Course Outline

ENGINEERING DESIGN AND PROFESSIONAL PRACTICE

DESN2000-CVEN Term 3, 2020

COURSE DETAILS

Units of Credit	**6**
Contact hours	6 per week

Each program participating in DESN2000 has its own course outline, this one is for CVEN.

DESN2000 uses Moodle and Microsoft Teams as the portal for remote teaching and learning. You are expected to check both platforms regularly. Common lectures will be available via Microsoft Teams, whereas CVEN specific lectures and workshops may be accessed via Blackboard Collaborate in Moodle. Class materials such as course outlines, assessment guides or workshop guides may be found on either platform. In the first instance, you are encouraged to ask questions after lectures. Otherwise, course discussions and questions should take place on Microsoft Teams. Your demonstrators and academic staff will actively monitor these posts. Please use replies to group discussions. If required, you may use Moodle forums or directly email staff. For the latter, make sure to use your student email address with DESN2000 as the subject line.

Your class times may vary week to week. Please check your myUNSW timetable for your class times each week.

Course Coordinator and Lecturer	Prof Ilpo Koskinen (ilpo.koskinen@unsw.edu.au) Design Next, Kens J17 Lv5 Rm503
School Coordinator and Lecturer	Prof Michael Regan (m.regan@unsw.edu.au) Room 112, Civil Engineering Building
Lecturer	Dr Doménique van Gennip (d.vangennip@unsw.edu.au) Design Next, Kens J17 Lv5 Rm503
Lecturer	Dr Nicholas Gilmore (nicholas.gilmore@unsw.edu.au) Design Next, Kens J17 Lv5 Rm503
Lecturer	Dr. Ali Ardeshiri (A.Ardeshiri@unsew.edu.au) Room 111, Civil Engineering Building
Industry lecturer	Wade Perram, Turnbull Engineering (contact via course staff)
Demonstrators	Jiayi Fu (jiayi.fu@unsw.edu.au), Andre Yiu (a.yiu@unsw.edu.au) Sheila Sun (sheila.sun@unsw.edu.au) Holly Daniel (h.daniel@student.unsw.edu.au) Jason Wang (jason.wang1@unsw.edu.au) Lauren Bricknell (l.bricknell@unsw.edu.au) Profita Chesda Keo (p.keo@student.unsw.edu.au) Jagachchandarr Sekar Uthra (j.sekaruthra@unsw.edu.au)

INFORMATION ABOUT THE COURSE

Prerequisites and assumed knowledge

The pre-requisites for this course is ENGG1000 (Engineering Design & Innovation). It is considered equivalent to CVEN3031 (Civil and Environmental Engineering Practice). The course includes some elements of CVEN4405 (Human factors in Civil and Transport Engineering).

HANDBOOK DESCRIPTION

See link to virtual handbook*:*

https://www.handbook.unsw.edu.au/undergraduate/courses/2021/DESN2000/

OBJECTIVES

DESN2000 aims to further develop your skills in engineering design with a particular focus on the early stages, where innovative concepts are created in response to open-ended problems. These skills will be developed in the context of an engineering project, with a focus on three areas:

(1) research techniques needed to understand design problems and discover concepts,

(2) technical skills needed to build a concept, and

(3) evaluation methods for evaluating the concept.

Alongside the development of design skills, the course also aims to develop your readiness for professional practice by deepening your understanding and skills in effective project management, teamwork and communication.

The CVEN stream of DESN2000 focuses on developing the basic conceptual design skills you need in civil engineering, and will be taught in 2020 by lecturers from CVEN and local civil engineering firm, Turnbull Engineering. The course teaches two types of design skills. Generic design skills include models of design process, economic and practical reasoning behind concept design, research and concept creation techniques in design, evaluation techniques in design, as well as communication, project management, and teamwork techniques.

This course will give students skills for creating innovative design concepts in the context of a civil engineering project. The focus is on the early stages of the process when students have to learn to cope with open-ended problems which are typical of design. This course combines generic design content with discipline-specific content.

The generic section focuses on mapping contextual information including human factors; analysis of the information; creative methods for translating the information into design concepts; communication of the information; and evaluation methods for analysing the validity of the design proposals.

TEACHING STRATEGIES

The primary teaching vehicle of the course is an engineering project in which students learn to apply scientific, engineering, and human factors knowledge to a design problem.

Students will complete both individual and group work.

Moodle: All class materials can be accessed though the Moodle page for this course. These materials include the project brief, lecture recordings, lecture slides, assessment guides, workshop materials and any additional resources.

All online lectures and workshops for the CVEN stream of DESN2000 will be delivered via Blackboard Collaborate Ultra, accessible via Moodle. Depending on your enrolment choice, some workshops will be delivered face-to-face.

MS Teams may be used to deliver some teaching materials and is available for discussions and collaboration in addition to Moodle. You will be added to the DESN2000 CVEN Team automatically, and files will be available there via:

Team: *DESN2000 CVEN – 2020 T3* > **Channel:** *General* > **Tab:** *Files*

Lectures

You are expected to attend all lectures. These provide the backbone for your practical work in tutorials and workshops.

Workshops and Tutorials

Weekly tutorials are the primary means through which students work through projects and associated exercises aimed at developing an understanding of the course materials. Demonstrators are available to provide guidance and support teams in their project development.

Design workshops will focus on concepts and pitching. The online workshops will be delivered remotely via Blackboard Collaborate Ultra, using "break-out" sessions it provides. The face-to-face workshops will be held on the allocated classes on campus. You will find links to the online sessions through the Moodle page.

Teaching strategies

The following teaching strategies will be used in the course:

Lectures	• See methods, examples and arguments that are not in the textbook • Learn concepts behind methods and examples • Learn communication techniques and rehearse them in relevant professional formats • Follow worked examples
Workshops	• Be guided by demonstrators • Practice solving set problems • Work with peers to apply theoretical concepts within realistic design scenarios
Private study	• Review lecture material and textbooks • Do set problems and assignments • Use Moodle for discussions • Download class notes from Moodle • Reflect on problems and assignments
Assessments	• Demonstrate knowledge and skills • Demonstrate higher understanding and problem solving

EXPECTED LEARNING OUTCOMES

This course is designed to address the learning outcomes above and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

Course Learning Outcomes		
#	**Learning outcome description**	**EA stage 1 Competencies**
1	Design creation: prepare design concepts using standard methods to collect, analyse and model user stakeholder and requirements.	1.5, 2.1, 2.3
2	Design evaluation: verify and validate the suitability of design concepts using standard technical, economic, risk, ethical and sustainability assessments	1.5, 1.6
3	Technical knowledge: identify and acquire the technical knowledge & skills identified as necessary from the design requirements. Specific disciplinary learning outcomes: • Apply human factors (HF) principles, methods and data to the concept design of light rail systems • Plan the integration of HF into the concept design lifecycle of light rail systems • Utilise HF research methods to concept design and evaluate light rail systems	1.3 1.3, 1.5, 2.3 1.3, 1.6, 2.3, 2.4 1.1, 1.2, 1.3, 1.4
4	Teamwork: demonstrate the characteristics of effective teamwork and professional conduct and apply organisational and interpersonal strategies	3.6
5	Project management: employ project management techniques to plan, execute and complete a design project	2.4
6	Communication: explain designs using oral, written and visual forms of professional communication to various audiences	3.2

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

COURSE PROGRAM

Class Topics

Date	Lecture - Mon	Workshop – Tue/Wed*	Workshop – Thur/Fri
Week 1 14/09/2020	Michael Regan / Wade Perram (Turnbull Engineering) Mon 15-16. 1 hour. Project introduction. Concept design in light rail projects. Ilpo Koskinen Mon 18-19. 1 hour. Course introduction and the basic of concept design	Demonstrator Various times. 2 hours Team and project organisation. Topic selection and research plan.	Demonstrator Various times. 2 hours Mentor session: work with the team on your project with demonstrator support.
Week 2 21/09/2020	Wade Perram (Turnbull Engineering) Mon 15-17. 2 hours. The components of a light rail concept and data sources for engineers. Ilpo Koskinen Pre-recorded. 1 hour. Research for concept design. Michael Regan Pre-recorded. 1 hour. Human factors principles in the content of light rail systems.	Homework The first hour: The components of a light rail concept and data sources for engineers. Second hour: Watch the pre-recorded lectures by Ilpo Koskinen as homework.	Demonstrator Various times. 2 hours Guided workshop on research for concept design. Then free time to work with your team on your project with demonstrator support.
Week 3 28/09/2020	Wade Perram (Turnbull Engineering) Mon 15-16. 1 hour. Technical tools for concept creation. Ilpo Koskinen Mon 16-17. 1 hour. The concept design process.	Demonstrator Various times. 2 hours Technical concept creation tools.	Demonstrator Various times. 2 hours Ideation and conceptualisation.
Week 4 05/10/2020	Wade Perram (Turnbull Engineering) Mon 15-16. 1 hour. Environmental and property assessment. Footprint/space proofing. *(Note: this is a public holiday. While this lecture is important, you are not required to attend at the indicated timeslot. A recording will be available shortly afterwards).*	Demonstrator Various times. 2 hours Environmental and property assessment. Footprint/space proofing.	Demonstrator Various times. 2 hours The first hour: Spent on environmental and property assessment. Footprint/space proofing. Second hour: Spent on evaluating concepts workshop.

Date	Lecture - Mon	Workshop – Tue/Wed*	Workshop – Thur/Fri
Week 5 12/10/2020	Michael Regan Mon 15-16. 1 hour. Integrating human factors knowledge in an engineering context.	Demonstrator Various times. 2 hours Integrating human factors knowledge in an engineering context.	Demonstrator Various times. 2 hours Storytelling for presentations. Then free time to work with your team on your project with demonstrator support.
Week 6** 19/10/2020	Free	Free	Free
Week 7 26/10/2020	Michael Regan Mon 15-16. 1 hour. Human factors. Data collection and evaluation research methods. Design Next Mon 17-19 Optional Q&A session.	Demonstrator Various times. 2 hours Human factors. Planning data collection and a small exercise.	Demonstrator Various times. 2 hours Reporting on the data collection exercise.
Week 8 02/11/2020	Shahe Momdijan Mon 15-16. 1 hour Pitching Prasannah Prabhakharan Mon 16-17. 1 hour. Ethics in Professional Practice Design Next Mon 17-19 Optional Q&A session.	Demonstrator Various times. 2 hours Planning data collection and a small exercise (Cont…).	Demonstrator Various times. 2 hours Guided workshop on pitching. Then free time to work with your team on your project with demonstrator support.
Week 9 09/11/2020	Wade Perram, Michael Regan and Ali Aldeshiri Mon 15-16. 1 hour. Q&A session covering budgeting and other assessments required by the final report.	Demonstrator Various times. 2 hours Research for budgeting.	Demonstrator Various times. 2 hours Guided time with demonstrators to work on your pitch video, or otherwise work on the project.
Week 10** 16/11/2020	Free time to work on report writing	Mentor session: help with report writing if required.	Mentor session: help with report writing if required.

* *Please check your myUNSW timetable for specific workshop times. Day 1 workshops fall on either Wed 14-16, 16-18 or Tue 12-14, 14-16, 16-18. Day 2 workshops fall on either Thur 9-11, 11-13 or Fri 9-11, 11-13.*

** *No new content or assignment submission during week 6 due to flexibility week. No new content for week 10 to allow free time to work on projects.*

Class Schedule

Please check your myUNSW timetable for your individual timetable information, and for any announcements on Microsoft Teams.

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Lecture *Project intro* Mon 15-17	**Lecture** *Components of a Light Rail Concept and Sources for engineers* Mon 15-17	**Lecture** *Tech tools for concept creation* Mon 15-16 **Lecture** *Process for concept design* Mon 16-17	**Lecture (recording)** *Environmental assessment* Mon 15-17	**Lecture** *Integrating Human Factors* Mon 15-17		**Lecture** *Human Factors, data, and evaluation* Mon 15-17	**Lecture** *Pitching* Mon 15-16 **Lecture** *Ethics in Professional practice* Mon 16-17	**Lecture** *Wade Q&A. Budget and other assessments.* Mon 15-17	**Lecture** *Free* Mon 15-17
Workshop *Project formation, topic selection, research plan* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *DN recorded lecture* Wed 14-15, 16-17 Tue 12-13, 14-15, 16-17 **Workshop** *Sources for engineers* Wed 15-16, 17-18 Tue 13-14, 15-16, 17-18	**Workshop** *Tech tools for concept creation* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *Environmental assessment* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *Integrating Human Factors* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *Free* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *HF: Planning data collection* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *Reporting on data collection* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *Research for budgeting* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18	**Workshop** *Free* Wed 14-16, 16-18 Tue 12-14, 14-16, 16-18
Workshop Mentor session Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Research for concept design* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Ideation and conceptualisation* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Environmental assessment* Thur 9-10, 11-12 Fri 9-10, 11-12 **Workshop** *Evaluation research methods* Thur 10-11, 12-13 Fri 10-11, 12-13	**Workshop** *Storytelling* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Free* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Reporting on data collection* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Guided pitching* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Pitch practice* Thur 9-11, 11-13 Fri 9-11, 11-13	**Workshop** *Free* Thur 9-11, 11-13 Fri 9-11, 11-13
Lecture *Shared intro to concept design* Mon 18-19						**Optional Q&A** Mon 17-19	**Optional Q&A** Mon 17-19		

ASSESSMENTS

Assessment Outline

Item	Weighting	Learning outcomes	Assessment criteria	Due date by
Design Journal (👤)				
End of week 4	12.5 %	1-6	Refer to assessment guide	Midnight, Friday 9 October (Week 4)
End-term	12.5 %	1-6	Refer to assessment guide	Midnight, Sunday 22 November (Week 10)
Interim Presentation (👥)	10 %	1-6	Refer to assessment guide	Midnight, Friday 16 October (Week 5)
Preliminary Report (👥)	25 %	1-6	Refer to assessment guide	Midnight, Friday 30 October (Week 7)
Pitch presentation (👥)	10 %	1-6	Refer to assessment guide	Midnight, Sunday 15 November (Week 9)
Final Report (👥)	25 %	1-6	Refer to assessment guide	Midnight, Friday 20 November (Week 10)
Peer Review (👤)	5 %	4-6	Refer to assessment guide	Midnight, Friday 20 November (Week 10)

(👤) individual assessment. (👥) group assessment.

Details for each assessment are presented in separate assessment guides for each task.

Individual contribution to group assessments will be evaluated via peer review completed at the end of the term. This will be used to scale marks of all group submissions, predominantly downgrading obvious cases of unsatisfactory contribution.

Marks will be returned within 2 weeks of the submission due date.

PENALTIES

Late work will be penalised at the rate of 20% per day after the due time and date have expired.

RELEVANT RESOURCES

- van Roeijen, Annemiek et al. 2015. Delft Design Guide. BIS Publisher, Amsterdam. Second edition.
- Pressman, R. S., Maxim, B.R., 9th Edition (2020). Software engineering: a practitioner's approach. McGraw Hill.

Other Useful Resources*:*

- Lehto, M. R. & Landry, J. (2012). Introduction to Human Factors and Ergonomics for Engineers (2nd Edition). USA: CRC Press - (e-book available via UNSW library)
- Sanders, M. S., & McCormick, E. J. (1998). Human factors in Engineering and Design (7th Edition). New York; McGraw-Hill (selected chapters available via UNSW library)
- Sandom, C. & Roger, S. (2004). Human Factors for Engineers. Stevenage, UK: The Institution of Engineering and Technology (IET) - (e-book available via UNSW library)
- Cunningham, M., Regan & M., Cairney, P. (2017). Human Factors in Road and Traffic Engineering (Chapter 2). In Delbosc, A.& Young, W. (Eds). Traffic Engineering and Management (7th Edition). Monash Institute of Transport Studies. (e-version available via UNSW library)
- Ogden, K.W (2003). Human Factors in Traffic Engineering (Chapter 2.1). In Young, W., Ogden, K. W., & Taylor, S.Y (Eds). Traffic Engineering and Management (3rd Edition). Monash Institute of Transport Studies. (e-version available via UNSW library)
- Austroads (2020). Guide to Traffic Management Part 13: Safe System Approach to Transport Management Sydney, Australia: Austroads (e-version available via UNSW library)
- PIARC (2015). Designing for Road Users Characteristics and Compliance (Version 1 – 20/10/15). World Road Association (PIARC)
  - https://roadsafety.piarc.org/en/planning-design-operation/designing-road-users

Online resources:

Microsoft Teams will be used to disseminate teaching materials. Assessment marks will also be made available via Moodle: https://moodle.telt.unsw.edu.au/login/index.php.

Refer to Academic Advice on the School website, for information about:

- Notes on assessments and plagiarism
- School policy on Supplementary exams
- Special Considerations
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and

DATES TO NOTE

Refer to MyUNSW for Important Dates available at: https://student.unsw.edu.au/dates

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

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

WORKLOAD

It is expected that you will spend about **15 hours per** week studying a 6 UoC course, from Week 1 until the final assessment, including both face-to-face classes and independent, self-directed study. In periods where you need to complete assignments or prepare for examinations, the workload may be greater. Over-commitment has been a common source of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities. Regular and punctual attendance at all classes is expected. UNSW regulations state that if students attend less than 80% of scheduled classes they may be refused final assessment.

GENERAL CONDUCT & BEHAVIOUR

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class.

WORK HEALTH & SAFETY

UNSW policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

SPECIAL CONSIDERATION & SUPPLEMENTARY EXAMINATION

You must submit all assignments and attend all examinations scheduled for your course. You can apply for special consideration when illness or other circumstances beyond your control interfere with an assessment performance. If you need to submit an application for special consideration for an exam or assessment, you must submit the application **prior to the start** of the exam or before the assessment is submitted, except where illness or misadventure prevent you from doing so. Be aware of the "fit to sit/submit" rule which means that if you sit an exam or submit an assignment, you are declaring yourself well enough to do so and cannot later apply for Special Consideration. For more information and how to apply, see https://student.unsw.edu.au/special-consideration.

COURSE IMPROVEMENT

This course is under constant revision in order to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course convener or via the online student survey myExperience.

ADMINISTRATIVE MATTERS

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Special Considerations: student.unsw.edu.au/special-consideration;
- Exams: https://student.unsw.edu.au/exams
- Approved Calculators: https://student.unsw.edu.au/exam-approved-calculators-and-computers
- Academic Honesty and Plagiarism: https://student.unsw.edu.au/plagiarism
- Equitable Learning Services: https://student.unsw.edu.au/els
- General and Program-specific questions: The Nucleus: Student Hub
- Others: https://student.unsw.edu.au/support

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of Knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership

Course Outline

ENGINEERING DESIGN AND PROFESSIONAL PRACTICE

DESN2000-MECH Term 3, 2020

COURSE DETAILS

Units of Credit	**6**
Contact hours	7 per week

Each program participating in DESN2000 has its own course outline, this one is for MECH.

DESN2000 uses Microsoft Teams as the portal for remote teaching and learning. It will be used for file sharing, virtual classrooms, announcements and other communications. You are expected to check the platform regularly. In the first instance, you are encouraged to ask questions after lectures. Otherwise course discussions and questions take place on MS Teams. Your demonstrators and academic staff will actively monitor these posts. Please use replies and keep discussions in appropriate channels. If required, emails must be made from your student email address with DESN2000 in the subject line.

Your class times may vary week to week. Please check your myUNSW timetable for your class times each week.

Course Coordinator and Lecturer	Prof Ilpo Koskinen (ilpo.koskinen@unsw.edu.au) Design Next, Kens J17 Lv5 Rm503
School Coordinator and Lecturer	Dr Ang Liu (ang.liu@unsw.edu.au) Room 408C, Kens J17 Lv4
Lecturer	Dr Doménique van Gennip (d.vangennip@unsw.edu.au) Design Next, Kens J17 Lv5 Rm503
Lecturer	Dr Nicholas Gilmore (nicholas.gilmore@unsw.edu.au) Design Next, Kens J17 Lv5 Rm503
Head demonstrator	Tamara Neil (t.neil@unsw.edu.au)
Demonstrators	Matt Brand (m.brand@unsw.edu.au) Jacqueline Orme (j.orme@unsw.edu.au) Shantanu Kumthekar (s.kumthekar@student.unsw.edu.au) John Taglini (j.taglini@unsw.edu.au) Elora Croaker (e.croaker@student.unsw.edu.au) Thaveesha Piyasiri (t.piyasiri@student.unsw.edu.au) Rachael Sharp (rachael.sharp@unsw.edu.au) Garen Douzian (g.douzian@unsw.edu.au) Courtney Morris (courtney.morris@unsw.edu.au) Yvonne Liaw (y.liaw@unsw.edu.au) Rawan Abdo (r.abdo@unsw.edu.au)

INFORMATION ABOUT THE COURSE

Prerequisites and assumed knowledge

The pre-requisite for this course is ENGG1000 (Engineering Design & Innovation). It is considered equivalent to MMAN2100 (Engineering Design 2).

HANDBOOK DESCRIPTION

See link to virtual handbook*:*

https://www.handbook.unsw.edu.au/undergraduate/courses/2021/DESN2000/

OBJECTIVES

This course develops conceptual design skills you need in mechanical engineering. The course teaches two types of design skills. Generic design skills include models of design process, economic and practical reasoning behind concept design, research and concept creation techniques in design, evaluation techniques in design, as well as communication, project management, and teamwork techniques.

This course will give students skills for creating innovative design concepts in the context of a mechanical engineering project. The focus is on the early stages of the process when students have to learn to cope with open-ended problems which are typical of design. This course combines generic design content with discipline-specific content.

The generic section focuses on mapping contextual information including human-centred design; analysis of varying types of information; creative methods for translating the information into design concepts; communication of the information; and evaluation methods for analysing the validity of the design proposals.

TEACHING STRATEGIES

The primary teaching vehicle of the course is an engineering project in which students learn to apply scientific, engineering, and conceptual knowledge to a design problem. These problems may also require an analysis of professional ethical issues.

Students will complete both individual and group work.

All class materials for 2020 T3 will be delivered online via MS Teams. This includes the project brief, lecture notes, lab guides, workshop guides and assessment guides, available via:

Team: *DESN2000 MECH – 2020 T3* > **Channel:** *General* > **Tab:** *Files*

MS Teams, Blackboard Collaborate Ultra and/or Zoom may be used for lecture recordings and virtual classrooms. These will be accessible via MS Teams. Links are posted well in advance of scheduled times.

Lectures

You are expected to attend all lectures online or watch the recordings. These provide the backbone for your practical work in the workshops.

Workshops

Weekly workshops are the primary means through which students work through projects and associated exercises aimed at developing understanding of the course materials. There will be a balance of facilitated activities, and free time to work on your project. In either case, demonstrators will be available to provide guidance and support teams in their project development.

Design workshops will focus on concepts and pitching. Workshops are either delivered in person or via online tools, depending on your enrolment. For the latter, you will find links to these sessions on your class channel in MS Teams in due course. Workshop guides for all classes are also made available in MS Teams.

Teaching strategies

The following teaching strategies will be used in the course:

Lectures	• See methods, examples and arguments that are not in the textbook • Learn concepts behind methods and examples • Learn communication techniques and rehearse them in relevant professional formats
Workshops	• Be guided by demonstrators • Practice engineering design methods • Work with peers to apply theoretical concepts within realistic design scenarios
Private study	• Review lecture material and textbooks • Do project work • Keep a design journal • Use Teams for discussions • Download class notes from Teams • Reflect on problems and assignments
Assessments	• Demonstrate knowledge and skills • Demonstrate higher understanding and problem solving • Demonstrate engineering design capabilities

EXPECTED LEARNING OUTCOMES

This course is designed to address the learning outcomes above and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

Course Learning Outcomes		
#	**Learning outcome description**	**EA stage 1 Competencies**
1	Design creation: prepare design concepts using standard methods to collect, analyse and model user stakeholder and requirements.	1.5, 2.1, 2.3
2	Design evaluation: verify and validate the suitability of design concepts using standard technical, economic, risk, ethical and sustainability assessments	1.5, 1.6
3	Technical knowledge: identify and acquire the technical knowledge & skills identified as necessary from the design requirements.	1.3
4	Teamwork: demonstrate the characteristics of effective teamwork and professional conduct and apply organisational and interpersonal strategies	3.6
5	Project management: employ project management techniques to plan, execute and complete a design project	2.4
6	Communication: explain designs using oral, written and visual forms of professional communication to various audiences	3.2

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

COURSE PROGRAM

Class Topics

Date	Lecture - Mon	Workshop – Day 1*	Workshop – Day 2*
Week 1 14/09/2020	Ang Liu Tue 13-15. 2 hour. Introduction to Design Thinking Ilpo Koskinen Mon 18-19. 1 hour. Course introduction and the basic of concept design	Demonstrator Various times. 2 hours Team and project organisation. Topic selection.	Demonstrator Various times. 2 hours Guided workshop on report preparation, team management, and design journal.
Week 2 21/09/2020	Ang Liu Tue 13-15. 2 hour. Functional Design Ilpo Koskinen Pre-recorded. 1 hour. Research for concept design.	Demonstrator Various times. 2 hours Guided workshop on functional design.	Demonstrator Various times. 2 hours Guided workshop on research for concept design.
Week 3 27/09/2020	Ang Liu Tue 13-15. 2 hour. Quality Function Deployment (QFD) Ilpo Koskinen Mon 16-17. 1 hour. The concept design process.	Demonstrator Various times. 2 hours Guided workshop on QFD.	Demonstrator Various times. 2 hours Guided workshop on ideation and conceptualisation.
Week 4 05/10/2020	Ang Liu Tue 13-15. 2 hour. Biologically inspired design Ang Liu Thur 13-14. 1 hour. Concept Generation Methods	Demonstrator Various times. 2 hours Guided Worksop on Biologically Inspired Design.	Demonstrator Various times. 2 hours Guided workshop on evaluating concepts.
Week 5 12/10/2020	Ang Liu Tue 13-15. 2 hour. Axiomatic Design for Concept Evaluation Ang Liu Thur 13-14. 1 hour. Axiomatic Design for Concept Evaluation	Demonstrator Various times. 2 hours Guided workshop on Axiomatic Design.	Demonstrator Various times. 2 hours Guided workshop on storytelling for presentations.
Week 6** 19/10/2020	Free	Free	Free

Date	Lecture - Mon	Workshop – Day 1*	Workshop – Day 2*
Week 7 26/20/2020	Ang Liu Tue 13-15. 2 hour. TRIZ for Concept Improvement Ang Liu Thur 13-14. 1 hour. Concept Selection	Demonstrator Various times. 2 hours Guided workshop on TRIZ.	Demonstrator Various times. 2 hours Guided workshop on CAD and report feedback.
Week 8 02/11/2020	Ang Liu Tue 13-15. 2 hour. Design for X – Design for Manufacturing and Sustainability Shahe Momdijan Thur 13-14. 1 hour Pitching	Demonstrator Various times. 2 hours Guided workshop on Design for X.	Demonstrator Various times. 2 hours Guided workshop on pitching.
Week 9 09/11/2020	Ang Liu Tue 13-15. 2 hour. Cost Analysis and Product Variety Ang Liu Thur 13-14. 1 hour. Tolerance and Uncertainty	Demonstrator Various times. 2 hours Guided workshop on Cost Analysis and BoM.	Demonstrator Various times. 2 hours Free time to work on your pitch assessment with your team and mentor support.
Week 10** 16/11/2020	Free	Demonstrator Various times. 2 hours Team design presentations.	Demonstrator Various times. 2 hours Team design presentations.

** Please check your myUNSW timetable for specific workshop times. Day 1 workshops fall on either Wed 14-16, 16-18, Tue 12-14, 14-16, 16-18 or Thur 11-13. Day 2 workshops fall on either Thur 9-11, 11-13 or Fri 9-11, 11-13. If workshops have additional time following guided activities this may be used by teams to work indendently on their projects with mentor support.*

*** No new content or assignment submission during week 6 due to flexibility week. No new content for week 10 to allow free time to work on projects. Coaching sessions may be offered to support student's project work, given sufficient demand.*

Class Schedule

Please check your myUNSW timetable for your individual timetable information, and for any announcements on Microsoft Teams.

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6*	Week 7	Week 8	Week 9	Week 10
Lecture *Shared* Mon 18-19	**Lecture** Thur 13-14	**Lecture** Thur 13-14	**Lecture** Thur 13-14	**Lecture** Thur 13-14		**Lecture** Thur 13-14	**Lecture** Thur 13-14	**Lecture** Thur 13-14	
Lecture Tue 13-15	**Lecture** Tue 13-15	**Lecture** Tue 13-15	**Lecture** Tue 13-15	**Lecture** Tue 13-15		**Lecture** Tue 13-15	**Lecture** Tue 13-15	**Lecture** Tue 13-15	
Workshop Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18		**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18	**Workshop** Tue 16-18 Wed 9-11, 14-16, 16,18 Thur 11-13, 16-18
Workshop Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17		**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17	**Workshop** Wed 16-18 Thur 9-11, 14-16, 16-18 Fri 9-11, 11-13, 15-17

*Given sufficient demand, optional coaching sessions will be offered during revision week to support student's project work.

ASSESSMENTS

Assessment Outline

Item	Weighting	Learning outcomes	Assessment criteria	Due date by
Design Journal (👤)				
End of week 4	12.5 %	1-6	Refer to assessment guide	Midnight, Friday 9 October (Week 4)
End-term	12.5 %	1-6	Refer to assessment guide	Midnight, Sunday 22 November (Week 10)
Interim Presentation (👥)	15 %	1-6	Refer to assessment guide	Midnight, Friday 16 October (Week 5)
Preliminary Report (👥)	15 %	1-6	Refer to assessment guide	Midnight, Sunday 18 October (Week 5)
Pitch presentation (👥)	10 %	1-6	Refer to assessment guide	Midnight, Sunday 15 November (Week 9)
Final Report (👥)	30 %	1-6	Refer to assessment guide	Midnight, Sunday 22 November (Week 10)
Peer Review (👤)	5 %	4-6	Refer to assessment guide	Midnight, Sunday 22 November (Week 10)

(👤) individual assessment. (👥) group assessment.

Details for each assessment are presented in separate assessment guides for each task.

Individual contribution to group assessments will be evaluated via peer review completed at the end of the term. This will be used to scale marks of all group submissions, predominantly downgrading obvious cases of unsatisfactory contribution.

Marks will be returned within 2 weeks of the submission due date.

PENALTIES

Late work will be penalised at the rate of 20% per day after the due time and date have expired.

RELEVANT RESOURCES

- Pahl G., Beitz, W. (2013). *Engineering design – A systematic approach.* Springer-Verlag.
- Suh NP (2001). *Axiomatic Design – Advances and Applications.* Oxford University Press.
- van Roeijen, Annemiek et al. 2015. *Delft Design Guide.* BIS Publisher, Amsterdam. Second edition.

Online resources:

Microsoft Teams will be used to disseminate teaching materials. Assessment marks will also be made available via Moodle: https://moodle.telt.unsw.edu.au/login/index.php.

Refer to Academic Advice on the School website, for information about:

- Notes on assessments and plagiarism
- School policy on Supplementary exams
- Special Considerations
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and

DATES TO NOTE

Refer to MyUNSW for Important Dates available at: https://student.unsw.edu.au/dates

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

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

WORKLOAD

It is expected that you will spend at least **15 hours per** week studying a 6 UoC course, from Week 1 until the final assessment, including both face-to-face classes and independent, self-directed

study. In periods where you need to complete assignments or prepare for examinations, the workload may be greater. Over-commitment has been a common source of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities.

Regular and punctual attendance at all classes is expected. UNSW regulations state that if students attend less than 80% of scheduled classes they may be refused final assessment.

GENERAL CONDUCT & BEHAVIOUR

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class.

WORK HEALTH & SAFETY

UNSW policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

SPECIAL CONSIDERATION & SUPPLEMENTARY EXAMINATION

You must submit all assignments and attend all examinations scheduled for your course. You can apply for special consideration when illness or other circumstances beyond your control interfere with an assessment performance. If you need to submit an application for special consideration for an exam or assessment, you must submit the application **prior to the start** of the exam or before the assessment is submitted, except where illness or misadventure prevent you from doing so. Be aware of the "fit to sit/submit" rule which means that if you sit an exam or submit an assignment, you are declaring yourself well enough to do so and cannot later apply for Special Consideration.

For more information and how to apply, see https://student.unsw.edu.au/special-consideration.

COURSE IMPROVEMENT

This course is under constant revision in order to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course convener or via the online student survey myExperience.

ADMINISTRATIVE MATTERS

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Special Considerations: student.unsw.edu.au/special-consideration;
- Exams: https://student.unsw.edu.au/exams
- Approved Calculators: https://student.unsw.edu.au/exam-approved-calculators-and-computers
- Academic Honesty and Plagiarism: https://student.unsw.edu.au/plagiarism

- Equitable Learning Services: https://student.unsw.edu.au/els
- General and Program-specific questions: The Nucleus: Student Hub
- Others: https://student.unsw.edu.au/support

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of Knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership

Course Outline

ENGINEERING DESIGN AND PROFESSIONAL PRACTICE

DESN2000-SPREE Term 3, 2020

COURSE DETAILS

Units of Credit	**6**
Contact hours	7 per week

Each program participating in DESN2000 has its own course outline, this one is for SPREE.

DESN2000 uses Microsoft Teams as the portal for remote teaching and learning. It will be used for file sharing, virtual classrooms, announcements and other communications. You are expected to check the platform regularly. In the first instance, you are encouraged to ask questions after lectures. Otherwise, course discussions and questions take place on MS Teams. Your demonstrators and academic staff will actively monitor these posts. Please use replies and keep discussions in appropriate channels. If required, emails must be made from your student email address with DESN2000 in the subject line.

Your class times may vary week to week. Please check your myUNSW timetable for your class times each week.

Course Coordinator and Lecturer	Prof Ilpo Koskinen ilpo.koskinen@unsw.edu.au Design Next, Kens J17 Lv5 Rm503
School Coordinator and Lecturer	Dr Ivan Perez-Wurfl ivanpw@unsw.edu.au Room 128, TETB Lv1
Lecturer	Dr Doménique van Gennip d.vangennip@unsw.edu.au Design Next, Kens J17 Lv5 Rm503
Lecturer	Dr Nicholas Gilmore nicholas.gilmore@unsw.edu.au Design Next, Kens J17 Lv5 Rm503
Demonstrators	Akasha Kaleem a.kaleem@unsw.edu.au Ramesh Atluri r.atluri@student.unsw.edu.au

INFORMATION ABOUT THE COURSE

Prerequisites and assumed knowledge

The pre-requisites for this course are ENGG1000 (Engineering Design & Innovation) and SOLA2051 (Project in Photovoltaics and Renewable Energy 1). It is considered equivalent to SOLA2052 (Project in Photovoltaics and Renewable Energy 2).

HANDBOOK DESCRIPTION

See link to virtual handbook*:*

https://www.handbook.unsw.edu.au/undergraduate/courses/2021/DESN2000/

OBJECTIVES

This course develops conceptual design skills you need in engineering. The course teaches two types of design skills. Generic design skills include models of design process, economic and practical reasoning behind concept design, research and concept creation techniques in design, evaluation techniques in design, as well as communication, project management, and teamwork techniques.

This course will give students skills for creating innovative design concepts in the context of a renewable energy engineering project. The focus is on the early stages of the process when students have to learn to cope with open-ended problems which are typical of design. This course combines generic design content with discipline-specific content.

The generic section focuses on mapping contextual information including human-centred design; analysis of varying types of information; creative methods for translating the information into design concepts; communication of the information; and evaluation methods for analysing the validity of the design proposals.

SPREE SPECIFIC INFORMATION

In SOLA2051 you acquired a few new skills that you applied in the solution of a complex practical problem. One of the skills that you discovered is your innate ability to learn based on need. You also realised that you are able to solve problems that may have seen too complicated in the beginning but proven to be fully solvable with the help of your newly acquired skills and the power of teamwork.

This term you will take your engineering skills one step further as you solve a real world challenge with the help of an even bigger and better team.

We will start by understanding and using design thinking to come up with a project for the term. We will then hone our organisational skills by learning the basics of project management. This will help planning a strategy to solve the challenge of the semester. While you plan and implement your strategy you'll learn four invaluable engineering skills: leveraging open source hardware, the basics of technical drawing using CAD, basic PCB design and implementing your design using 3D printing and other computer assisted machining techniques. Throughout the semester you will work on your project as a team applying these skills plus any others that you will acquire on your own based on the needs of the project. As you will be tackling a real world problem, there is no predefined way to solve it, this is precisely what makes it fun! Teamwork will be instrumental in getting to an optimal solution. You will have a chance to rate your teammates performance at the end of the semester by means of peer assessment.

The course instructor and demonstrators will be there to guide you but may not have all the answers you are looking for. Fortunately, nowadays information and specialised resources are only a few typed questions away. You are strongly encouraged to look for solutions beyond the confinements of the course. After all, this is a real world challenge and you are an engineer!

TEACHING STRATEGIES

The primary teaching vehicle of the course is an engineering project in which students learn to apply scientific, engineering, and conceptual knowledge to a design problem. These problems may also require an analysis of professional ethical issues.

Students will complete both individual and group work.

All class materials for 2020 T3 will be delivered online via MS Teams. This includes the project brief, lecture notes, lab guides, workshop guides and assessment guides, available via:

Team: *DESN2000 SPREE – 2020 T3* > **Channel:** *General* > **Tab:** *Files*

MS Teams and/or Zoom may be used for lecture recordings and virtual classrooms. These will be accessible via MS Teams. Links are posted well in advance of scheduled times.

Lectures

You are expected to attend all lectures online or watch the recordings. These provide the backbone for your practical work in the workshops.

Workshops

Weekly workshops are the primary means through which students work through projects and associated exercises aimed at developing understanding of the course materials. Demonstrators are available to provide guidance and support teams in their project development.

Design workshops will focus on concepts and pitching. Workshops are either delivered in person or via online tools, depending on your enrolment. For the latter, you will find links to these sessions on your class channel in MS Teams in due course. Workshop guides for all classes are also made available in MS Teams.

Teaching strategies

The following teaching strategies will be used in the course:

Lectures	• See methods, examples and arguments that are not in the textbook • Learn concepts behind methods and examples • Learn communication techniques and rehearse them in relevant professional formats
Workshops	• Be guided by demonstrators • Practice engineering design methods • Work with peers to apply theoretical concepts within realistic design scenarios
Private study	• Review lecture material and textbooks • Do project work • Keep a design journal • Use Teams for discussions • Download class notes from Teams • Reflect on problems and assignments
Assessments	• Demonstrate knowledge and skills • Demonstrate higher understanding and problem solving • Demonstrate engineering design capabilities

EXPECTED LEARNING OUTCOMES

This course is designed to address the learning outcomes above and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

Course Learning Outcomes		
#	**Learning outcome description**	**EA stage 1 Competencies**
1	Design creation: prepare design concepts using standard methods to collect, analyse and model user stakeholder and requirements.	1.5, 2.1, 2.3
2	Design evaluation: verify and validate the suitability of design concepts using standard technical, economic, risk, ethical and sustainability assessments	1.5, 1.6
3	Technical knowledge: identify and acquire the technical knowledge & skills identified as necessary from the design requirements.	1.3
4	Teamwork: demonstrate the characteristics of effective teamwork and professional conduct and apply organisational and interpersonal strategies	3.6
5	Project management: employ project management techniques to plan, execute and complete a design project	2.4
6	Communication: explain designs using oral, written and visual forms of professional communication to various audiences	3.2

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

COURSE PROGRAM

Class Topics

Date	Lecture – Mon 2 hrs[+]	Workshop* – Tue 3 hrs	Workshop* – Fri 1 hr
Week 1 14/09/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture on motivation for semester project and how to tackle it with open source hardware and software. **Ilpo Koskinen** Mon 18-19 Lecture introducing the course and the basics of concept design.	**Ilpo Koskinen** Tue 11-12 Lecture on research for concept design **Demonstrator** Tue 12-13 Workshop activites on research for concept design. **Ilpo Koskinen** Tue 13-14 Lecture on the concept design process.	**Demonstrator** Fri 12-13 or 13-14 Workshop activities on ideation and conceptualisation.
Week 2 21/09/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture, introduction to CAD part 1. **Ivan Perez-Wurfl** Thur 15-16 Drop in consultation session.	**Dr. Nathan Chang** Tue 11-12 Lecture on project management 101. **Nathan and demonstrators** Tue 12-14 Workshop on Project Management Game.	**Demonstrator** Fri 12-13 or 13-14 Workshop activities on evaluating design concepts.
Week 3 27/09/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture, introduction to CAD part 2. **Ivan Perez-Wurfl** Thur 15-16 Drop in consultation session.	**Ivan and demonstrators** Tue 11-14 Teams, project plan presentation and feedback on project feasibility.	**Ivan Perez-Wurfl** Fri 12-13 or 13-14 Drop in consultation session.
Week 4 05/10/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture, Arduino Uno beyond LabVIEW *(Note: this is a public holiday. While this lecture is important, you are not required to attend at the indicated timeslot. A recording will be available shortly afterwards).*	**Ivan and demonstrators** Tue 11-14 Teams, adding technical detail to project plan. Place orders for material that will be needed	**Ivan Perez-Wurfl** Fri 12-13 or 13-14 Drop in consultation session.

Date	Lecture – Mon 2 hrs[+]	Workshop* – Tue 3 hrs	Workshop* – Fri 1 hr
Week 5 12/10/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture on PCB design	**Ivan and demonstrators** Tue 11-14 Team first iteration of project presentations. Interim presentation assessment. Feedback on project to be included in plan of 2nd iteration.	**Demonstrator** Fri 12-13 or 13-14 Workshop activities on storytelling for presentations.
Week 6** 19/10/2020	Free	Free	Free
Week 7 26/20/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture on rapid fabrication and prototyping	**Ivan and demonstrators** Tue 11-14 Work on second iteration of project. Note this is also the deadline for the PCB design submission.	**Ivan Perez-Wurfl** Fri 12-13 or 13-14 Drop in consultation session.
Week 8 02/11/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture on simulating the world using FEA part 1 **Shahe Momdijan** Thur 15-16 Guest lecture on pitching.	**Ivan and demonstrators** Tue 11-14 Work on second iteration of project. Note this is also the deadline for prototype design submission to be 3D printed and/or laser cut.	**Demonstrator** Fri 12-13 or 13-14 Workshop activities on pitching as an engineer.
Week 9 09/11/2020	**Ivan Perez-Wurfl** Mon 16-18 Lecture on Simulating the world using FEA part 2	**Ivan and demonstrators** Tue 11-14 Work on implementing second iteration of project.	**Demonstrator** Fri 12-13 or 13-14 Free time to work on pitching assessment with demonstrator support.
Week 10** 16/11/2020	**Ivan and demonstrators** Mon 16-18. Teams: Presentations of 2nd iteration of project. Demonstrators and class: Assessment of presentations	**Ivan and demonstrators** Tue 11-14 Teams presentations of 2nd iteration of project and assessment of presentation	**Ivan Perez-Wurfl** Fri 12-13 or 13-14 Drop in consultation session.

** Please check your myUNSW timetable for specific workshop times. Tuesday workshops take place in the Renewables Makerspace in TETB LG09/LG10. If you will be attending these workshop sessions remotely, make sure to interact with your team during the session times via zoom or teams as if you were physically present in the workshop.*

*** No new content or assignment submission during week 6 due to flexibility week. No new content for week 10 to allow free time to work on projects.*

[+] Additional lecture times on: Week 1 Mon 18-19 / Week 2 Thursday 15-16 / Week 8 Thursday 15-16

ASSESSMENTS

Assessment Outline

Item	Weighting	Learning outcomes	Assessment criteria	Due date by
Project plan presentation (👥)	5 %	1-6	Refer to assessment guide	11 am, Tuesday 29 September (Week 3)
Design Journal (👤)				
End of week 3	5 %	1-6	Refer to assessment guide	Midnight, Friday 2 October (Week 3)
End-term	15 %	1-6	Refer to assessment guide	Midnight, Sunday 22 November (Week 10)
Interim Presentation (👥)	10 %	1-6	Refer to assessment guide	11 am, Tuesday 13 October (Week 5)
CAD assignment (👤)	20 %	1-6	Refer to assessment guide	Submission: Midnight, Friday 30 October (Week 7) Assessment: Midnight, Friday 6 November (Week 8)
Pitch presentation (👥)	10 %	1-6	Refer to assessment guide	Midnight, Sunday 15 November (Week 9)
Final Presentation (👥)	15 %	1-6	Refer to assessment guide	4pm, Monday 16 November (Week 10)
Final Report (👥)	15 %	1-6	Refer to assessment guide	Midnight, Friday 20 November (Week 10)
Peer Review (👤)	5 %	4-6	Refer to assessment guide	Midnight, Friday 20 November (Week 10)

(👤) individual assessment. (👥) group assessment.

Details for each assessment are presented in separate assessment guides for each task.

Individual contribution to group assessments will be evaluated via peer review completed at the end of the term. This will be used to scale marks of all group submissions, predominantly downgrading obvious cases of unsatisfactory contribution.

Marks will be returned within 2 weeks of the submission due date.

PENALTIES

Late work will be penalised at the rate of 20% per day after the due time and date have expired.

RELEVANT RESOURCES

- van Roeijen, Annemiek et al. 2015. *Delft Design Guide.* BIS Publisher, Amsterdam. Second edition.
- Reinders, Angèle et al. 2012, *The Power of Design: Product Innovation in Sustainable Energy Technologies*, Chichester, West Sussex, U.K. : John Wiley & Sons.
- Siegel, Neil G. 2019, *Engineering project management,* Hoboken, NJ, USA, John Wiley and Sons, Incorporated.

Other Useful Resources:

- Report Writing, The Learning Centre UNSW: https://student.unsw.edu.au/report-writing-support
- Referencing sources of information: (https://student.unsw.edu.au/referencing)
- Writing as an Engineer or Scientist. (http://www.writing.engr.psu.edu/)
- Collins online Unabridged English Dictionary.

Online resources:

Microsoft Teams will be used to disseminate teaching materials. Assessment marks will also be made available via Moodle: https://moodle.telt.unsw.edu.au/login/index.php.

Refer to Academic Advice on the School website, for information about:

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- Academic Honesty and Plagiarism: https://student.unsw.edu.au/plagiarism
- Equitable Learning Services: https://student.unsw.edu.au/els
- General and Program-specific questions: The Nucleus: Student Hub
- Others: https://student.unsw.edu.au/support

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
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	PE1.3 In-depth understanding of specialist bodies of Knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professionaland Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership