UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

# Course Outline

Term 1 2020

# MANF9544

# CONCURRENT PRODUCT AND PROCESS DESIGN

# Contents

# 1. Staff contact details

**Contact details and consultation times for course convenor**

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

Consultation concerning this course is available on Monday 13:00 –17:00 whenever the lecturer is not otherwise engaged.

# 2. Important links

- Moodle
- Lab Access
- Health and Safety
- Computing Facilities
- Student Resources
- Course Outlines
- Engineering Student Support Services Centre
- Makerspace
- UNSW Timetable
- UNSW Handbook
- UNSW Mechanical and Manufacturing Engineering

# 3. Course details

**Credit points**

This is a 6 unit-of-credit (UoC) course and involves 3 hours per week (h/w) of face-to-face contact.

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 3 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** | Monday | 6pm – 8pm | Ainsworth 202 (K-J17-202) |
| | | | |
| **Demonstrations** | Monday | 8pm – 9pm | Ainsworth 202 (K-J17-202) |

**Summary and Aims of the course**

This course introduces the core activities of concurrent development of products, processes, systems, and quality. Therefore, this course is a core part of the MEngSc program in Manufacturing Management and relates its contents to other courses in the program, such as Manufacturing Strategies, Managing Manufacturing Operations and Production Technologies.

The need for companies to develop products that the customer wants and to do this in the shortest possible time has become one of the main success factors on the market. Concurrent Product and Process Development is one of the key strategies that address this problem of fast product development and customer satisfaction by taking into account economic and environmental objectives. It needs new techniques and design tools to be adopted, and it requires a change of the traditional departmental separation of tasks in a company.

Therefore, this course aims to provide an understanding of the integrative nature of concurrent product and process development in a team work environment, and how it affects all subsequent activities in production.

**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. | Have gained knowledge in the interdisciplinary field of concurrent product development. | PE1.3, PE1.5 |
| 2. | Have gained the capacity for critical thinking and problem solving, have experienced collaborative and multi-disciplinary work. | PE2.3, PE3.6 |
| 3. | Learned to appreciate the difficulties of change, and acquired skills of effective communication. | PE2.3, PE3.6 |
| 4. | Have gained knowledge in the inter-disciplinary field of concurrent product development. | PE1.3, PE1.5 |

## 4. Teaching strategies

The subject will be presented in the form of lectures and problem-solving classes. Weekly classes will consist of a 1-1.5 hrs lecture followed by a problem-solving class example or case study related to the material covered in the lecture.

## 5. Course schedule

| Week | Topic | Demonstration/Lab Content | Location | Suggested Readings |
|---|---|---|---|---|
| 1 | - Introduction and definitions | | Ainsworth 202 | Lecture notes on Moodle |
| 2 | - Product Development and Time-to-Market Concept | Economic Trade-off Analysis in Product Development Exercise | Ainsworth 202 | Lecture notes and reading material on Moodle |
| 3 | - Quality Function Deployment | QFD Exercise | Ainsworth 202 | Lecture notes on Moodle |
| 4 | - Design for Manufacture (DFM) | None | Ainsworth 202 | Lecture notes and reading material on Moodle |
| 5 | - Design for Assembly (DFA)<br>- Modularization | DFA Exercise | Ainsworth 202 | Lecture notes and reading material on Moodle |
| 6 | - Design for Environment (DFE)<br>- Design for Reliability (DFR) | Trade-off Analysis | Ainsworth 202 | Lecture notes and reading material on Moodle |
| 7 | - Systems Engineering<br>- Manufacturing System Design | Assembly Sequence Generation Exercise | Ainsworth 202 | Lecture notes and reading material on Moodle |
| 8 | - Rapid Prototyping and Digitalization | None | Ainsworth 102 | Lecture notes and reading material on Moodle |
| 9 | - Easter Monday | - | - | - |
| 10 | - Organisation, Management and Operating of CE Teams | Team Problem Solving Exercise | Ainsworth 202 | Lecture notes on Moodle |
| 11 | Test | None | Ainsworth 202 | None |

# 6. Assessment

## Assessment overview

| Assessment | Group Project? | If Group, # Students per group | Length | Weight | Learning outcomes assessed | Assessment criteria | Due date and submission requirements | Deadline for absolute fail | Marks returned |
|---|---|---|---|---|---|---|---|---|---|
| Individual Online quiz | No | N/A | 8 questions | 0% | 1,2,3 and 4 | Topics assessed Definitions and Product Development and Time-to-Market Concept | Will be released on 6th March on Moodle and is needed to be done before 8th March 23:59 | 8th March 23:59 | Immediately after submission |
| Group assignment 1 | Yes | 4 | 1000 words | 15% | 1, 2, 3 and 4 | Topics assessed include Quality Function Deployment | Will be released on the 2nd March and submission on the 16th March via Moodle | Midnight Sunday 30th March | Two weeks after submission |
| Group assignment 2 | Yes | 4 | 5000 words | 45% | 1, 2, 3, and 4 | Topics assessed include Design for Assembly | Will be released on the 16th March and submission on the 6th April via Moodle | Midnight Sunday 20th April | Two weeks after submission |
| Test | No | N/A | 150 min | 40% | 1 and 4 | Lecture material from week 1 to 10 | In week 11, during the class | N/A | Two weeks after the test |

## Assignments

The assessment tasks will be provided during the class on the dates described in the *Assessment overview* table. The assessment tasks and their detail will be provided on Moodle at https://moodle.telt.unsw.edu.au/login/index.php

*Presentation*

All non-electronic submissions should have a standard School cover sheet, which is available from this course's Moodle page.

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 percent (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
d. 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

You must be available for all tests in this course.

*Calculators*

You will need to provide your own calculator of a make and model approved by UNSW for the examinations. The list of approved calculators is available at student.unsw.edu.au/exam-approved-calculators-and-computers

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an "Approved" sticker for it from the Engineering Student Supper Services Centre prior to the examination. Calculators not bearing an "Approved" sticker will not be allowed into the examination room.

**Special consideration and supplementary assessment**

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

**Please note** that UNSW now has a Fit to Sit / Submit rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

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

## 7. Expected resources for students

Textbooks are suggested in Moodle for presented lectures in each week.

**Suggested Additional Readings**


1. Thomas A. Salomone: "What every Engineer should know about CONCURRENT ENGINEERING", Marcel Dekker, 1995.
2. James L. Nevins, Daniel E. Whitney: "Concurrent Design of Products and Processes", A Strategy for the Next Generation in Manufacturing, McGraw-Hill Publishing Company, 1989. (good textbook but out of print)
3. Andrew Kusiak: "Concurrent Engineering", Automation, Tools, and Techniques, John Wiley & Sons Inc., 1993.
4. John Corbett, Mike Dooner, J. Meleka, C. Pym: "Design for Manufacture", Strategies, Principles, and Techniques, Addison-Wesley Publishing Company, 1991.
5. Paul G. Ranky: "Concurrent/Simultaneous Engineering", Methods, Tools and Case Studies.
6. CIMware Limited, Guildford, England, 1994.
7. Geoffrey Boothroyd, Peter Dewhurst, Winston Knight: "Product Design for Manufacture and Assembly", Marcel Dekker, 1994.
8. Goeffrey Boothroyd, Peter Dewhurst: "Product Design for Assembly", Handbook, Boothroyd Dewhurst Inc, 1991.

9. Kim Clark, Stephen Wheelwright: "Managing New Product and Process Development" and "Revolutionizing Product Development", Free Press, New York, 1993.
10. Sammy G. Shina: "Successful Implementation of Concurrent Engineering Products and Processes." Van Nostrand Reinhold, New York, 1994.
11. Ben Wang: "Integrated Product, Process and Enterprise Design." Chapman & Hall, 1997.

UNSW Library website: https://www.library.unsw.edu.au/
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 better tutorial content and assessment procedure.

## 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, visit: 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

## 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
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

# 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 |