collection, use or disclosure of personal information without consent of the participant</td>
</tr>
<tr>
<td>Photographs, images, video or audio footage</td>
</tr>
<tr>
<td>Fingerprints</td>
</tr>
<tr>
<td>Collection, use or disclosure of health information</td>
</tr>
<tr>
<td>Information or an opinion about: (i) the health or a disability (at any time) of an individual; or (ii) an individual’s expressed wishes about the future provision of health services to him or her; or (iii) a health service provided, or to be provided, to an individual</td>
</tr>
<tr>
<td>Personal information about organ donation</td>
</tr>
<tr>
<td>Genetic information about an individual or the individual’s relatives</td>
</tr>
<tr>
<td>Collection, use or disclosure of sensitive information</td>
</tr>
<tr>
<td>Projects involving covert observation, active concealment, or planned deception of participants</td>
</tr>
<tr>
<td>Activity that potentially infringes the privacy or professional reputation of participants, providers or organisations</td>
</tr>
<tr>
<td>People in / from countries that are</td>
</tr>
<tr>
<td>Potential for participants to experience harm</td>
</tr>
</tbody>
</table>

Answering Y to any of the above questions makes this a high risk application, which must be reviewed by the UTS Human Research Ethics Committee. Please contact your Supervisor or Faculty representative for assistance. You can also contact research.ethics@uts.edu.au for more information.

If you answered N to all of the above, please continue with Section 3 below.
### Section 3: Declaration & Sign off

#### 3.1 Student

- I have answered all questions in the risk assessment truly and completely to the best of my knowledge
- I declare that I believe this research to be of low risk in accordance with the National Statement on Ethical Conduct in Human Research (Chapter 2.1)
- I will notify the UTS Human Research Ethics Committee of any variation to this research that may alter the level of risk associated with it
- This research will be undertaken in compliance with the UTS Research Ethics and Integrity Policy or any replacement or amendment thereof
- This research will be undertaken in compliance with the Australian Code for the Responsible Conduct of Research and National Statement on Ethical Conduct in Human Research

**Name (Please Print):**

**Signature:**

**Sign off date:**

#### 3.2 Supervisor / Subject Co-ordinator

- I declare that I believe this research to be of low risk in accordance with the National Statement on Ethical Conduct in Human Research (Chapter 2.1)
- This research will be undertaken in compliance with the UTS Research Ethics and Integrity Policy or any replacement or amendment thereof
- This research will be undertaken in compliance with the Australian Code for the Responsible Conduct of Research and National Statement on Ethical Conduct in Human Research

**Name (Please Print):**

**Signature:**

**Sign off date:**
Consent Form

In the case my final Capstone Project Report, submitted as part of the subject 41030/48026/48012/48006, is awarded with a D/HD grade:

☐ I give permission

☐ I do not give permission

I give permission to the Faculty of Engineering & IT to upload my report to the UTS library site available to view by all UTS staff and students.

I grant permission to UTS library to adjust format or technical elements of this file in order to apply operations that support the digital preservation of this work.

Student Name: ___________________________

UTS student ID: _______________

Signature: _____________________

Date: ____________

Please upload the filled in form to UTSOnline submission folder along with your final report. Submission folder details will be available on UTSOnline.

Please Note: In case you do not submit this form along with your final report, the faculty reserves the right to upload your report to UTS library site.

For any further information please write to feitcapstone@uts.edu.au