



Faculty of Engineering

ENGG1000
ENGINEERING DESIGN
AND INNOVATION

Course Outline

Term 1, 2020

Chris Menictas

Course Co-ordinator

This outline informs you on how this course will be run.

If you need more help...

Before the course starts, ask at the Nucleus.

Once you are enrolled, the Moodle Learning Management site
has more specific information for this course

<https://moodle.telt.unsw.edu.au/>

Quick-start To-Do List

When	Action	Location
Week 1		
Monday 17 th February , 2:00pm	Attend Introductory lecture	As per your class timetable (see my.unsw.edu.au)
Thursday Week 1, 20 th February: 2pm or 3pm <u>as allocated in first lecture</u> – see Moodle if lost!	Participate in Impromptu Design activity (this activity is assessable)	Various locations and one of two times as allocated in Intro Lecture, and in Moodle or meet outside Engineering Student Centre before 2pm if lost
Before 11.55PM Friday 21 st February.	Finalise your decision on the project you want to select; if you make a mistake contact your project coordinator (Page 4)	Via Moodle
Week 2		
Monday 24 th February, 2:00pm	Attend lecture on Impromptu Design, Problem Statement (includes details of an Assessable task) Note: Depending on project chosen, project launch lectures may begin at 3:00pm	As per your class timetable (see my.unsw.edu.au) See timetable on Moodle including in your project section.
Thursday 27 th February 2pm and onwards	Attend the project specific lectures for the project you have chosen.	See timetable on Moodle including in your project section.

Course Staff

The course is coordinated by the Faculty of Engineering and projects will be coordinated by the various schools within the Faculty.

Course Convenor for the Faculty

A/Prof Chris Menictas

Location: Ainsworth Building Room 402F

Phone: +61 2 9385 6269

Email: c.menictas@unsw.edu.au

Contacts for the projects in this course

Project	Coordinator and contact details
Project eEvee	Dr Peter Neal peter.neal@unsw.edu.au, Ph 9385 4814 Room E8-216
Soccer Droids	Dr Michael Schofield michael.schofield@unsw.edu.au Room J17 - 510K
Shock Resistant Buildings	Dr Daniel O'Shea d.oshea@unsw.edu.au
Sustainable Water in Walgett	A/Prof Lucy Marshall lucy.marshall@unsw.edu.au, Ph 9385 7944
Surfing the Ocean Energy Wave	Prof Ian Turner ian.turner@unsw.edu.au, Ph 8071 9829 Dr Mitchell Harley m.harley@unsw.edu.au, Ph 8071 9883
Mapping with Drones	A/Prof Jinling Wang jinling.wang@unsw.edu.au, Ph 9385 4203 Prof Nancy Glenn n.glenn@unsw.edu.au, Ph 9385 4193
Autonomous Container Delivery	Dr Ke Meng ke.meng@unsw.edu.au, Ph 9385 6649 Room G17-306
Project Bionic Band	Dr Michael Stevens michael.stevens@unsw.edu.au, Ph 9385 3912 Room E26-1005
WARMAN Competition	Dr Ang Liu ang.liu@unsw.edu.au, Ph 9385 64080 Room J17-408C
Mars Regolith Collection	Dr Binghao Li binghao.li@unsw.edu.au, Ph 9385 0783 Room OMB-164
Sunray Speedway	Dr Murad Tayebjee m.tayebjee@unsw.edu.au, Ph 9385 4259 Room TETB-242

Course Information

Units of credit: 6 UOC

Prerequisite(s): None

2.1 Course summary

In this course, you will experience first-hand one of the major things that engineers do: designing and building creative solutions to problems. You will learn to think the way that engineers think, coming up with good solutions to problems despite being limited by budget, time and resources, the requirement to also meet environmental and social objectives and of course the limitations of the laws of physics. This will help you to appreciate the central ideas of engineering design as an on-time, on-budget and fit for purpose solution to a poorly specified, open-ended problem.

You will start to build key skills for engineers that will be called upon repeatedly in your academic and professional lives, including concept development, critical thinking and evaluation skills, clear communication, research and information literacy skills and the skills involved in successfully functioning within a team environment to complete a given task.

A key part of the course is a design project. You will select one project from the more than ten projects offered in the Faculty of Engineering. Once you've joined a project you will be assigned to a team of 5-8 students. It is with this team that you will work to practically solve your design problem.

This project-specific work will be complemented by common Faculty-wide activities and assessments. Further, the Faculty ensures that all project-specific work achieves the same learning outcomes. Further, any differences in assessments and learning activities between projects are reviewed to ensure equivalence.

2.2 Course aims

This course aims to make you familiar with the process of engineering design and the use of design methods for defining an open-ended design problem, generating alternative conceptual solutions, evaluating these solutions and implementing them. We also want to give you opportunities to develop your professional skills, such as technical writing, public speaking, teamwork and project management.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you should be able to:

1. Demonstrate an understanding of the process of engineering design and the use of design methods.
2. Become familiar with the tangible elements of engineering design.
3. Understand the dynamics of collaborative teams and how to work effectively within a team to accomplish tasks within given deadlines
4. Understand the basic elements of project management and be able to plan and schedule work activities in accordance with standard practice, including being able to organise, conduct and record engineering meetings.
5. Be able to convey your thoughts and ideas effectively in an engineering design report
6. Understand some of the roles and responsibilities of a professional engineer, as well as, the ways that quality, safety, diversity and equal opportunity apply to university and professional life.

2.4 Relationship with the rest of your program and the discipline

This course looks at what it means to be a design engineer. You will see the big picture and how all your studies, such as mathematics and science, fit together. It will also look at some of the non-technical issues which are just as vital to a successful engineering career.

You will study and experience Engineering Design as a multi-faceted activity, which requires considerable creativity, as well as judgement, decision making and problem-solving skills. You will see the need to take context into account and be able to complete design projects on time and within budget. The problem solving and project management skills that you learn in this course will be invaluable for later courses in your degree, in your career and for life in general.

The following table explains how ENGG1000 is designed to align with Engineers Australia's Stage 1 Competencies. These are the Program Learning Outcomes for the Bachelor of Engineering (Honours).

Course Learning Outcome (CLO)	CLO Statement	Program Learning Outcome (PLO)
CLO 1	Demonstrate an understanding of the process of engineering design and the use of design methods.	1.5, 2.1, 2.3
CLO 2	Become familiar with the tangible elements of engineering design	1.3
CLO 3	Understand the dynamics of collaborative teams and how to work effectively within a team to accomplish tasks within given deadlines	3.6
CLO 4	Understand the basic elements of project management and be able to plan and schedule work activities in accordance with standard practice, including being able to organise, conduct and record engineering meetings.	2.4
CLO 5	Be able to convey your thoughts and ideas effectively in an engineering design report	3.2
CLO 6	Understand some of the roles and responsibilities of a professional engineer, as well as, the ways that quality, safety, diversity and equal opportunity apply to university and professional life.	1.5, 1.6

2.5 Course evaluation and development

Engineering Design is a team effort and we are particularly interested in your feedback. We want your suggestions of what is good and should be retained, and what is not so good and should be improved (with ideas on how to do it).

In addition to the standard UNSW Course and Teaching Evaluation and Improvement (myExperience) surveys we will be asking for your feedback in other ways during your studies. Do make attempts to communicate constructive feedback to your lecturers. Feedback on individual tasks are often requested during the course.

3. Strategies and approaches to learning

3.1 Learning philosophy

This course is, first and foremost, an exercise in experiential learning, with emphasis on reflection on the design process. You will work together in teams to design a solution to a specified but open-ended problem. This project will be supported with a variety of additional student experiences to help you acquire individual

and group skills in areas needed for communicating the design, including graphical representation, collaboration, report writing and any necessary discipline-specific knowledge.

3.2 Learning and teaching activities

Teaching in this course is centred on the project. For example, you will develop communication skills by communicating about the project; you will develop teamwork and project management skills in the context of your project team; and you will experience the kinds of technical problems resolved by engineers in your selected project area. How this will work out in detail will depend upon the particular project. You will receive a separate handout describing this once you have finalised your choice. If you want to see details earlier, refer to the Moodle site for this course.

3.2 Expectations of students

Integrity and Respect

The [UNSW Student Code of 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 ENGG1000. Since there is no final exam, this translates to approximately 12-15 hours per week of work for this course. We expect 60 hours to be spent participating in face-to-face classes, with the remaining 90 hours spent collaborating with your teammates outside of class time, and in private study.

Participation

When you attend face-to-face classes, we expect you to actively participate in the activities organised. This may mean listening, taking notes, asking questions or engaging in peer discussions. It may also mean working by yourself or in groups on tutorial exercises.

To complete the design project, you are required to work in a team. We expect all team members to agree on how they will manage the team (e.g. making and documenting decisions), to assign the project work equitably and contribute to the delivery of project outputs to the best of their ability.

Students are expected to contribute to online discussions through the course forum on Moodle. You may wish to discuss challenges faced through this course, ask questions about course content, discuss solutions to project challenges.

Attendance and punctuality

We expect students to be punctual and attend at all lectures, mentor meetings and classes. While exceptions may be made for special circumstances, we do expect University commitments to take precedence over regular work activities, holidays etc. If you miss a class, you should catch up in your time, lectures will be recorded and available through Moodle.

4. Course schedule and structure

4.1 Teaching times and locations

In general, you will have ENGG1000 every Mondays and Thursdays from 2 to 5pm.

Your class for Monday of Week 1 (2-5pm) and Week 2 (2-3pm) will be in either Clancy Auditorium or CLB 7 (depending on your timetable).

Your start time, room location for Thursday, Week 1 will be announced through Moodle.

From 3pm on Monday of Week 2, you will attend project specific classes. The dates, times and rooms of classes for the project you select are available via the Moodle site. Please check them before the end of Week 1.

4.2 Course Schedule

Shaded items below are Faculty-wide activities

Week(s)	Monday	Thursday
1	Introductions and project descriptions	Impromptu Design (everyone, assessable)
2	Review Impromptu Design including assessable task. Projects Refer to your Project Course Outlines for Timetable	Projects Refer to your Project Course Outlines for Timetable
3 - 11	Project Activities	Project Activities

5. Design Projects

5.1 Introduction

We want you to experience the engineering design process as well as hear about it and reflect upon it. So, in this course you will learn by doing; by working on tasks connected with a project.

Performance of your design will be one important part of the assessment; the other marks will be awarded for process (what you do) and your reflection (thinking about and showing that you have understood what you do).

5.2 Project Selection

After the Week 1 Monday lecture, the next step is to go into the **Project Description Document on Moodle** and research the various projects that are available. To help you decide, one-page descriptions of each project are available on Moodle. This information complements that provided during the first Faculty lecture of the course in Week 1.

When there is no doubt in your mind which project you want to do, click on the signup tool icon. You may select any of the projects, independently of your preferred field of study. It is not mandatory to do the project associated with your chosen discipline. **If you make a mistake, please contact the Faculty Course Coordinator via the email address given at the beginning of this outline.**

Project selections are to be finalised by 11.55PM Friday 21st February.

Once you have selected a project, you will be granted access to the full project outline and specifications on Moodle. Make sure you are certain of which project you wish to enrol in before committing yourself to the online selection option.

5.3 Range of Projects and Project Selection

Projects fall within the topic areas listed below. Some areas have more than one project. You may choose a topic in any area, irrespective of the program you are enrolled in. **All projects are subject to quotas.** **Selections may be changed on-line up to Friday 21st February. For exceptional circumstances please contact the relevant School coordinator.**

Project title(s)	Engineering topic areas
Project eEvee	Chemical, Mechanical, Electrical, Petroleum and Environmental
Soccer Droids	Computing, Electrical and Mechanical
Shock Resistant Buildings Sustainable Water in Walgett Surfing the Ocean Energy Wave Mapping with Drones	Civil, Environmental, Humanitarian and Surveying
Autonomous Container Delivery	Mechanical, Electrical and Computing
Project Bionic Band	Biomedical, Mechanical, Electrical and Computing
WARMAN Competition	Mechanical, Electrical and Computing
Mars Regolith Collection	Mining, Mechanical, Electrical and Computing
Sunray Speedway	Photovoltaic, Renewable Energy, Mechanical and Electrical.

6. Assessment

6.1 Assessment tasks

ENGG1000 has been designed to ensure there is equivalence and alignment between the various Project's offered in this course. Each Project operates within an agreed framework of learning outcomes as indicated in the following table.

Course Learning Outcome	Weight
Development of engineering design skills for creative solutions to open ended problems	30% – 50%
Communication skills in technical report writing, graphical communications and experience in public presentation.	30% – 50%
The development of teamwork and project management skills	10% – 30%
Information gathering and evaluation skills to support the design process.	10% – 30%
School-selected discipline knowledge component	0 – 20%

Full details of each Project's specific assessment activities and their weightings are provided in the project outlines available on the Moodle site after the project has been selected. You are encouraged to preview these and download them for future reference.

6.2 Assessment criteria and standards

The marking rubrics used in ENG1000 will be provided separately. Students should familiarise themselves with these rubrics well before the assessment due date.

Because of differences between each Project's specific learning and assessment activities it may be necessary to moderate adjust marks (up or down) to ensure fairness. This will be undertaken after all the results are available at the end of the semester and by a representative panel of the Faculty.

6.3 Submission of assessment tasks

Most written assessments will be submitted through Moodle. Presentations and performance testing are normally conducted face-to-face.

Specific submission details for each assessment will be provided separately on Moodle.

Because of differences between each Project's specific learning and assessment activities it may be necessary to moderate adjust marks (up or down) to ensure fairness. This will be undertaken after all the results are available at the end of the semester and by a representative panel of the Faculty.

Requests for special consideration

There are no formal examinations in this course. However, if you find that your performance in an assessable component has been significantly affected by illness or other unexpected circumstance, then you should make an application for special consideration as soon as possible after the event by visiting UNSW Student Central. Talk to the project/course coordinator too. Note that consideration is not granted automatically.

6.4. Feedback on assessment

You will receive feedback on you and your team's performance in many ways through this course. Sometimes it may be written, other times verbal comments. The use of rubrics also provides students with guidance on how they well they are performing in the course.

In addition to feedback from the teaching staff, from time to time you will also receive feedback from your peers – particularly your teammates.

7. Academic integrity, referencing and plagiarism

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

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

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting

and the proper referencing of sources in preparing all assessment tasks.

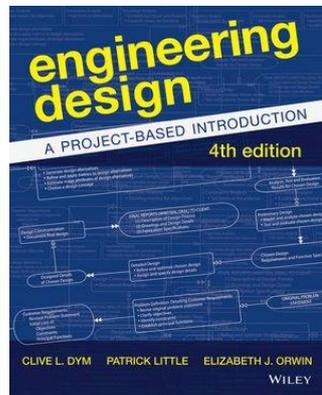
If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning and Career Hub, or sometimes resubmit your work with the problem fixed. However more serious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

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the [Student Misconduct Procedures](#). The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university.

8. Readings and resources

The eLearning Moodle site for this course is a vital and integrated part of the learning environment. eLearning is the web-based learning environment at UNSW. You can access eLearning via [Moodle](#) and login using your zPass.

The recommended text for this course is:



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

You should have access to a copy as it provides useful reading on several relevant topics. It is available as a text and as an accompanying eBook from the UNSW Bookshop. There are copies available for purchase from the University Book Store and available in the University Library Reserved Collection. The coordinator of your selected project will tell you if alternative or additional textbooks are recommended. References specific to a particular project are given in the School outlines that will be supplied after you have finalised your decision and may be previewed on the eLearning site for this course.

9. Administrative matters

For most of you this will be your first session at UNSW. We are a large, complex organisation and you will have much to become familiar with. Take time to review the documentation on processes and procedures that you will have received at enrolment and from your School. Additional Administrative Matters documentation for this course will be posted on the Moodle site.

Questions about enrolment and other administrative matters should be directed to [the Nucleus: Student Hub](#). They are located inside the Library – first right as you enter the main library entrance. You can also contact them via <http://unsw.to/webforms> or reverse a place in the in-person queue using the [UniVerse app](#).

For course administration matters, please contact the Course Coordinator.

For project administration matters, please contact your Project Coordinator.

Information on Faculty policies and guidelines may be found on the [Faculty website](#) and [student intranet](#).

Occupational Health and Safety

Like the wider community, UNSW has strict policies and expectations on Occupational Health and Safety, and you should read these. They may be accessed on the [University Governance website](#).

The requirements for risk management and workshop/lab access will differ between projects. University makerspaces also have specific induction processes. You should aim to complete safety training/inductions as early as possible in the term.

If you have any questions about risk management policies and procedures, please speak to your project coordinator or the course coordinator. They will be able to direct you to the relevant Health and Safety Advisor.

Equity and Diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the [Equitable Learning Services](#). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

*Chris Menictas
February 2020*