UNSW AUSTRALIA

Course Outline

Semester 1 2015

Never Stand Still | Faculty of Engineering | School of Mechanical and Manufacturing Engineering

MMAN2130
DESIGN AND MANUFACTURE

CONTENTS

COURSE OUTLINE

MMAN2130 DESIGN AND MANUFACTURE

1. STAFF CONTACT DETAILS

Contact details and consultation times for course convener

Course Convenor and Lecturer:

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Course Demonstrators:

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TAFE Workshop
Ian Frost
E-mail: Ian.G.Frost@tafensw.edu.au

Consultation concerning this course is available on Monday–Wednesday 0930–1700 whenever I am not otherwise engaged. Please use Moodle as a first resort for consultation. Strictly no consultations will be held on Thursday and Friday.

Contact details and consultation times for additional lecturers and problem solving class/laboratory teaching staff

Nil.

2. COURSE DETAILS

Units of credit

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

For a standard 24 UoC in the semester, this means 600 hours, spread over an effective 15 weeks of the semester (thirteen weeks plus stuvac plus one effective exam week), or 40 hours per week, for an average student aiming for a credit grade Various factors, such as your own ability, your target grade, etc., will influence the time needed in your case. Some students spend much more than 40 h/w, but you should aim for not less than 40 h/w on coursework for 24 UoC.

This means that, for this course, you should aim to spend not less than an additional 2.5 hours per week of your own time for the weeks where there are 7.5 hours of contact. This should be spent in making sure that you understand the material presented, completing the set tasks, further reading about the requirements for the project.

There is no parallel teaching in this course.

Summary of the course

This subject introduces you to basic aspects of design and manufacturing, process selection, manufacturing processes, material properties and selection and the use of computers in the design process.

Aims of the course

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

This is a project-based course. The project selected allows you as a student to work individually and in a team environment to achieve the final objective, which is a workable product. In carrying out this work the student is exposed to design principles and drawing practices which includes Computer aided Design and Drafting, 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

On completion of this course it is expected that the student will

- 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.
- Be able to interpret two dimensional engineering drawings and produce isometric sketches of relevant components.
- 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.

- Be familiar with the basic engineering and physical properties of common engineering materials and how to select them for a given design.
- Be familiar with the link between product design, material selection and manufacturing.
- Able to understand some manufacturing processes and their capabilities.
- Able to extend the methodology developed for this course to other situations.
- Able to work in a group to determine the manufacturing requirements and functionality of the product.
- Able to relate to economic requirements for manufacturing and thus optimise the production of the component.

Graduate attributes

UNSW's graduate attributes are shown at
www.secretariat.unsw.edu.au/acboard/approved_policy/graduate_attributes.pdf
and are:

1. the skills involved in scholarly enquiry;
2. an in-depth engagement with the relevant disciplinary knowledge in its interdisciplinary context;
3. the capacity for analytical and critical thinking and for creative problem solving;
4. the ability to engage in independent and reflective learning;
5. information literacy — the skills to locate, evaluate and use relevant information;
6. the capacity for enterprise, initiative and creativity;
7. an appreciation of, and respect for, diversity;
8. a capacity to contribute to, and work within, the international community;
9. the skills required for collaborative and multidisciplinary work;
10. an appreciation of, and a responsiveness to, change;
11. a respect for ethical practice and social responsibility; and
12. the skills of effective communication.

A statement of broad graduate attributes has meaning when expressed in the context of the discipline. The graduate attributes contextualised for engineering are shown at http://learningandteaching.unsw.edu.au/content/userDocs/GradAttrEng.pdf.

In this course, you will be encouraged to develop Graduate Attributes 2, 3, 4, 5, 9 and 12 by undertaking the selected activities and knowledge content. These attributes will be assessed within the prescribed assessment tasks.

3. RATIONALE FOR INCLUSION OF CONTENT AND TEACHING APPROACH

This course is included to give you the skills to appreciate and to carry out product design and manufacture in a project-based environment. The content reflects my experience as a lecturer as well as my practical experience from manufacturing environment, and the project drawn from that experience are used throughout the lectures and problem solving classes.

Effective learning is supported when you are actively engaged in the learning process and by a climate of enquiry, and these are both achieved in the lectures and problem solving classes by way of practical case studies.

You become more engaged in the learning process if you can see the relevance of your studies to professional, disciplinary and/or personal contexts, and the relevance is shown in all parts of the lectures and assignments by way of examples drawn from industry.

Dialogue is encouraged between you, others in the class and the lecturers. Diversity of experiences is acknowledged, as some students in each class have prior experience in manufacturing environment. Your experiences are drawn on to illustrate various aspects, and this helps to increase motivation and engagement.

It is expected that assignments will be marked and handed back as soon as possible. You will have feedback and discussion, while the assignment is fresh in your mind, to improve the learning experience.

4. TEACHING STRATEGIES

This course is being conducted as a project based course in which the material being 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 monitored over the different periods for the milestones achieved. Each of the milestones will be evaluated by a panel of members made up of academic, and workshop staff.
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. ASSESSMENT

General

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:

Assessment	Deadline	% Mark	Graduate Attribute Assessed	Details
Concept Sketches	Week 3	2	1(a), 1(b), 1(d), 1(f), 4(a)	Individual submission
Engineering Drawing	Week 5	13	1(a), 1(b), 1(d), 1(f), 4(a)	Individual submission

Manufacturability Review	Week 8	12	1(a), 1(b), 1(d), 1(f),4(a)	Individual submission
Hands-on CAD test 1	Week 9	9	1(d)	Individual assessment
Hands-on CAD test 2	Week 11	9	1(d)	Individual assessment
Prototype Testing	Week 13	10	1(d)	Group submission
Final Report	Week 13	25	1(a), 1(b), 1(d), 1(f),4(a)	Group submission
TAFE Assessments	TAFE will announce	20	1(b),1(d)	Individual assessment

*The submission dates may change to accommodate contingencies.

Presentation

A standard specification is available from the School office to aid presentation of your assignments (in all courses). All submissions should have a standard School cover sheet. All submissions are expected to be professional, and clearly set out. The submissions must be made in a proper folder so that the pages will not be missing (no stapling allowed!!!)

Submission

Assignments are due on Tuesday of the class in the week nominated below. Assignments should be submitted direct to me in class. (**No** submission via the assignment boxes at the School office).

Late submission of assignments attracts a penalty of ten percent per *day*, unless prior dispensation has been given; i.e. see me before the due date to avoid penalty. It is always worth submitting as, in the event of difficulty making a final grade (either to pass or higher), any penalties for late submission may be removed.

Examination

There will be no final examination in this course.

Special Consideration and Supplementary Assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see *Administrative Matters for All Courses*, available from the School website.

6. ACADEMIC HONESTY AND PLAGIARISM

Plagiarism is using the words or ideas of others and presenting them 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 booklet which provides essential information for avoiding plagiarism: https://my.unsw.edu.au/student/academiclife/Plagiarism.pdf

There is a range of resources to support students to avoid plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarize. They also hold workshops and can help students one-on-one. Information is available on the dedicated website Plagiarism and Academic Integrity website: http://www.lc.unsw.edu.au/plagiarism/index.html

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 a honours thesis) even suspension from the university. The Student Misconduct Procedures are available here: http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Further information on School policy and procedures in the event of plagiarism is presented in a School handout, *Administrative Matters for All Courses*, available on the School website.

7. COURSE SCHEDULE

All lectures in this course are given by Prof. S. Kara unless stated otherwise.

Tuesday	10:00-12:00	Law Theatre (Lecture)
CAD Labs	(check allocated time)	G16-17 Tyree Energy Building
TAFE	(check allocated time)	(see the information booklet on Moodle)

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Date	**Wk**	**Graphics**	**Manuf. Technology**	**Workshop Technology (TAFE)**	**Project**	**Assessment**
3/3	1	Lecture/problem solving class *(Introduction to MMAN1130, final enrolment, expectations and assessment,*			*Introduction to project Develop Concept Sketches*	

		Sketching)			
4,5,6/3	1	CAD Lab *(Introduction to SolidWorks, Features, Navigation and CAD philosophy)*			
10/3	2	Lecture/problem solving class *(Introduction to design, materials and processes)* *(Problem solving class: Sketching Exercise)*		Introduction to project Develop Concept Sketches	
11,12, 13/3	2	CAD Lab *(Solids modeling, assembly, use of catalogue of common fixings, etc.)*			
17/3	3	Lecture/problem solving class *(Engineering drawings, orthogonal projections, sectioning examples)* *Standards, dimensioning, datums and symbols)*	(Week3) Measuring	Finalize the concept for the group	**Concept Sketch Submission**
18,19, 20/3	3	CAD Lab *(Creation of Engineering Drawings, Standards, dimensioning, datums and symbols)*			
24/3	4	Lecture/problem solving class *(Dimensioning, limits, fits and tolerance)*	(Week4) Temp/Milling	Allocation of parts for group member. Developing CAD Drawing of parts	
25,26, 27/3	4	CAD Lab *(Tolerance techniques, assembly drawings)*			
31/3	5	Lecture/problem solving class *(Review of standards, for fixings and influence on part design, standards for holes, etc., parts and material list)* *(Manufacturability and Process Planning)*	(Week5) Temp/Milling	Developing CAD Drawing of parts	**Engineering Drawing Submission**

1,2,3/4	5	CAD Lab *(Tolerance techniques, assembly drawings)*			
6-10/4	**Easter Monday and Session Break**				
14/4	6	Lecture/problem solving class *(Auxiliary Projection, more on standards and symbols)* *(Manufacturability and Process Planning)*	(Week 6) Temp/Milling	Developing Manufact. of components	
15,16, 17/4	6	CAD Lab *(Auxiliary Projection, parts and material list)*			
21/4	7	Lecture/problem solving class *(Manufacturability and Process Planning)*	(Week 7) Turning	Developing Manufact. of components	
22,23, 24/4	7	CAD Lab *(Solids and Drafting exercise)*			
28/4	8	Lecture/Problem solving class *(Design for Manufacturability, Material Selection and High Volume Manufacturing)*	(Week 8) Turning	Developing Manuf. for High Volume Manufact. Design Implication	**Manufacturability Review Submission**
29,30/ 4 – 1/5	8	CAD Lab *(Assembly exercise)*			
5/5	9	Lecture/Problem solving class *(Design for Manufacturability, Material Selection and High Volume Manufacturing)*	(Week 9) Product Manufacture	Developing Manuf. for High Volume Manufact. Design Implication	
6,7,8/5	9	CAD Lab (Assembly Exercise)			
12/5	10	Lecture/Problem solving class *(Design for*	(Week 10) Product Manufacture	Developing Manuf. for High	

		Manufacturability, Material Selection and High Volume Manufacturing)		Volume Manufact. Design Implication	
13,14, 15/5	10	CAD Lab *(Self practice)*			
19/5	11	Lecture/Problem solving class *(Design for Manufacturability, Material Selection and High Volume Manufacturing)*	(Week 11) Product Manufacture	Developing Manuf. for High Volume Manufact. Design Implication	
20,21, 22/5	11	CAD Lab (Self practice / Working on team project)			
26/5	12	Lecture/Problem solving class (*Feasibility Report Writing)*	(Week 12) No more TAFE	Preparation of Final Report	
27,28, 29/5	12	CAD Lab (Self practice / Working on team project)			
2/6	13	Lecture/Problem solving class (No more lectures – prototype testing will be carried out)	(Week 13) No more TAFE	Preparation of Final Report	**Prototype Testing & Final Report Submission**
3,4,5/6	13	CAD Lab (Self practice / Working on team project)			

***Course contents my change in order to accommodate contingencies.**

8. RESOURCES FOR STUDENTS

(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.

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 communications.

Recommended Internet sites

None

9. COURSE EVALUATION AND DEVELOPMENT

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final problem solving class 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 the revision of the simulation game and early start of the game preparation.

10. ADMINISTRATIVE MATTERS

You are expected to have read and be familiar with *Administrative Matters*, available on the School website. This document contains important information on student responsibilities and support, including special consideration, assessment, health and safety, and student equity and diversity.

Prof. S. Kara
February 2015