



# Course Outline

**MANF4430**

**Reliability & Maintenance Engineering**

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# Contents

# 1. Staff Contact Details

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

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Consultation concerning this course is available immediately after the classes. Direct consultation requires prior booking via email.

## **Contact details and consultation times for addition**

## Summary of the Course

The course will introduce statistics, mathematics and associated techniques for analysing an industrial process for the purpose of maintaining and improving it. Major disciplines covered include issue analysis, data collection, statistical data analysis, process modeling, decision-making and implementation. The course focuses on developing experimental techniques using statistical methods to test the performance of the processes in a manufacturing industry. It lays the foundations for testing products, components, machinery and processes. This is necessary for the development of quality products and processes. This leads to the development of quality assurance metho



Test for independence & test for association	26/8/15	OMB149	Goodness-of-fit test, Chi-Square test	Chapter 2.7 of the prescribed text
Correlation and Regression	2/9/15	OMB149	Regression and correlation analysis	Chapter 2.8 of the prescribed text
Catch-up session, quiz 2 revision	9/9/15	OMB149	Catch-up session, Q/A for Quiz 2	-
Component reliability & Weibull analysis	16/9/15	OMB149	Reliability function, failure function, Weibull probability plot	Chapter 3.1 to 3.3 of the prescribed text
System reliability & condition monitoring	23/9/15	OMB149	Series system, parallel system, composite system	Chapter 4.1 of the prescribed text
Maintenance Theory	7/10/15	OMB149	Reliability centered maintenance, FMECA	Lecture notes available on Moodle
Process Identification, characterisation and modeling	14/10/15	OMB149	Bayesian network, partial least squares path modelling	Lecture notes available on Moodle
Process Improvement and Implementation	21/10/15	OMB149	Process improvement verification and validation	Lecture notes available on Moodle
Course summary and course evaluation	28/10/15	OMB149	CATEI evaluation, Q/A for Quiz 4	-

## 5. Assessment

**Assessment task      Length      Weight**



### Assessment Criteria

The following criteria will be used to grade assignments:

- Analysis and evaluation of assignments by integrating knowledge gathered in lectures, demonstrations and textbook.
- Sentences in clear and plain English—this includes correct grammar, spelling and punctuation.
- Correct referencing in accordance with the prescribed citation and style guide.
- Appropriateness of analytical techniques used.
- Accuracy of numerical answers.
- All working shown.
- Use of diagrams, where appropriate, to support or illustrate the calculations.
- Use of graphs, where appropriate, to support or illustrate the calculations.
- Use of tables, where appropriate, to support or shorten the calculations.
- Neatness.

### **Examinations**

You must be available for all tests and examinations. There are 4 quizzes that count toward 60% of the course. There is no final examination in this course.



## 6. Expected Resources for students

### Prescribed textbook

The prescribed textbook for this course is:

Modarres, Kaminsky and Krivtsov, Reliability Engineering and Risk Analysis – A practical guide, Macmillan, ISBN 978-0-8493-9247-4.

The prescribed textbook is available for purchase at the UNSW bookshop, and a number of copies can be borrowed from the UNSW library:

[info.library.unsw.edu.au/web/services/services.html](http://info.library.unsw.edu.au/web/services/services.html)

Each of you will be assigned to two major assignments with set of questions listed. These cases are published by the Harvard Business School. The case is copyrighted therefore you need to download it at a reasonable cost (around AUD \$8.00) from their website.

### Reference books:

1. Moubray J, Reliability-centered Maintenance, 2nd edition, 1997, Butterworth Heineman (two copies are held in the library, one in open reserve)
2. J L Devore, Probability and Statistics for Engineering and the Sciences, Duxbury
3. C Chatfield, Statistics for Technology, Chapman and Hall, 1983
4. C Lipson and N J Sheth, Statistical Design and Analysis of Engineering Experiments, McGraw Hill, 1973.
5. D C Montgomery, Design and Analysis of Experiments, John Wiley, 2001.
6. D H Besterfield, Quality Control, Prentice Hall, 5th Edition 1998
7. Moubray J, Reliability-centered Maintenance, 2nd edition, 1997, Butterworth Heineman (two copies are held in the library, one in open reserve)
8. C. Ebeling, An Introduction to Reliability and Maintainability Engineering, International Edition, 1997, McGraw-Hill, Singapore
9. Tribology Handbook (2nd Edition), Edited by: Neale, Michael J. © 1995 Elsevier (UNSW Library, on-line access)

## 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.

In this course, recent improvements resulting from student feedback include the introduction of using statistical software package – Minitab 17 to assist in data analysis.

## 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: [student.unsw.edu.au/plagiarism](http://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



## Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

	<b>Program Intended Learning Outcomes</b>
<b>PE1: Knowledge and Skill Base</b>	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
<b>PE2: Engineering Application Ability</b>	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
<b>PE3: Professional and Personal Attributes</b>	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