



UNSW
AUSTRALIA

Course Outline

Semester 2 2015

Never Stand Still

Engineering

Mechanical and Manufacturing Engineering

MANF3510

PROCESS TECHNOLOGY AND AUTOMATION

Contents

1.

1. Staff Contact Details

Aims of the Course

The course aims to develop you into a skilled and all-rounded process design engineer able to carry out and manage the key design processes in parallel and concurrently. Design is inherently complex and a systematic, yet flexible, agile and interdisciplinary approach is required to bring product to the market successfully and in less time, using appropriate technology. The course teaches this approach, based on global best-practice methodologies, industry lecturers, and incorporates case studies and projects, to apply these methodologies and become proficient at them.

Student learning outcomes

This course is designed to address the below learning outcomes 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 Competencies
1. Understand and apply systematic design principles as part of designing automated industrial machines and processes.	PE1.3, PE1.5, PE2.1, PE2.3
2. Use appropriate CAD/CAM technology to design a component and generate the CNC code to manufacture that component using CNC and/or 3D rapid prototyping manufacturing technology.	PE1.3, PE2.2, PE2.3, PE3.4
3. Understand the performance and characteristics of major machine elements and building blocks and how to specify and select appropriate equipment items from suppliers.	PE1.1, PE1.3
4. Be able to integrate the various elements of automation into an appropriate machine or process.	PE2.1, PE2.2, PE2.3
5. Understand the capability and performance of off-the-shelf programmable logic controllers and be able to write and execute basic ladder programming of these devices.	PE1.3, PE2.2
6. Understand the role of safety and regulatory compliance of machine design.	PE3.1, PE3.4

3. Teaching strategies

Lectures in the course are designed to cover the terminology and core concepts and theories in the area of manufacturing process design. They do not simply reiterate the texts, but

Lab sessions are designed to provide you with feedback and discussion on the assignments, and to investigate problem areas in greater depth to ensure that you understand the application.

Teaching Strategies and their rationale

This course will be presented using PowerPoint presentations as well as case studies and real-life designs. The material will be presented in the lecture and the student is expected to actively participate in discussion, analysis and design. Assignments to develop the understanding of the key methodologies and theories and how to apply them will be provided as part of the course. There will be quizzes to support the learning experience, and in addition, there will be a final exam.

Suggested approaches to learning in the course

Suggested approaches to learning in this course include:

- Careful reading, discussion and understanding of the material presented in lectures.
- Additional reading on and about the material presented in lectures to broaden the knowledge base.
- Paying attention throughout the lectures/demonstrations, and asking questions when anything is not understood.
- Conscientiously working through assignments.
- Learning of the lecture material in preparation for quizzes.

Student -centered and self -directed learning (expectations of the students)

This course involves four hours per week of face-to-face contact, and it is expected that you will put in, on average, an additional five to six hours per week of your own time. This time should be spent in revising lecture material and further reading, completing assignments, and revising and learning for the quizzes.

Expected learning outcomes; their association with the teaching strategies and with the suggested approaches to learning

The lectures are designed to teach you the underlying theory and key methodologies centered on process design, CNC manufacturing, PLC control and machine element selection. These methodologies are state-of-the-art and used by leading industrials. The assignments are designed to use these methodologies on real case-studies and give you the confidence and ability to make important design and manufacturing decisions. This helps to prepare you for a rewarding career in this field.

The course has been designed to support academic learning, by understanding the theory and philosophy of design for manufacturing, but also to support developing practical skills that industry needs.

4. Course schedule

Week	Topic
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5. Assessment

Assessment task	Topic	Weight	Learning outcomes assessed	Assessment criteria	Due date , time, and submission requirements
Group Assignment I	CAD/CAM	20%	2	Technical content, design capability and report writing skills	End of week 8 via Moodle
Group Assignment II	PLC	20%	5 and 6	Technical content, Programming skill and report writing skills	

and realisation of your design using CNC technology and the programming of the most common control platform in industry, the programmable logic controller or PLC.

Each part of the assignment requires a write-up and these are due in week 8 and week 13.

You need to ensure that you use both an appropriate writing style as well as professional formatting and editing of style and content in your report.

Completed assignments will be handed in hard copy by the end of the week the assignment is due. The assignments support the learning outcomes by incorporating an appropriate mix of analytical techniques, enabling software, data analysis that supports achievement of appropriate solutions.

Late submission penalty: 5 marks per 24 hours (10% of total mark) [7.4 / (s)-2(dex(6(l)2.6-6.6(i)2

either short written answers or analysis and calculations or both.

3. Low-cost Jigs, Fixtures & Gages, for limited production, Boyes W.E. ed., Society of Manufacturing Engineers, 1986, Dearborn, Michigan
4. Fundamentals of Modern Manufacturing, Groover M.P., 2nd ed., 2002 John Wiley

Additional information may be available from the UNSW Library website:

<https://www.library.unsw.edu.au/servicesfor/index.html>

7. 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 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.

Recent improvements to this course include the introduction of SolidCam and a greater emphasis on scalable production systems.

8. 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: <https://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.

AppendixA: Engineers Australia (EA) Professional Engineer Competency Standard

	Program Intended Learning Outcomes
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PE1: Knowledge