VICTORIA UNIVERSITY OF
WELLINGTON
TE HERENGA WAKA

School of Engineering and Computer Science
Te Kura Mātai Pūkaha, Pūrorohiko

PO Box 600
Wellington
New Zealand

Tel: +64 4 463 5341
Internet: office@ecs.vuw.ac.nz

BSc Hons Handbook
2024

AIML487, CGRA489, COMP489, and ELCO489
(Individual Research Project)

Abstract

These courses are individual research projects, which are a major undertaking for both students and staff. This document describes in detail the requirements for these courses and provides some additional guidelines.

Staff expect that students are completely familiar with the contents of this document. Questions regarding this document should be discussed with the supervisor (where appropriate) or the course coordinator (otherwise).

Contents

Chapter 1

Introduction

The BSc Hons (CGRA/COMP/ELCO489 and AIML487) project courses consist of an individual or small group project done under the supervision of one (or more) academic staff. The underlying aim of the project is to develop your research ability and demonstrate your independent and critical thinking. The project will involve refining a project proposal, reviewing and analysing relevant literature, potentially developing an artefact, and evaluating the artefact or research problem. You will prepare a final written report and give an oral presentation.

1.1 Aims and Scope

The aim of this document is to provide a comprehensive guide to the BSc Hons project, for both students and staff. In particular, the document sets out the requirements of the course and clarifies the way in which student projects will be assessed and supervised.

1.2 Engineering versus Science

Many of your colleagues will be doing ENGR489, which is an engineering project that is focused on implementation and process, while this handbook describes the **research** projects.

Research projects at 4th-year range from literature reviews and analysis, repeating existing published work, to the testing of new artefacts and the creation of knowledge. The first part of the project is to define the scope of the project and the research questions that you want to try to answer. If an artefact is created then there needs to be an experimental protocol to collect, analyse and interpret data. BSc Hons students are expected to demonstrate mathematical rigour (where appropriate) and use scientific experimentation to make critical observations. The literature survey for the projects will typically draw on research papers in journals and conferences.

NOTE: If unsure you should consult with their supervisor(s) and/or the course coordinator to ensure that the project is a research project.

1.3 Plan, Create, Test and Evaluate

A project can be thought of as planning, reviewing the research area, typically creating an artefact based on research, and evaluating the *artefact*. The term artefact refers to student-created software, theoretical framework, taxonomy, dataset or other work apart from than the report created as part of the project.

1.4 Project Timeline

The following provides a rough overview of the project timeline:

Week 1	Students review projects and meet with potential supervisors
Week 2	Discussion with potential supervisors continues, final allocation
Week 3	Student meet with their allocated supervisor and begin work
Week 4	Working on the proposal
Week 5	**Students submit project proposals** ECS submission system
Week 6	Work continues; students meet regularly with supervisors.
...	. . .
Week 12	**Students submit their progress report.** This is worth 20% if it increases the student's final grade.
Mid-Year Break	Work continues around examinations.
	Students meet with supervisors where possible.
Week 1	Students give a presentation to their associated research group
...	Work continues; students meet regularly with supervisors.
Week 7 (end of)	Students submit a draft of their final report to their Supervisors.
Week 12 (end of)	**Students submit final report.**
T2 Assessment Period	**Students present their work during presentation day.**

Chapter 2

Project Allocation and Proposal

The first stage of the BSc Hons project is the allocation of projects to students. We do our best to allocate students to the projects they prefer. Given the smaller number of BSc Hons students, we will do this manually in Weeks 1 and 2. Once the allocation is complete, students must produce a project proposal in conjunction with their supervisor(s).

2.1   Choosing a Project

Projects are listed on the Projects page. Note that although this says "COMP489", this course homepage is for **all** the BSc Hons projects. You should discuss the project(s) you are interested in with the academic who is named on that project. If you and the academic both agree to work together (and the project is not already taken!), you should inform the course coordinator (in 2024: Dr Andrew Lensen) via email, cc'ing the academic for confirmation. Alternatively, you can let the course coordinator know your top few options, and they will confirm a project for you.

   The course coordinator will make the final decision on project allocations. Occasionally, you may not be able to do the project you have chosen. We cannot guarantee that every student will be allocated to a project they prefer.

2.2   Proposal

Once the allocation of students to projects is complete, students are expected to meet with their supervisors and put together a *project proposal*.

   NOTE: it is the **student's** responsibility to contact their supervisor and arrange an appropriate regular meeting time.

   Students are required to submit a report (no more than four pages) for the proposal stage by the end of week 5. The report should include the following components:

- **Title Page**: with project tile, student and supervisor names.

- **Problem Statement**: an overview of the research problem being addressed by the project.

- **Motivations:** a statement of key motivations, including limitations or issues that the current/state-of-the-art methods have and this project is to tackle.

- **Goals:** the overall goal of the project, as well as specific objectives, hypotheses, or research questions, including the proposed method to investigate the problem.

- **Evaluation:** how you will evaluate the project's success, e.g. possible available data and the evaluation measures.

- **Ethics:** a discussion of any ethical considerations around the project.

- **Budget** *(optional)***:** a statement, if applicable, regarding any budgetary requirements, including appropriate justification. There is limited funding available (for internal projects) primarily to help purchase items necessary for the project, although it can be used for other purposes (e.g. koha for user experiments or surveys).

- **Other Requirements** *(optional)***:** for example, any risks or hazards that the project poses (either in the development itself or in using the final artefact), any need for access to particular equipment or rooms, special IP issues, etc.

- **Bibliography**.

2.2.1 Assessment Process

The supervisor and one examiner will read the proposal and provide feedback within two weeks of submission. They will be checking:

1. whether the project is viable and sensible for the given specialisation;

2. whether there are any obvious issues which must be addressed.

Chapter 3

Supervision and You

As this is likely your first experience with an individually supervised project, it is important to calibrate your expectations against your supervisor's. This section describes what you expect from your supervisor and what your supervisor should expect from you. Please discuss any concerns with your supervisor early. If you cannot resolve them, please bring them to the BSc Hons coordinator. The earlier that issues are identified, the better things will be handled. There is little we can do to resolve long-standing problems a few weeks out from submission.

3.1 Supervisors Responsibilities

It is the responsibility of your supervisors to guide you through the academic requirements of your project. Supervisors will:

- Meet with you regularly.

- Provide you with academic guidance and scholarly direction.

- Assess your progress and give you feedback.

- Act as guides to University facilities.

- Make sure you comply with the University's administrative regulations.

- Provide you feedback on drafts of reports (within two weeks). You cannot expect supervisors to provide feedback within days without prior arrangement.

3.1.1 Regular Meetings

You and your supervisor are expected to have regular, in-person, individual meetings.

- **Internal Projects:** For a project supervised by a THW-VUW staff member, we expect a 30-minute individual meeting each week. You may agree with your supervisor to different arrangements that better suit the nature of the project, but it is important that you have regular meetings.

- **Industry (External) Projects:** For a project supervised by an external supervisor and a THW-VUW supervisor, we would expect a fortnightly supervision meeting with the external supervisor and a fortnightly meeting with the internal supervisor. The THW-VUW supervisor will not attend every meeting with the external, but you should have a combined meeting at least once a month.

3.1.2 Academic Guidance

Your supervisors will provide guidance on a range of academic matters, such as:

- The standards required for an honours project.

- How to plan your research.

- Skills you will need to acquire.

- Research resources.

- Feedback on your methodology.

- How to undertake a literature review.

- Advice on any ethical, legal, professional and safety issues.

3.1.3 Support

Your supervisor is also there to support you. If you encounter problems impacting your study, you should feel free to discuss them with your supervisor. The BSc Hons coordinator is also available to help and offer support in such situations, especially if you are not comfortable discussing matters directly with your supervisor. If they can't help directly, they will be able to refer you to other student support services run by the University.

3.2 Your Responsibilities as a Project Student

You will need to abide by the University regulations governing your degree.

3.2.1 Planning and Actively Pursuing Your Work

You have an obligation to devote sufficient time to your work, to complete each phase on time, and to avoid activities that interfere with your satisfactory and timely completion of the project.

The 30-point courses CGRA489, COMP489 and ELCO489 are the equivalent of 15 points per trimester, so you should expect to spend on average 10 hours per week on your project, spread over the 30 weeks that the course runs (i.e. including mid-trimester breaks, and the mid-year break).

For the 45-point course AIML487, you will normally have one semester with three courses and one with two. In your semester with two courses, you will need to spend 20 hours a week on your AIML487 project.

It is challenging to maintain steady progress and dedicate the time as course loads increase during the trimester, however, it is important that you manage your time well so that you can devote time each week to the project. You will get little benefit from your supervisor if you treat your project as a series of short-term crunches! Certainly, they will not be able to provide timely feedback or appropriate guidance in this situation.

3.2.2 Ethics

You must conduct your research in an ethical manner. We already have ethical approval for standard user interface testing for software (Ethics #29386) linked from the ENGR489 course resources page. Additionally, you must:

- Where appropriate, discuss ethics with your supervisors.

- Familiarise yourself with the University's ethical guidelines.

- Obtain approval from the relevant ethics committee for work involving human or animal subjects.

You must also conduct yourself ethically in your project in relation to academic misconduct. Plagiarism or other forms of academic misconduct will be treated very seriously. If you are concerned about plagiarism, you should talk to your supervisor early.

3.2.3 AI Use

You are allowed to use AI in this course to help you revise and structure your writing and to check grammar/spelling. You are responsible for the authenticity and accuracy of your writing. AI can also be a useful tool to generate research ideas or understand concepts, but you must be very mindful of hallucinations and ensure you fully understand what you are doing. It may invent citations and concepts or give incorrect results – often very subtly.

3.2.4 Health & Safety

The University's approach to health and safety is based on risk management. Students must discuss with supervisors and show in the project proposal report (due at the end of week 5) that they have identified safety risks and developed a plan to manage them.
Students are expected to be aware of the Health and Safety at Work Act:
http://www.business.govt.nz/worksafe/hswa.
Students need to fill out the health and safety plan available on the ECS Wiki in consultation with their supervisor. You need to fill "ECS Project Information Form" and "Project Description and Safety Plan". For any work that takes place off THW-VUW campuses, the students need to fill out "ECS Off Campus Activity Plan". Please contact Roger.Cliffe@vuw.ac.nz for the form.

Chapter 4

Preliminary Report

At the conclusion of the first trimester, students must submit a preliminary report that outlines the progress they have made and identifies any outstanding issues where feedback is required. This report should be considered a first step towards the final report — including a good treatment of the introduction and related/background work. It also needs to include sections on work done, requests for feedback, and a timeline for completing the project.

Please Note: The preliminary report grade is used as part of the final grade if it helps increase the overall grade.

4.1 Suggested Organisation

A suggested outline for the preliminary report is as follows:

- **Introduction/Proposal Review**. Briefly outline the project and, if necessary, reevaluate the original plan in light of what has been learned in the interim. In particular, any significant deviations in the research problem being addressed should be clearly highlighted and justified.

- **Literature review**. This should discuss the background required to understand your project. It should also survey existing solutions to the given problem, referencing academic papers, books and other sources as appropriate. You should identify key differences between these solutions and those being developed in your project.

- **Work Done**. This should discuss what progress has been made. In many cases, the formal evaluation will not yet have begun. However, it is important to demonstrate that sufficient thought has been given to the evaluation.

- **Future Plan.** This should highlight the main components that remain to be done and provide a proposed timeline in which this will happen. Your timeline must take into account upcoming examinations, coursework deadlines and other disruptions.

- **Request for Feedback.** This should highlight any difficulties currently faced and make specific requests for guidance from the examiners. For example, a student may be unsure how best to evaluate their artefact and request suggestions for alternative methods.

The report does not have to strictly conform to the above structure. For example, in some cases, students may wish to present preliminary experimental results or include a more detailed literature survey. This will be especially true for AIML487 students who are

doing fewer courses in T1, and therefore are two-thirds through their project by the mid-year break.

NOTE: In the event of an aegrotat application, the preliminary report may be used (in conjunction with the snapshot submission) to help determine your grade.

4.2 Getting Help with Writing

Students struggling with writing and presentation should seek help from the student learning support as early as possible. It is not your supervisor's responsibility to correct your grammar and spelling. https://www.wgtn.ac.nz/student-learning.

4.3 Format

- The report should be written using the ECS report templates provided on the resources page of the course site, available for LaTeXand Word. LaTeXis much preferred for scientific writing!

- The report is expected to be around ten pages in length. As a rough breakdown: two pages of introduction and goals; four pages on background/related work; three pages on progress; and one page on your future plan. Shorter reports are permitted, but you must ensure all necessary detail is provided for a good grade.

- The report should be written in such a way that any 4th-year student in your specialisation can understand. Since the report will be assessed by an independent examiner (i.e. not just the supervisor), it is critical that all examiners can properly understand what has been achieved.

- The report should include your original project proposal as an appendix.

The preliminary report must be submitted via the online submission system by the deadline.

4.4 Assessment Process

The preliminary report will be read by two examiners, one of whom is the primary supervisor. You will be provided with feedback from the examiners.

Chapter 5

Final Report

The final report is the most important component of the individual project. This is where you will set out what exactly it is you have done, why you have done it and how it can improve things.

5.1 Format

- The report should be written using the ECS report templates provided (available for LaTeXand MS Word). Fonts should be no smaller than 11pt.

- The report must contain a table of contents.

- The report is expected to be between 10,000 and 15,000 words with an absolute limit of 20,000 words (this is about 40 pages). For AIML 487, the expectation is 12,000 - 18,000 words with a limit of 25,000 words. Reports which are longer than this will need to be justified to the supervisor and the course coordinator, or risk being penalised for excessive length.

- The report should be written in such a way that any 4th-year student in your specialisation can understand. Since the report will be assessed by a panel of examiners (i.e. not just the supervisor), it is critical that all examiners can properly understand what has been achieved.

- Material from the preliminary report and/or project proposal may (and should!) be used directly in the final report.

The final report must be submitted via the online submission system on or before the given due date. Extensions will be granted only in exceptional circumstances. This *must* be arranged in advance through discussion with project supervisors **and the course coordinator**. It is the student's responsibility to ensure the course coordinator is informed of the extension request.

Take some care with the format of your final document. Remember that we often print the document, and you can easily make that very hard for us. Here are some things to think about:

- We do not accept Word files. Make a PDF for submission.

- Try to use vector graphics (e.g. SVG or PDF) rather than raster formats (JPEG, PNG, etc.). Not only will this look better it will produce a smaller file that will be easier to print.

5.2 Suggested Organisation

A suggested outline for the final report is:

- **Introduction.** The purpose here is to introduce the research question and motivate why it is a problem we should care about and to outline the process for finding a solution. *Remember*: the introduction is the first part of the report an examiner will read. If they finish reading it without a proper understanding of the research problem or what has been done, then they will almost certainly struggle with understanding the remainder. You should attempt to make the research goals and associated specifications as clear and as quantifiable as possible. These goals and specifications should inform everything else that follows, so it is important to establish them in the examiner's mind.

- **Background/Related Work.** The background should cover any important terminology and/or concepts used in the remainder of the report and should demonstrate an understanding of previous works which are relevant. *Remember:* A good related work section does not just provide a list of previous works accompanied by short summaries. Wherever possible it must extract real insight from these works, painting a picture of how they relate to each other and the project.

- **Methodology.** The aim here is to explain the process of the research. This is generally where the majority of your time would have been spent in your project — so make sure you show what you have done clearly!

- **Implementation** *(optional)*. What and how the artefact was created.

- **Results.** The results from the experiment or analysis. Use graphs and other figures! They are much more effective at communicating many results than are words.

- **Discussion.** What do the results mean? What does it contribute to the wider field?

- **Conclusions and Future Work.** Future work should *not* just be a list of things that you would have done if you had a little more time. Talk about new things that are possible now that you have finished your project. What projects could a 489 student tackle next year if they started from your endpoint?

- **Bibliography.**

5.3 Assessment

5.3.1 Process

The final report will be read by two examiners, one of whom is the primary supervisor. A third marker will be included if there is a significant disagreement in the marks awarded. Examiners will complete their marking in a timely fashion so that the committee can meet and determine a final grade for the student.

5.3.2 Criteria

The final report will be assessed using the following criteria:

- **Quality of work.** This will include but is not limited to:

  - **Introduction** *Does the report clearly identify the problem being solved and motivate the reason a solution would be valuable?* Emphasis is placed on connection with existing academic research problems.

  - **Context** *Does the report provide clear evidence of understanding the previous and current research?* This includes the coverage and justification for including previous research and the connection to the research question.

  - **Methodology** *Does the report clearly describe the process used to explore the research question?* This section justifies and explains the process used to generate the results in a later section.

  - **Implementation (often)** *Does the report describe the artefact created and relevant decisions relevant to the research?* This section is for students who create something in order to test a theory. This could be software, a framework, a mathematical model or proof.

  - **Results.** *Does the report provide a clear set of results from the experimentation/evaluation?* This should report on the data collected and present it in a coherent fashion. This would likely include statistical tests and figures to help the reader understand the data.

  - **Discussion and Conclusion.** *Does the report discuss the importance and limitations of the results and experiment in general?* There should be both an evaluation of the results and a section on the limitations of the project. The Conclusion should include both a reflection on the overall meaning of the research and a future work section.

  - **Critical Thinking.** *Does the report provide clear evidence of critical thought?* This should be evident throughout the report, with an emphasis on the discussion section.

- **Presentation.** *Is the report written in an appropriate and professional manner, with due consideration given to the presentation?* This includes but is not limited to the overall report structure; spelling and grammar; consistent bibliography layout including all necessary information (e.g. journal/conference title, page numbers, year, author names, article title); presentation and layout of figures and tables; minimum requirements of written English.

These criteria are, by definition, subject to the examiner's individual interpretation. In any case, where an examiner is uncertain regarding some aspects of the criteria or process, the course coordinator should be consulted.

Among the current BSc Hons, only AIML487 has 45 points. With the additional 150 hours, the AIML487 students are expected to have more work done and have some novelty and original contributions to the research project.

Chapter 6

Presentation Day

The presentation day is an opportunity for students to demonstrate their oral presentation skills. The primary objective of the presentation day is to prepare students for the real world, where presentations are an integral component of business. This will be an all-day during the assessment period. There will be a Dean's session in the morning that industry will attend. Students are nominated for this based on their presentations at the start of Trimester 2, and the quality of their submitted report. This is a serious opportunity for your work to be seen on a larger stage and perhaps lead to some new opportunities.

6.1 Overview

The presentations will each be 15 minutes long in total. This should break down into around 10 minutes of speaking, 3 minutes for questions and 2 minutes for change over. Strict time-keeping will be followed, and presentations that run over the time limit will be cut short. Failing to manage your time is not a good look to your examiners.

You should expect to get through around seven slides. Any more, and you will be speaking far too quickly to give an effective presentation. Make sure that you practice your talk several times to get the timing right.

The talk should cover all aspects of your project, including the motivation, problem statement, discussion approach, technical aspects of approach and experimental results. The following suggestion is one possible outline, though, naturally, you should vary the structure to suit the specifics of your project.

Slide	Title
Slide 1	Title, Name and Supervisor Name(s)
Slide 2	Introduction + Motivation
Slide 3	Problem Statement and Discussion of Possible Approaches
Slide 4	Overview + Justification of Chosen Approach
Slide 5	Experimental Results and/or Findings
Slide 6	Discussion
Slide 7	Conclusion

NOTE: The format for presentations should be either in PDF or PowerPoint. Presentations will need to be submitted the day before, so we can make sure they're all loaded on the presentation machines. We will *not* check that your files work correctly, so you should do that yourself.

6.2 Demonstration

Most students will be able to provide a sufficient illustration of their project during the presentation. However, in some cases, a demonstration of the working artefact may be useful. Think carefully about this; a demonstration may seem like a good idea, but it can easily break the flow of a talk and detract from the message being delivered. It is very easy to have the audience looking curiously at your project rather than listening to you speak! Videos of your project can be more effective for this reason — and are strongly recommended as live demonstrations are inherently high risk and it is not unusual for them to go wrong.

NOTE: The course coordinator must be notified well before the presentation day if a student wishes to use a demonstration.

6.3 Assessment

The examiners will consider the presentations according to the following criteria:

- Motivation (i.e. was the project properly motivated?).

- Research Statement (i.e. was the problem being addressed clearly identified?).

- Methodology (i.e. how you conducted your research?).

- Implementation (i.e. was a sensible discussion of what has been done provided?).

- Evaluation Approach (i.e. was the approach being taken clearly identified?).

- Justification of Evaluation (i.e. was the evaluation approach justified?).

- Results (i.e. are results presented in a clear manner?).

- Professionalism (i.e. was the presentation of a professional nature?).

- Structure (i.e. was the presentation structured appropriately?).

NOTE: There is limited time within the presentation and, hence, we do not expect you will cover all of the above in detail.