Faculty of Engineering

ENGG2600 Vertically Integrated Projects

Course Outline

2023

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Version control

Changes will not ordinarily be made to Course Outlines once published, especially so for assessment structure. Sometimes, however, it may be necessary to make minor adjustments, such as to the course schedule. Such changes will be documented here.

Revision	Date	Changes
0	31/01/23	Initial version

1. Staff

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Contacts for the projects

The following table lists the project coordinators for this course and their contact details. For questions about the project, course content or assessments this should be posted on the MS Teams site provided. *Emails and phone calls to the lecturers or the coordinator should only be for personal reasons* (e.g., absences, sickness and special consideration). If required, individual consultations may be arranged.

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2. Course information

Units of credit: This is a 6 unit of credit (UoC) course that runs across the year as 2 credit points per term. You must complete all three terms of the course and satisfy all assessment requirements as set out by the project coordinator to receive full course credit. Partial credits will not be given.

You will have at least five contact hours per week. This will be a combination with academics and VIP team members.

Pre-requisite:

ENGG1000 – Introduction to Engineering Design and Innovation (Undergraduate) for engineering students only. Other faculties, Food Science and Computer Science are exempt.

Pre-requisite conditions:

1. Must have completed at least 42 UoC by the start of the VIP program
2. Must be in good academic standing
3. Students not from Engineering can enrol in ENGG2600 as a General Education Elective

Weekly team meetings during term time will be organised directly within your VIP team.

2.1 Course summary

This course is designed for highly motivated undergraduates seeking the opportunity to integrate specific research, technical and project-based learning components into their undergraduate program. You will also experience leadership, project management and presentation skills thus giving you a head start when seeking employment.

The course runs across three consecutive terms within a single calendar year: T1, 2 and 3 (2 UoC per Term) for a total of 6 UoC at completion, which enables students to extend their research and project-based learning experience beyond a single term.

Students will pursue research or project execution in their selected projects, explore interdisciplinary research and development, gain a global perspective, develop an entrepreneurial mindset, or give back to the community through service learning. Benefits for participating can include unique opportunities and experiences, mentoring by academic supervisors, guest speakers, and opportunities to engage with industry partners.

Under the guidance of academics and mentors, this course provides a vehicle for guided but independent group project work on challenging and unique briefs. The learning and effort in the course are largely team-based, with team-members ideally being drawn from different discipline areas to promote diverse teams with unique mixes of skills that each member can contribute. Students will develop their skills in critical thinking, problem definition, creative and systematic design, precise written and oral technical communication skills, and professional skills including communication, project management, team organisation and coordination. The course allows students to design, build and research a variety of intriguing projects.

ENGG2600 is the first course in a "vertical" series of research and project-based learning courses, with ENGG3600 and ENGG4600 also offered. This allows students an opportunity for continual engagement with their chosen VIP team over multiple years and to develop their skills as they progress though the VIP series of courses.

2.2 Course aims

This course enhances student's teamwork, design skills and independent study skills through a student-driven design project or through academic-driven research. It aims to develop students critical thinking skills, and their ability to define and respond to a specific problem or project or research outcome. Professional skills such as teamwork, written and oral skills, strategic thinking and organisational skills are desired outcomes from this course.

2.3 Course learning outcomes (CLO)

At the successful completion of this course:

1. (Research/Enquiry) Students will be able to demonstrate an understanding and fundamental application of engineering enquiry-based methods in the pursuit of solving an engineering problem.
2. (Technical) Students will be able to apply a fundamental disciplinary body of knowledge related to their project work and the various facets and practical issues encountered.
3. (Teamwork) Students will be able to demonstrate an awareness and application of the elements of effective teamwork, including constructive participation, respect, group decision-making, active listening, questioning and debate, and collaboration.
4. (Leadership) Students will be able to demonstrate an awareness of the role leadership plays in a diverse team.

5. (Management) Students will be able to apply effective engineering project management and self-management principles. Self-management principles include, but are not limited to, time and priority management, ability for critical self-review, commitment to self-directed learning and professional development, and presenting a professional image.
6. (Communication) Students will be exhibit competence in oral and/or written communication in the context of the engineering project, to a variety of stakeholders, via presentation, written reports, and contribution to team and mentor meetings.
7. Students will be able to independently work towards filling an identified gap in their capability.

2.4 Relationship with the discipline and the rest of your program

The following table sets out how the learning outcomes of this course are connected to your program learning outcomes as articulated in the Engineers Australia Stage 1 Competencies.

Course Learning Outcome (CLO)	Learning Outcome Description	EA Stage 1 Competen-cies	Related Tasks & Assessment
CLO 1	(Research/Enquiry) Students will be able to demonstrate an understanding and fundamental application of research enquiry-based methods in the pursuit of solving problems.	PE1.5, 1.6, 2.1, 2.2, 2.3	Assessments 1, 2, and 3
CLO 2	(Technical) Students will be able to apply a fundamental disciplinary body of knowledge related to their project work and the various facets and practical issues encountered.	PE1.5, 1.6, 2.1, 2.2, 2.3	Assessments 1, 2, and 3
CLO 3	(Teamwork) Students will be able to demonstrate an awareness and application of the elements of effective teamwork, including constructive participation, respect, group decision-making, active listening, questioning and debate, and collaboration.	PE3.6	Assessments 1, 2, and 3
CLO 4	(Leadership) Students will be able to demonstrate an awareness of the role leadership plays in a diverse team.	PE3.6	Assessments 1, 2, and 3
CLO 5	(Management) Students will be able to apply effective engineering project management and self-management principles. Self-management principles include, but are not limited to, time and priority management, ability for critical self-review, commitment to self-directed learning and professional development, and presenting a professional image.	PE2.4, 3.4, 3.5	Assessments 1, 2, and 3
CLO 6	(Communication) Students will exhibit competence in oral and/or written communication in the context of the VIP project, to a variety of stakeholders, via presentation, written reports, and contribution to team and mentor meetings.	PE3.2, 3.4	Assessments 1, 2, and 3
CLO 7	Students will be able to independently work towards filling an identified gap in their capability.	PE3.5	Assessments 1, 2, and 3

2.5 Course evaluation and development

We want your feedback on this course whether positive or negative. You can provide verbal or written feedback directly to your project coordinator, the course authority, through our course's anonymous feedback forum or through the University's MyExperience survey.

3. Strategies and approaches to learning

Under the guidance of academics and mentors, this course (and the more senior versions) provides a vehicle for research- and project-driven group work. The structure of the course is largely team-based and assessments support and reflect this focus.

3.1 Learning and teaching activities

The main teaching strategy of this course is *project-based learning,* where learning is structured around the delivery of a major project deliverable/s with your knowledge and skills developing as you progress. Key to supporting the progression of your learning is weekly academic mentor meetings (similar to a thesis or academic consultation). These weekly meetings will typically focus on setting goals, discuss challenges faced and discussing progression to goals. There are also supporting workshops provided for this course including a workshop for building presentation skills. Communication in the course is vital part of a well-structured team and this will be via email, Office 365 (shared documents and Teams) and Moodle. Guidance from academics provide the scaffold for the learning outcomes of the course and you are encouraged to make the most of all the feedback opportunities you will receive to inform your learning. Depending on the nature of the project/research, industry and technical staff will also provide mentorship, providing elements of research and project-based learning.

At the end of the course, you will have the confidence to work in a team to deliver a shared research goal.

For more information on project-based learning you can visit – https://www.pblworks.org/what-is-pbl

3.2 Expectations of students

Integrity and Respect

The UNSW Student Code of Conduct (https://student.unsw.edu.au/conduct) among other things, expects all students to demonstrate integrity in all the academic work and to treat all staff, students and visitors to the University with courtesy, tolerance and respect.

Time commitment

UNSW expects students to spend approximately 150 hours to successfully complete a 6 UOC course like ENGG2600. You will have at least 1 contact hour per week of team meetings. It is suggested to use up to 4 hours per week devoted to collaborative working time, professional development workshops, assessments, and working on your assigned deliverables.

Competence

You will be developing new competencies over the year and to demonstrate the standards we expect, there will be marking rubrics or guidelines provided for all assessments. You will be provided with feedback on your assessments from your team coordinators and peers so you can continue to improve over the year.

Participation

We expect you to actively participate in all face to face or online sessions. This includes listening, taking meeting notes, asking questions or engaging in peer discussions.

As part of the vision of the course, you will need to work effectively with your team members. We expect all team members to agree on how they will work together as a team.

Students are expected to contribute to online discussions in the MS Teams communication channels. **Communicating via MS Teams** is especially important in the vertically integrated projects program as it **forms part of the official record** to document the research generated. You will likely need to discuss parts of the design process, research challenges faced and task prioritisation here. It is expected that you will help others in your team and the project coordinators will contribute too.

Attendance and punctuality

We expect students to be punctual and **attend at all meetings, workshops and organised team work sessions.** University commitments take precedence over regular work activities, holidays etc. Students who attend less than 80% of their possible sessions may be refused final assessment.

4. Course structure and schedule

This course consists of a minimum of 1-hour weekly meeting or as agreed with your team lead and the occasional 2-hour professional development workshop. You are expected to take up to 4 hours of non-class contact hours to do your project work and complete assessments. Please note the schedule for the workshops below may be subject to change. You may have additional optional professional development workshops that your team may participate in throughout the year. You will be notified by MS Teams chat when these additional workshops will be scheduled.

Time/ location	Activity/session	Related CLO
	Term 1	
O week	**Welcome and info session (2 h)** Welcome to the program and overview on the course structure and other info regarding VIP.	N/A
Week 9	**Progress Review 1 (20%)** You will be marked on the progress and given feedback on your current progress.	1-7
	Term 2	
Week 1-4	**Confidence in Presenting Stage 1 (beginners) and Stage 2 (advanced)** **Confident Presenting – Stage 1** The 'Confident Presenting' short course comprises one online Moodle module and one practical skills workshop. The Moodle module will guide students to create and deliver their own elevator pitch about their VIP project. In the associated practical workshop, you will learn how to improve your personal presence and presentation skills and you will also present your VIP project elevator pitch to your peers. **Confident Presenting – Stage 2** This course provides an advanced perspective/skillset to confident presenting stage 1 and will include one online Moodle module and one practical skills workshop. The Moodle module will guide students to create an engaging and effective presentation about their VIP project for a target audience (external), such as a potential industry partner. In the associated practical workshop, you will learn how to improve your skills in storytelling, create a powerful 'call to action' and handle Q&A sessions. You will also have the opportunity to present your VIP presentation to your peers. VIP students must complete Confident Presenting Stage 1 before doing Confident Presenting Stage 2. A student may request an exemption from Stage 1 from their lead academic if they have already demonstrated advanced presenting skills.	6

	A link to register for these short courses will be posted in Students VIP teams chat and emailed to project coordinators to distribute to students.	
Week 9	**Progress Review 2 (20%)** You will be marked on the progress and given feedback on your current progress.	1-7
	Term 3	
Week 9	**Progress Review 3** The final output for your technical will be finalised by the end of term 3 as decided on with your team leads, and it will be assessed together with your contribution.	1-7
By the end of T3	**Final Pitch** Pending Covid health and safety rules, the goal will be to have an expo for Vertically Integrated Projects to showcase your team's successes during the year to an audience of academics and potentially industry partners and future students. This will form a major part of your communication dimension of your Progress Review 3 unless your team has decided on a different assessment approach.	6

5. Assessment

5.1 Assessment tasks

The three assessment tasks in the VIP course for the entire year have been designed to allow you to demonstrate your ability to meet the course learning outcomes. These assessments will be based on your progress over the year and assessed based on progress, contribution, and technical output. Your final marks will be determined based on the culmination of all three terms.

For more details of assessment, generic assessment rubrics, and assessment criteria and standards see Section 5.2.

Assessment 1: Progress Review 1 (20%)

This assessment task will be in an oral and/or written format and agreed upon in consultation with your project coordinator. You will be assessed based on your progress against milestones (15%) and your contributions to the project (5%) for T1.

Assessment 2: Progress Review 2 (20%)

Same as the first assignment, this assessment task will be in an oral and/or written format and agreed upon in consultation with your project coordinator. You will be assessed based on your progress against milestones (15%) and your contributions to the project (5%) for T2.

Assessment 3: Progress Review 3 (60%)

A key part of your learning in this course will be the outputs of the research work that you will undertake with your teams and deliver a research output. At the start of the year, you will need to discuss the research deliverables your project coordinator would like you to focus on. It is strongly recommended that your technical deliverables will need to be recorded regularly in your online OneNote notebook. Over the duration of the year, you will be evaluated on the development and how well you have attained technical skills during your research. Since the outputs of teams will differ markedly based on what work you will be doing, this assessment could be in forms such as a technical report, business case study, presentation to industry, programming code, verified test case, procedural assay, prototypes, notebook recordings, literature review, marketing websites, competition entries, journal articles, etc. You will be assessed based on your progress against milestones (10%), your contributions to the project (5%), and your final technical output (45%).

5.2 Summary of the assessment structure, criteria, and rubric

Assessment Structure

ASSESSMENT DIMENSIONS	**T1** **PROGRESS REVIEW 1** **20%**	**T2** **PROGRESS REVIEW 2** **20%**	**T3** **PROGRESS REVIEW 3** **60%**
PROGRESS • Progress against milestones (Technical content e.g., research proposal, milestones, and deliverables) • Self-reflection to set goals (project/time management) • Communication (Pitching to audience - how well it is communicated)	Initial pitch and/or report 15%	Second pitch and/or report 15%	Final pitch 10%
CONTRIBUTION • Regular contribution to meetings • Response to given feedback • Meeting project team objectives	Term 1 contribution 5%	Term 2 contribution 5%	Term 3 contribution 5%
TECHNICAL ASSESSMENT • Final/technical output			Final Output 45%

Assessment Criteria and Rubric

PROGRESS		HD	D	CR	PS	FL
Progress against milestones (Technical content e.g., research proposal, milestones, and deliverables)	• Proper background information on the topic is given. • The research question is clearly stated. • The aims and objective are clearly stated. • The methods used are explained with great detail. • The proposed solution is explained. • The research findings are clearly described. • The conclusions are clear, reflect the aims and are supported by the data. • There is enough essential information given to allow the audience to effectively evaluate the research done in context. • The student demonstrates a clear understanding of the material presented.	An outstanding level of performance	A superior level of performance	A good level of performance	A satisfactory level of performance	An unsatisfactory level of performance
Self-reflection to set goals (project/time management)	• Reflections about the set goals are given in a detailed way. • The student demonstrates deep understanding of their field(s) of study and broadening perspective through the research experience. • There is great evidence of how the project is managed and how the time management went. • Comprehensive detail into current strengths, weaknesses in self-progress to the intended deliverables, opportunities for change and threats to achieving set self / team deliverables (SWOT). • The student demonstrates self-awareness and envisions a future self or develops plans that build on the research experience. • The student demonstrates effective teamworking skills. (4600) The student demonstrates leadership in their team.	Reflection is of an outstanding quality.	Reflection is of a superior quality.	Reflection is of a good quality.	Reflection is of a satisfactory quality.	An unsatisfactory attempt.

Communication (Pitching and/or report to audience - how well it is communicated)	• The presentation follows a clear and logical structure. • Presenter speaks with clarity and in an engaging way. • Presenter delivers in a relaxed, confident manner and uses eye contact and body language. • Presenter makes good use of well-designed visual aids. • Presenter uses relevant high-quality images and graphs that enhance the presentation.	Exceptional communication skills.	Superior communication skills.	Good communication skills.	Satisfactory communication skills.	Unsatisfactory communication skills.

CONTRIBUTION		HD	D	CR	PS	FL
Regular contribution to meetings Response to given feedback Meeting project team objectives	• The student shows great evidence of regular updates about the project. • There is evidence of detailed team meeting notes. • The student regularly contributes to team meetings and class feedback sessions.	An outstanding level of performance.	A superior level of performance.	A good level of performance.	A satisfactory level of performance.	An unsatisfactory level of performance.

TECHNICAL OUTPUT		HD	D	CR	PS	FL
Academic leads to provide relevant assessment criteria based on the expected project output	Academic leads to provide relevant rubric based on the expected project output	Academic leads to provide relevant mark based on the expected project output				

Grade	Performance
HD	An outstanding performance; mark range 85-100. Indicates that the student has produced outstanding work, and has demonstrated a high level of understanding across the entire content of the course.
D	A superior performance; mark range 75-84. Indicates that the student has demonstrated superior ability to consider the course and its assessment requirements from a number of perspectives and to explore their interrelation.
CR	A good performance; mark range 65-74. Indicates that the student has demonstrated the ability to think analytically and contextually about the course and its assessment requirements, and to understand/present alternative points of view/perspectives and supporting evidence.
PS	An acceptable level of performance; mark range 50-64. Indicates that the student has addressed the assessment requirements of the course and has demonstrated an acceptable understanding of the issues entailed.
FL	Unsatisfactory performance, below the minimum expected level. This grade characterizes work which shows a significant lack of understanding of the topic or its context and is therefore unsatisfactory.

Further information

UNSW grading system: https://student.unsw.edu.au/grades
UNSW assessment policy: https://student.unsw.edu.au/assessment

5.3 Optional Assessment criteria and standards for pitching/report writing

The following marking rubric/guidelines can be used as suggestions.

Rubric for an oral presentation

Aspect 1: Presentation skills

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

Aspect 2: Knowledge base

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

Aspect 3: Content

Criteria	Grade
Were the aims / objectives clearly stated?	
Were the methods used explained with enough detail?	
Were the research findings clearly described?	
Was the overall content explained and phrased in a way that is suitable for the audience?	
Was there enough technical explanation?	
Were clear conclusions presented?	
Did the conclusions reflect the aims and supported by the data?	
Was prior knowledge cited correctly?	

Rubric for a poster presentation

Aspect 1: Layout and Design

Criteria	Grade
Was the poster eye-catching / visually attractive? (colour schemes, images, …)	
Was the poster layout clean and logical? (not too crowded, …)	
Was the poster easily readable? (Font size, style, …)	
Were the headlines easily distinguished from the rest of the content?	
Were the authors easily identified and is contact information available?	

Aspect 2: Graphs, images and language

Criteria	Grade
Were all images/graphics high-quality?	
Were all graph-/figure-labels present and comprehensible?	
Did the graphs show only the relevant information or was there unnecessary information in there?	
Were there spelling or grammatical errors?	
Did the images / graphs enhance the text?	

Aspect 3: Content

Criteria	Grade
Were the aims / objectives clearly stated?	
Were the methods used explained with enough detail?	
Did the poster show results of experiments/methods?	
Was the content explained and phrased in a way that is suitable for the audience?	
Was there enough technical explanation?	
Were clear conclusions presented?	
Did the conclusions reflect the aims and supported by the data?	
Was a bibliography included?	

Rubric for report writing

(Note: Adopted from thesis writing rubric)

Criteria	Task	Grade	Pages
Literature review	(What is the problem to be solved, and its significance?) • Brief background to project • Summary of literature relevant to project • Identification of “gaps” in the literature		
Research question and project plan	(How will the student answer the research question in the given time using their available resources?) • Research question • Hypothesis and aims • Proposed Solution/Experimental Methodology • Thesis timeline – for next two term • Justification of time allocation for each task • Available resources identified • Required training and upskilling identified		
Project dependant preparation	(Can the student achieve the aims in the timeline? What progress has been made already?) Project specific, but may include: • Evidence of training on specific equipment • Evidence of some upskilling in new software/methods • Preliminary results • Preliminary sketches • Components/parts ordered • Detailed budget of parts to be ordered • Risk Assessment		
Document presentation	• Report or slide structure and layout • English skills – spelling, grammar • Data presentation (if applicable) • Clarity of writing • Citations consistent and correctly formatted		

5.4 Submission of assessment tasks

All written work will be submitted for assessment via Teams unless otherwise specified. If you are unable to submit the work via Teams, you should email the work to the project coordinator as soon as possible. The time the email is received will be considered the submission time. If the final is too big to email, you can share it via your UNSW OneDrive.

Some assessments will require you to complete the work online and it may be difficult for the course coordinator to intervene in the system after the due date. You should ensure that you are familiar with assessment systems well before the due date. If you do this, you will have time to get assistance before the assessment closes.

When you submit work for assessment you are assumed to be assenting to the standard plagiarism declaration. A copy of the plagiarism declaration is available from this course's Teams page. You should not include a plagiarism declaration with your submissions as it will lead to false positives in the plagiarism detection system.

Late penalty

Submissions received after the due date and time will be penalised at a rate of 10% per day or part thereof.

5.5 Feedback on assessment

Feedback on your progress is integral to the design process and will be provided throughout the course from your project coordinator/s and your team members. To ensure you receive the greatest benefit from this feedback it is important that you solicit feedback from others, including your peers, and that you act on the feedback regularly. The feedback you will receive includes, but is not limited to, weekly team meetings, peer feedback as part of your team evaluation, feedback on your self-reflections, regular feedback on your thoughts recorded in your notebook, and feedback from your project coordinator for your communication and technical assessment. We encourage you to seek regular feedback throughout this course to make the most out of this course.

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

Your referencing should be complete, and consistent. Consult your supervisor on her or his preferred referencing style (and the reasons why it is preferred!)

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage[1]. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and plagiarism can be located at:

[1] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

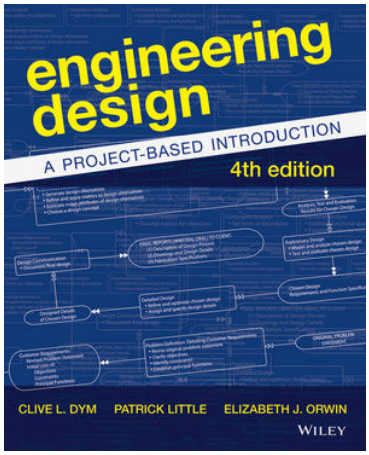
- The *Current Students* site https://student.unsw.edu.au/plagiarism, and
- The *ELISE* training site http://subjectguides.library.unsw.edu.au/elise

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

7. Readings and resources

There are no set text books for this course. Any required readings/resources for the professional workshop series will be provided as you are doing them. Your team will also have shared resources that you are also responsible in contributing to.

To explore the engineering design process in more detail, you are welcome to read this text:



Dym, Clive L., Engineering Design A Project Based Introduction.

8. Administrative matters

For enrolment and other administrative matters, please see the Engineering Student Support Services at The Nucleus: Student Hub. The office is on Level 2, Main Library, Kensington Campus and may be contacted on +61 2 9385 8100 or via http://unsw.to/webforms.

For course administration matters, please contact the Course Authority.

9. 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