BIOM4953

Research Thesis C

Term 3, 2021
Course Overview

Staff Contact Details

Convenors

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Availability</th>
<th>Location</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Stevens</td>
<td><a href="mailto:thesis.biomedeng@unsw.edu.au">thesis.biomedeng@unsw.edu.au</a></td>
<td>By Appointment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatemeh Karimi</td>
<td><a href="mailto:fatemeh.karimi@unsw.edu.au">fatemeh.karimi@unsw.edu.au</a></td>
<td>By Appointment</td>
<td></td>
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</tr>
</tbody>
</table>

School Contact Information

Student Services can be contacted via uns.w.to/webforms.
Course Details

Units of Credit 4

Summary of the Course

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

Course Aims

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

Course Learning Outcomes

1. Develop a design or a process or investigate a hypothesis following industry and professional engineering standards.
2. Critically reflect on a specialist body of knowledge related to their thesis topic.
3. Apply scientific and engineering methods to solve an engineering problem.
4. Analyse data objectively using quantitative and mathematical methods.
5. Demonstrate oral and written communication in professional and lay domains.
6. To solve biomedical problems by applying CLOs 1-5

Teaching Strategies

The course is taught as an individual research project, to develop a level of research skills and autonomy.

Students in this cohort will complete their thesis over three terms (4+4+4) or over two terms (4+8). A summary of the assessment is as follows

Thesis A: It is intended that Thesis A cover the scoping, planning, and completing preparations for the project. Students must have completed this assessment and passed in order to enroll in BIOM4953. This course is worth 10% of your final thesis grade.

Thesis B: The primary intention behind Thesis B is to ensure students stay on track with their projects
and project work as they progress through the year. This subject is worth 10% of your final thesis grade. Students must have completed this assessment and passed in order to enroll in BIOM4953. This course is worth 10% of your final thesis grade.

**Thesis C:** Thesis C continues the project work. The key deliverable is the Written Report, alongside a poster presentation. This subject is worth 80% of your final thesis grade.

Upon completion of Thesis C, the final grade will be calculated and reapplied to this course and then to BIOM4951 and BIOM4952, replacing any E.C. components.
Assessment

The aim of Thesis C is to finalise your research results and disseminate them in both an oral and written manner. This is the final key part of being a successful researcher. To that end, the assessment tasks provide students with a realistic experience of being a researcher.

There are 3 assessment tasks for Thesis C.

- TC1: Written report (65%)
- TC2: Conference Presentations (10%)
- TC3: Participation (5%)

Students have the option to use Smarthinking to receive feedback on their assessments. This can be accessed through Moodle.

<table>
<thead>
<tr>
<th>Assessment task</th>
<th>Weight</th>
<th>Due Date</th>
<th>Course Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conference Presentation</td>
<td>10%</td>
<td>Week 7</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td>2. Thesis Report</td>
<td>65%</td>
<td>Final week of term</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td>3. Participation</td>
<td>5%</td>
<td>After submission of final thesis report</td>
<td>1, 2, 3, 4, 6</td>
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</tbody>
</table>

Assessment 1: Conference Presentation

**Assessment length:** Poster Presentation - make a poster, stand next to it virtually to answer any questions about it.
**Due date:** Week 7

The aim of Thesis C is to finalise your research results and disseminate them in both an oral and written manner. This is the final key part of being a successful researcher. To that end, the assessment tasks provide students with a realistic experience of being a researcher.

There are 3 assessment tasks for Thesis C.

Conference Presentations

1. Students are required to present a short virtual poster presentation in week 7. This is a good opportunity to present your work to senior academics and to industry.
2. The target audience for this presentation are research engineers who are not necessarily familiar with your field of expertise. In other words, the audience knows the research process and general engineering knowledge but may not know the specific ins and outs of your project.
3. Your challenge: present the significance of your research problem as well as your key results that show whether you have met your aim or proved/disproved your hypothesis.
4. Your assessors will then ask questions on your presentation that you must answer.
5. Success in this assessment will involve both a clear and cohesive presentation and an ability to
explain your research to engineers who are not necessarily in your field of study.  
6. This event will take place at the GSBME-BESS Industry Networking Night. The best poster presentation on the night will win an award!

This is not a Turnitin assignment

**Assessment criteria**

**Biom 4953 poster presentation rubric**

Last updated: 8 september 2021

<table>
<thead>
<tr>
<th>Assessment attribute</th>
<th>WT</th>
<th>Levels of attainment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>20%</td>
<td>Outstanding: The student can explain the broader context that the work fits into, why it was done and how important it is. Excellent: The student can explain why the work was done in direct terms. Good: Good, above satisfactory effort. Adequate: The student attempts to explain why the work was done but you think they barely understand. Deficient: The student cannot explain why the work was done.</td>
</tr>
<tr>
<td>Has the student been able to explain why the work was done?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>20%</td>
<td>Outstanding: Quite challenging project conducted which required extensive use of high-level engineering methods. Excellent: Project professionally conducted using appropriate engineering methods. Good: Engineering methods were employed correctly in project, but with some weaknesses or omissions in the methods employed. Adequate: Work is trivial or was conducted incorrectly or with inappropriate use of engineering methods, placing conclusions in some doubt. Deficient: Work completely fails to address the stated aims,</td>
</tr>
<tr>
<td>How good is the work? Extent of applications of engineering methods?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demonstration</strong></td>
<td>20%</td>
<td>Outstanding: Excellent, very convincing demonstration of a non-trivial project with valuable new results. Excellent: Good show from which some credible conclusions can be drawn. Good: Satisfactory, maybe inconclusive but evidence of serious effort. Adequate: Satisfactory, maybe inconclusive but evidence of serious effort. Deficient: Deficient, no tangible deliverable, not much to show, nothing learned.</td>
</tr>
<tr>
<td>Does it work? What new information was learned?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>20%</td>
<td>Outstanding: Aims, methods, results, conclusions are all clear. The poster is excellent and. Excellent: Aims, methods, results and conclusions are clear but only after. Good: Some deficiencies: more than one of aims, methods, results and conclusions. Adequate: Taken together, graphical and verbal dissemination of findings is</td>
</tr>
<tr>
<td>How well is the work presented?</td>
<td></td>
<td></td>
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</tbody>
</table>
attractive; the presentation is engaging
is adequate.
probing. Some aspects of the poster or presentation were not well considered.
are not clear.
so poor that you are left unsure what the work is about.

Q&A
How well is the student able to answer questions?

<table>
<thead>
<tr>
<th>20%</th>
<th>Provide in-depth flawless answers that demonstrate commanding knowledge of the subject matter.</th>
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<tbody>
<tr>
<td></td>
<td>Able to answer questions easily and directly, almost flawless.</td>
</tr>
<tr>
<td></td>
<td>Able to answer questions with only minor flaws; you are sure they have reasonably good understanding about their work.</td>
</tr>
<tr>
<td></td>
<td>Able to answer questions but there are flaws. Nevertheless, you are fairly sure they understand what they're doing.</td>
</tr>
<tr>
<td></td>
<td>Unable to answer questions about the work or attempt to answer but clearly doesn't really understand.</td>
</tr>
</tbody>
</table>

Additional details

Note that the poster is due in WEEK 7.

Assessment 2: Thesis Report

Due date: Final week of term

The aim of Thesis C is to finalise your research results and disseminate them in both an oral and written manner. This is the final key part of being a successful researcher. To that end, the assessment tasks provide students with a realistic experience of being a researcher.

There are 3 assessment tasks for Thesis C.

Report

The written report is the final documentation of your thesis project. It should be approximately 50 pages in length (excluding references and appendices).

The thesis content will be assessed according to the stated thesis aims which may be a) experimental or simulation-based b) design or c) critical reviews. The assessment weightings are shown below. Please note that these are only assessment criteria. The thesis structure outline is entirely up to you.

The mark break down for this report is as follows

1. Literature review/background and putting the results in context (20%)
2. Execution of the research project, quality of analysis, discussion of results (50%)
3. Conclusions and value added (20%)
4. Document presentation (10%)
<table>
<thead>
<tr>
<th>Grade</th>
<th>Mark</th>
<th>Brief description</th>
<th>Longer explanation / examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail</td>
<td>0-49</td>
<td>Clearly deficient</td>
<td>Work at this level is clearly deficient - in not addressing the stated project aims or in containing major problems that the student should reasonably have been aware of but did not address in the thesis.</td>
</tr>
<tr>
<td>Pass</td>
<td>50-64</td>
<td>&quot;Thin&quot; results, lacking intellectual engagement</td>
<td>The student has completed a body of work and presented some results but not succeeded in interpreting meaning from them (=intellectual input is largely absent from the discussion, which is essentially equivalent to observation of the results). Performance at this level may also indicate a lack of engagement with the project, sometimes evidenced as a “thin&quot; or &quot;one-dimensional&quot; investigation characterised by attempted padding.</td>
</tr>
<tr>
<td>Credit</td>
<td>65-74</td>
<td>Several components to the research work, not coherently linked.</td>
<td>The student probably has a number of components to their research, such as literature, experiments, designs, simulations etc. They have interpreted meaning from the results but have overall not succeeded in linking the components of their research together as a coherent scientific story. There's no clear &quot;big picture&quot;.</td>
</tr>
<tr>
<td>D</td>
<td>75-84</td>
<td>Solid, coherent work, linking all the research components together into a consistent story.</td>
<td>At this level the student has assembled the pieces of their research project (which could include literature, different sets of experiments or measurements, simulations or analyses) into a coherent scientific story. Overall, you are left with a clear and convincing picture of what the research question was and what the answer is (along with its caveats). A student is generally not going to be able to achieve this if there are conceptual or methodological problems with their work, or if their review of literature is inadequate.</td>
</tr>
<tr>
<td>HD</td>
<td>80-100</td>
<td>Solid, coherent and consistent story PLUS something unexpected.</td>
<td>Student would have to have achieved as at the previous level but additionally has achieved something unexpected, thoughtful and original, such as a novel perspective or theory. This requires deep thinking of the student.</td>
</tr>
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</table>

**Criterion 3: Conclusions, and value added (20%)**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Mark</th>
<th>Brief description</th>
<th>Longer explanation / examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail</td>
<td>0-49</td>
<td>No value</td>
<td>There are obvious and substantial problems with what was presented – the work as it stands has no value</td>
</tr>
</tbody>
</table>
because it doesn't "hold water".

<table>
<thead>
<tr>
<th>Grade</th>
<th>Mark</th>
<th>Brief description</th>
<th>Longer explanation / examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>50-64</td>
<td>No interesting results</td>
<td>The presented work is not at all challenging and yields entirely expected results – the student does not appear to appreciate this. The work doesn't really add any significant value.</td>
</tr>
<tr>
<td>Credit</td>
<td>65-74</td>
<td>Minimal value</td>
<td>The presented work adds some value in some way – improvement of “local knowledge” such as techniques, additional data points in a larger design or hypothesis etc. The student worked well but did not push themselves harder to make any real new discoveries or interpretations, therefore the conclusions are limited and discussions of future work are predictable extensions of the work completed.</td>
</tr>
<tr>
<td>D</td>
<td>75-84</td>
<td>Will have wider impact when further work is done.</td>
<td>You are fairly sure that the results and discussion can eventually form the core of a research publication or change in industry practice (It may have already been included in a conference publication during the course of the thesis). However, further work will first be required – such as repeated experiments – before the work is truly sufficient. The student has included good, thoughtful discussion of limitations and provided insight into future work on this project or new avenues of research which could be followed.</td>
</tr>
<tr>
<td>HD</td>
<td>80-100</td>
<td>Will have wider impact now.</td>
<td>This is valuable work. This work can easily form the basis of a peer-reviewed journal publication, or other form of professional dissemination/presentation appropriate to the field (i.e. patent application, best practice document at a company, trade publication, workshop, etc.).</td>
</tr>
</tbody>
</table>

**Criterion 4: Document presentation (10%)**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Mark</th>
<th>Brief description</th>
<th>Longer explanation / examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail</td>
<td>0-49</td>
<td>Impedes document reading</td>
<td>Presentation is poor to the extent that it impedes reading of the document. Examples include multiple inconsistent citation styles or incomplete citations, unintelligible grammar, figures or tables not labelled or badly inconsistent document formatting. Page limit is not adhered to.</td>
</tr>
<tr>
<td>Pass</td>
<td>50-64</td>
<td>Poor formatting / document structure</td>
<td>Document is not at a professional level. Although figures and diagrams are labelled and references in text match reference list (and vice versa), formatting is unclear and inconsistent to the extent that the reader can lose track of the context when reading. The structure of the document is poor or illogical, with little</td>
</tr>
</tbody>
</table>
Discernible flow. Page limit is not adhered to.

<table>
<thead>
<tr>
<th>Credit</th>
<th>65-74</th>
<th>Poor judgement with respect to layout, possible padding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document is not at a professional level. Figures and diagrams are labelled, formatting is consistent, references in text match reference list (and vice versa), pictures are clear and attributed, sections clearly labelled. Poor judgement has been exercised in placing data, tables or figures in the body of the work, and/or excessive figures/tables – some of which would have been better placed in an appendix or discarded. An attempt might have been made to &quot;pad&quot; the work or increase the page count using unnecessary, repetitive, or large figures, unnecessarily lengthy text, wide margins, etc. The language is not sophisticated or sufficient for describing the technical aspects clearly and rigorously, and there are disjointed aspects to the structure. Page limit is not adhered to.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| D | 75-84 | Professional, may have issues with data presentation |
| Document is at a professional level. Figures and diagrams are correctly and clearly labelled, text spacing aids readability, consistent formatting, references in text match reference list (and vice versa), pictures are clear and attributed, sections clearly labelled, and good use made of appendices. Some of the graphical presentation of data is inappropriate - poor choice of axes, overcrowding, poor use of chart space etc. Padding is not a feature of work at this level. The structure is well thought out and logical, and there is a good command of descriptive and technical language – descriptions and explanations have depth but clarity, and are concisely worded. Page limit is adhered to. |

| HD | 80-100 | Professional, concise and readable |
| Document is at a professional level. Figures and diagrams are correctly and clearly labelled, text spacing aids readability, consistent formatting, references in text match reference list (and vice versa), pictures are clear and attributed, sections clearly. Page limit (pictures and text) is adhered to strictly. |

### Assessment 3: Participation

**Assessment length:** Online Survey  
**Due date:** After submission of final thesis report.
Participation

This is an assessment completed by the supervisor, which will be based on the following criteria.

1. Completion of Project Exit Form
2. Initiative and Engagement
   1. Intellectual contribution
3. Sustained activity throughout the term
   1. Attendance at lab meetings
4. Diligence and competence in performing the task
   1. Amount of work and engagement with problem
   2. Risk assessments complete (when relevant)
   3. Other project-specific evidence (e.g. lab book completion)

Assessment criteria

1. Completion of Project Exit Form (SA/UN)
2. Initiative and Engagement (33%)
   1. Intellectual contribution
3. Sustained activity throughout the term (33%)
   1. Attendance at lab meetings
4. Diligence and competence in performing the task (33%)
   1. Amount of work and engagement with problem
   2. Risk assessments complete (when relevant)
   3. Other project-specific evidence (e.g. lab book completion)
Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

No lectures in this course.

View class timetable

Timetable

<table>
<thead>
<tr>
<th>Date</th>
<th>Type</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 7: 25 October - 29 October</td>
<td>Assessment</td>
<td>Poster Presentation at the GSBME/BESS Industry Night</td>
</tr>
<tr>
<td>Study Week: 20 November - 25 November</td>
<td>Assessment</td>
<td>Final Report Due Monday Week 11, 11:59pm</td>
</tr>
<tr>
<td></td>
<td>Assessment</td>
<td>Submit your project exit form.</td>
</tr>
</tbody>
</table>
Resources

Prescribed Resources

Resources will be made available to help students guide them in their journey for Thesis A.

Extensions

You can apply for special consideration when illness or other circumstances interfere with your assessment performance.

Other applications for extension of submission of thesis reports (e.g. equipment breakdown, etc.):

1. Discuss the possibility of an extension with your supervisor first.
2. Requests can then be lodged by the student here http://tinyurl.com/yy2jzpyv. The supervisor will then receive an email asking them to approve, before it is escalated to the decision panel.
3. Request must be lodged by Week 6 of term.
4. Panel decision will be made by end of week 7.
5. The decision will be made by a panel – consisting of the HoS (or their nominee), Thesis Coordinator, and 1 other person.
6. Students should be alerted to the fact that this is not guaranteed, and thus should not rely on getting an extension.
7. Typically, extensions are granted UP TO 3 weeks. The length of the extension needs to be requested and justified by the supervisor. Panel will decide the length of time granted.

Procedure if you fail Thesis A, B or C

Fail in Thesis A (interim report mark < 50%) – must re-enrol in Thesis A again.

Fail in Thesis B (seminar mark < 50%) – must re-enrol in Thesis B again

Fail in Thesis C – Students have three options.

1. re-enrol for Thesis A, B and C again, new project and supervisor
2. re-enrol for Thesis C again, same project - needs consent of an appropriate supervisor & student
3. Student does further work, re-submits thesis after a max of 6 weeks. Course mark capped at 50%. If still not satisfactory, then needs to re-enrol.

This last option is only available if the original mark was ≥40, OR if the student is in their last semester before graduation (regardless of the original mark).

Fail in Thesis B & C (when taken simultaneously) – Students must re-enrol in Thesis B again, and cannot concurrently enrol in C. They can then take Thesis C when Thesis B has been satisfactorily completed.

Industry based projects

We encourage students to seek partnerships with industry, so students can have a co-supervisor from
industry. However, if confidentiality is required, a confidential disclosure agreement (CDA) is obligatory. The agreement will protect the intellectual property rights of the industry partner, UNSW and the student. Students or academics are not authorised to sign confidential disclosure agreements on behalf of UNSW and are advised to talk to the course coordinator and UNSW legal office to arrange for drafting and signing of the confidential disclosure or research agreement.

To complete an industry-based thesis, you must complete the following steps:

1. Identify an industry supervisor and share with them these guidelines.
2. Identify a GSBmE Academic who can be your academic supervisor.
3. Complete this Industry thesis permission form and make sure your industry supervisor AND your academic supervisor have signed the form.
4. Upload the signed form here (you may need to log in with your zID@ad.unsw.edu.au and zPass).

**Late procedure**

In all cases, applications for late submission can be applied for BEFORE the due date. This is at the discretion of the thesis coordinator but should only be granted in exceptional circumstances. As per normal, students can also apply through myUNSW for special consideration.

For Thesis A, B or C, 5 marks will be deducted off the thesis for every day late. Penalty applies until the marks for the course decrease to 50, and further lateness does not result in failure of the course, but might be a failure of the thesis (weekends count as days).

**Additional support for students**

- The Current Students Gateway: https://student.unsw.edu.au/
- Academic Skills and Support: https://student.unsw.edu.au/academic-skills
- Student Wellbeing, Health and Safety: https://student.unsw.edu.au/wellbeing
- Disability Support Services: https://student.unsw.edu.au/disability-services
- UNSW IT Service Centre: https://www.it.unsw.edu.au/students/index.html

**Recommended Resources**

Not available
Submission of Assessment Tasks

Laboratory reports and major assignments will require a Non Plagiarism Declaration Cover Sheet.

Late submissions will be penalised 10% of the mark for each calendar day late. If you foresee a problem in meeting the nominated submission date please contact the Course Convenor to make an appointment to discuss your situation as soon as possible.
Academic Honesty and Plagiarism

PLAGIARISM
Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise will have their names entered on a plagiarism register and will be liable to disciplinary action, including exclusion from enrolment.

It is expected that all students must at all times submit their own work for assessment. Submitting the work or ideas of someone else without clearly acknowledging the source of borrowed material or ideas is plagiarism.

All assessments which you hand in must have a Non Plagiarism Declaration Cover Sheet. This is for both individual and group work. Attach it to your assignment before submitting it to the Course Coordinator or at the School Office.

Plagiarism is the use of another person’s work or ideas as if they were your own. When it is necessary or desirable to use other people’s material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:
https://student.unsw.edu.au/plagiarism
Academic Information

COURSE EVALUATION AND DEVELOPMENT
Student feedback has helped to shape and develop this course, including feedback obtained from on-line evaluations as part of UNSW’s myExperience process. You are highly encouraged to complete such an on-line evaluation toward the end of Term. Feedback and suggestions provided will be important in improving the course for future students.

DATES TO NOTE
Refer to MyUNSW for Important Dates, available at:
https://my.unsw.edu.au/student/resources/KeyDates.html

ACADEMIC ADVICE
For information about:

• Notes on assessments and plagiarism,
• Special Considerations,
• School Student Ethics Officer, and
• BESS

refer to the School website available at
http://www.engineering.unsw.edu.au/biomedical-engineering/

Supplementary Examinations:
Supplementary Examinations for Term 3 2021 will be held on Monday 10th January – Friday 14th January (inclusive) should you be required to sit one.

Image Credit
Synergies in Sound 2016

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country
We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.