UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Semester 2 2018

MMAN2130

DESIGN AND MANUFACTURING

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Mr. D. Lyons CEng FRINA MIEAust GCULT
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Tel: (02) 9385 6120
Email: david.lyons@unsw.edu.au

Consultation time concerning this course:
Face-to-face: Please **email** the course convenor first, to confirm his availability.
By email or course Moodle: At any time.

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Name: Joseph Salim (head demonstrator)
Email: joseph.salim@unsw.edu.au

Please see the course Moodle for other demonstrator contact details.

2. Important links

- Moodle
- UNSW Mechanical and Manufacturing Engineering
- Course Outlines
- Student intranet
- UNSW Mechanical and Manufacturing Engineering Facebook
- UNSW Handbook

3. Course details

Credit Points

This is a 6 unit-of-credit (UoC) course, and involves 7.5 hours per week (h/w) of face-to-face contact.

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact hours

	Day	Time	Location
Lectures	Thursday	9am – 11am	H6 G16
Week 1-10 Design Conclaves			
CAD Labs**	Thursday	12noon – 1:30pm	J17 203; OR
Weeks 2-9	Thursday	1:30pm –3:00pm	J17 203
TAFE**	Tuesday	4:30pm – 9:30pm	Ultimo TAFE; OR
Weeks 2 to 10	Wednesday	4:30pm – 9:30pm	Ultimo TAFE; OR
TAFE PPE safety rules apply: see Moodle	Thursday	4:30pm – 9:30pm	Ultimo TAFE

****Please refer to your class timetable for the learning activities you are enrolled in &/or assigned to and attend only those classes (affects your CAD Lab and TAFE day/time): http://timetable.unsw.edu.au/2018/MMAN2130.html#S2S**

(i) **You CANNOT swap CAD or TAFE classes week to week. No "make-ups" possible for TAFE.**

(ii) **You cannot miss more than one TAFE lesson (during weeks 2 to 7) or one TAFE pump manufacturing session (during weeks 8, 9, 10) – otherwise you may fail the TAFE component of MMAN2130 and risk overall course failure.**

(iii) **Sporting fixtures, personal reasons etc. are not acceptable reasons for missed attendances. (See (ii) above).**

Summary and Aims of the course

This is one of the introductory technology-based design courses in the school. This course develops an appreciation of the concepts involved with product development and manufacture. The other courses in the degree program further develop the theoretical and analysis methods for design and development.

- This course introduces basic aspects of design and manufacturing, process selection, manufacturing processes, material selection based on material and physical properties and the use of computers in the design process.

- There are four main teaching and learning modalities in the course:

    - Face-to-face interactive lectures
    - CAD lab practice
    - TAFE college hands-on workshop manufacturing processes and practice
    - Group project physical testing and evaluation

- This is a project-based course delivered by a blended (face-to-face/online) approach. The project selected allows students to work individually and in a team environment to achieve the final objective, which is a workable product.

- As part of the project, students are asked to develop a product from a page of functional requirements by developing a concept sketch, material selection, detail engineering drawings, process plan and finally making the product in a workshop.

- At the end of the semester, the products are tested. The necessary skills required for carrying out the project is taught during the semester by using face-to-face and e-learning approaches.

- In carrying out this work the student is exposed to design principles and drawing practices which include Computer Aided Design and Drafting (CAD), the link between material selection and design, manufacturing processes and practical selection and limitations of manufacturing components and products.

- A continuing emphasis is placed on group work and report writing essential to engineering.

Student learning outcomes

This course is designed to address the learning outcomes below 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.

After successfully completing this course, you should be able to:

Learning Outcome		**EA Stage 1 Competencies**
1.	Understand the importance and relevance of graphical communication in engineering, be able to represent a three dimensional object in two dimensional space in accordance with AS-1100 technical drawing standards and conventions and be able to interpret two dimensional engineering drawings and produce isometric sketches of relevant components.	PE 1.3, PE1.4, PE2.2
2.	Be able to use the SolidWorks modeling software and application to create a range of engineering components in solid representation to create production drawings of engineering components in accordance with AS-1100 technical drawing standards.	PE1.3, PE2.2
3.	Be familiar with the basic engineering and physical properties of common engineering materials and how to select them for a given design and familiar with the link between product design, material selection and manufacturing.	PE1.3, PE1.5, P2.4
4.	Be able to understand some manufacturing processes and their capabilities.	PE1.3, PE2.4

Learning Outcome		EA Stage 1 Competencies
5.	Be able to work in a group to determine the manufacturing requirements and functionality of the product.	PE2.4, PE3.5, PE3.6
6.	Be able to relate to economic requirements for manufacturing and thus optimise the production of the component.	PE2.4

4. Teaching strategies

This course is conducted as a project-based course in which the material presented is related to the tasks that a student needs to attempt to achieve the final goal of the project. Therefore, the presentation of the material will vary from week to week. Initially there will be lectures and problem-solving classes to guide you through the project, while in the later weeks you will be required to be self-sufficient to finalise the project. However, the project will be assessed over the different periods for the milestones achieved.

There will be laboratory work for hands-on experience in creating the design that you have developed. In relation to the product development, it is expected that the students will be able to search for information and requisites for the development of the product using the web, library and books which are listed as resources for the product development.

5. Course schedule

Week	Topic	Location	Lecture Content	CAD Lab Content	Suggested Readings
Week1	Intro and Group Project Description	H6 G16	Intro to MMAN2130, Group project outline, TAFE groups, venue details & CAD Lab info. Drawings.	No CAD lab	Week 1 See Moodle and Pump Requirement Specification
Week2 *CAD and TAFE start this week*	Concept Sketching	H6 G16	Techniques useful for concept sketching	Introduction to SolidWorks and sketching	Week 2 See Moodle
Week3	3D Part Modeling	H6 G16	Sketching & Modeling parts in 3D	3D Operations	Week 3 See Moodle
Week4	Engineering Drawings	H6 G16	AS1100 standards, dimensioning	Holes and hole wizard	Week 4 See Moodle and Engineering Drawing Assessment Guide

Week	Topic	Location	Lecture Content	CAD Lab Content	Suggested Readings
Week5	Limits Fits & Tolerances	H6 G16	Limits, Fits and tolerances and their application in design.	Engineering drawing	Week 5 See Moodle
Week6	Process Planning	H6 G16	Process Plan Assembly Plan BOM	Assemblies	Week 6 See Moodle
Week7	Design for high volume Manufacture	H6 G16	Design for Manufacturability, Material Selection and High Volume Manufacturing	Fasteners	Week 7 See Moodle + Final Report Assessment Guide
Week8	Material Selection Introduction	H6 G16	Utilizing Material Index's	Patterning & Mirroring	Week 8 See Moodle
Week9	Material Selection - Detail	H6 G16	Design for Manufacture, Material Selection and High Volume Manufacturing	CAD summary (final)	Week 9 See Moodle
MSB	**Mid-Session Break**				
Week10 (*final TAFE this week)*	Advanced Manufacturing Techniques	H6 G16	Design for Manufacture, Material Selection and High Volume Manufacturing		Week 10 See Moodle
Week11	Prototype Testing	Willis J18 UTL	Prototype testing		Week 11 See Moodle for Final Report Assessment Guide
Week12	Contingency				

6. Assessment

You are assessed by way of a product development project which involves designing and manufacturing a product based on given functional specifications. This project will test your ability to demonstrate applied knowledge, which you will be expected to perform as an engineering student.

The weighting of the individual assessment components will be as follows in the table with full details on each assessment provided under Moodle/Assignments.

Assessment overview

Assessment	Length	Weight %	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
1 (a): Concept Sketch	TBA on Moodle	10	1,2,3,4	Detailed Assessment Criteria will be uploaded on the Moodle, Individual submission	Week 5 on Moodle	Week 7 (Mon)	Two weeks after submission
1 (b): Engineering Drawing & Manufacturability Review	TBA on Moodle	20	1,2,3,4,5,6	Detailed Assessment Criteria will be uploaded on the Moodle, Individual submission	Week 7 on Moodle	Week 9 (Mon)	Two weeks after submission
2. Final Report	TBA on Moodle	40	1,2,3,4	Detailed Assessment Criteria will be uploaded on the Moodle, Group + Individual assessment	Week 12 on Moodle	Week 14 (Mon)	Two weeks after submission
3. Prototype Testing	TBA on Moodle	10	1,2,3,4,5,6	Detailed Assessment Criteria will be uploaded on the Moodle, Group submission	Week 11	Week 11	Two weeks after submission
4. TAFE Assessments	TAFE will announce	20	5,6	Individual assessment	TAFE will announce	Ref TAFE	Two weeks after submission

Assignments

Presentation

WRITTEN SUBMISSIONS (excluding 1(a)) MUST BE TYPED (including any equations and calculations) and shall be submitted via Moodle with a standard School cover, sheet which is available from this course's Moodle page. Hand sketches should be scanned and all drawings use Solidworks CAD software, with 2D drawings compliant with AS1100.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Submission

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 per cent (20%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include:

a. Weekly online tests or laboratory work worth a small proportion of the subject mark, or
b. Online quizzes where answers are released to students on completion, or
c. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or Pass/Fail assessment tasks.

Marking

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Examinations

There is no final examination for this course.

Special consideration and supplementary assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the information on UNSW's Special Consideration page.

7. Expected resources for students

The UNSW Library has several of the following in eBook format which are gradually being linked into this course's Moodle lesson-books using Leganto during semester 2, 2018. Announcement may be found in Moodle.

(1) *Manufacturing Engineering and Technology*, S. Kalpakjian and S R Schmid. Prentice Hall
(2) *Engineering Drawing*, A. W. Boundy, McGraw Hill (7th Edition).
(3) *Material Selection in Mechanical Design,* Ashby, M., Elsevier.
(4) *Dimensioning and Tolerancing for Function and Economic Manufacture*, L. E. Farmer, Blueprint Publications.
(5) *Manufacturing Processes* B.H. Amstead, P.F. Ostwald and M.L. Begeman.
(6) *Materials and Processes in Manufacturing*, E.P. Degamo, J.P. Black and R.A. Kohser.
(7) *Product Design and Process Engineering*, B.W. Niebel and A.B. Draper.
(8) *Manufacturing Processes*, H.W. Yankee.
(9) Moodle based learning modules.
(10) AS1100 via the university library SAI Global subscription: http://subjectguides.library.unsw.edu.au/engineering go to Standards tab on right-hand side; Australian standards (via SAI Global). Log in with zPass, search Australian Standard AS1100 *Technical drawing* in several parts – ensure you access current version.

Additional material can be found at the UNSW Library via https://www.library.unsw.edu.au/

Additional materials provided in Moodle

Course will be administered by using Moodle. Therefore, course administration and lecture materials will be uploaded to Moodle. Students are advised to use Moodle for class communication.

Moodle: https://moodle.telt.unsw.edu.au/login/index.php

8. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, recent improvements resulting from student feedback include streamlining of assignments and providing more information on pump design information early in the course.

The Digital Uplift of this course in accordance with the UNSW 2025 Strategy is being undertaken concurrently with the running of the course in semester 2, 2018. Full implementation will occur in time for T1-2019. Lecture material is gradually being placed in Moodle lesson books and traditional lecture time transformed by a “flipping” process into interactive, flat-space design conclaves.

9. Academic honesty 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 Centre 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 Centre, 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. The Student Misconduct Procedures are available here: www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Further information on School policy and procedures in the event of plagiarism is available on the intranet.

10. Administrative matters and links

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

- Attendance, Participation and Class Etiquette
- UNSW Email Address
- Computing Facilities
- Assessment Matters (including guidelines for assignments, exams and special consideration)
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Student Equity and Disabilities Unit
- Health and Safety
- Student Support Services

David Lyons
Chartered Engineer
Course Convenor
6 July 2018
Rev 01

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