UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Semester 2 2018

MMAN4400

ENGINEERING MANAGEMENT

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. Face-to-face consultation is preferred.

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

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Consultation concerning this course is available immediately after the classes. Face-to-face consultation is preferred.

Please see the course Moodle.

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 4 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
Lecture	Tuesday	09:00 – 11:00	Chemical Science M17
Demonstrations	Tuesday	11:00 – 12:00	Chemical Science M17

Please refer to your class timetable for the learning activities you are enrolled in and attend only those classes.

Summary and Aims of the course

MMAN4400 Engineering Management presents four subject areas, considered to be critical in terms of managing and leading engineering operations. They are:

- Issue analysis and decision making
- Investment analysis and engineering economy
- Costing and operations analysis
- Quality management, including design

Within each subject area, the course will cover many conceptual and analytical techniques, all supporting fact- and data-based analysis and decision making with the aim of improved product and process performance, economy and sustainability. The course consists of lectures, demonstration sessions and assignment work. There will be three quizzes and a major case study. There will be no final exam.

Considering the diverse nature of subject areas, there really is no single, suitable textbook available that covers all these areas and therefore a custom textbook, consisting of a compilation of outstanding chapters from three different textbooks, has been created with the assistance of the McGraw-Hill company. Our campus bookstore will have this book for you to purchase. It is important you do so, as this book will be an excellent reference for you for years to come. Additional lecture notes are also posted on Moodle.

This course is designed to help you to learn how to manage the operations in organizations and also to build a business or commercial case for making engineering related decisions, such as investment in plant, equipment and processes. Although the main emphasis will be on product and process, consideration will also be given to designing engineering services. The course offers a broad managerial perspective emphasizing the strategic impact of operations decisions and the interfaces between operations and the other functional areas of organizations, including of course, finance.

This course encompasses the key elements of operations management and investment analysis and pulls them together in a coherent format that allows you to understand the 'big picture' as well as 'the specific details'. It is aimed at integrating the knowledge gained from the different engineering subjects you have studied into a framework and process that allows you to implement your solutions and ideas in a commercial environment.

Engineers have traditionally played an important role in management, largely because design and technology were the main key factors for success in product and process design, but also the fact that our engineering degree gave us outstanding analytical skills to solve a multitude of problems. This really hasn't changed, but in an increasingly complex world, successful organizations – public, private or governmental – need managers with increasingly broad and diverse skills, especially in finance, law, risk and quality management, and customer relations. And more to the point, organizations need leaders at every level, with the ability to make carefully considered and innovative long-term strategic decisions. It is the purpose of MMAN4400 to equip you with enough knowledge and information to become a global manager, indeed a leader, with the ability to apply analytical methods and quality processes to create short and long-term value for your organization, your customers, and the community, in other words, all stakeholders.

Some of you will follow a 'traditional' engineering career, whereas others will branch out into very different fields, including consulting, banking, insurance, service industries, transport and so on. It is the aim of this course to prepare you for any of these and to train your mind to think strategically and systematically, integrating technical, commercial, financial and managerial concepts. We will also have some guest lecturers from industry and the professions. They will speak on a range of current and important issues, and be happy to engage you in discussion.

The textbooks, notes, case studies and UNSW Moodle postings support the lectures and demonstration sessions, but they are not intended to be a substitute for attending classes. You are expected to cover all the materials assigned for both lectures and demonstration sessions.

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.	State what an organisation needs to do to remain competitive in today's environment.	PE3.1, PE3.2, PE3.6
2.	Perform investment and feasibility analyses.	PE1.1, PE1.2, PE2.1

Learning Outcome		EA Stage 1 Competencies
3.	Be able to determine whether a process is capable of producing a product or service to specifications.	PE1.1, PE1.2, PE1.6
4.	To be able to understand the role that the operations management function plays in international business and how the operations function can play a strategic role in improving the global competitiveness of the organisation.	PE3.1, PE3.4, PE3.6

4. Teaching strategies

Lectures, demonstrations and assessments in the course are designed to cover the core knowledge areas in Engineering Management. They do not simply reiterate the texts, but build on the lecture topics using examples and cases taken directly from industry to show how the theory is applied in practice and the details of when, where and how it should be applied.

Lectures and demonstrations are designed to develop several graduate attributes by creating an environment where information sharing, discussions, teamwork, communication, task completion and project role playing will take place. Since each of you may have come from a different engineering stream, your experiences are drawn upon to illustrate various aspects of cases covered, and this helps to increase motivation and engagement.

5. Course schedule

Date	Lecture Content (Chemical Science M17) 09:00 – 11:00	Suggested Readings	Demonstration (Chemical Science M17) 11:00 – 12:00
Week 1 Tue 24/07/18	Issue analysis Part I – Issue analysis framework, investment, processes, systems and cost	Lecture notes and video on issue analysis	No demonstration in Week 1
Week 2 Tue 31/07/18	Issue analysis Part II – Operation, strategy, process capacity, Little's law	Chapter 1,2, 3, 4 and Lecture notes	Case study discussion
Week 3 Tue 07/08/18	Issue analysis Part III – Income statement analysis, taxation, inflation and depreciation	Chapter 9,16, 17, 18, 19 and Lecture notes	Tutorial Questions

Date	Lecture Content (Chemical Science M17) 09:00 – 11:00	Suggested Readings	Demonstration (Chemical Science M17) 11:00 – 12:00
Week 4 Tue 14/08/18	Issue analysis Part IV – Quality management, Basic 7 tools	Chapter 8 and Lecture notes	Questions on the Basic 7 tools
Week 5 Tue 21/08/18	Engineering economy Part I – Foundations of engineering economy and cost estimation	Chapter 6, 7, 9 and Lecture notes	Quiz 1 (In-class)
Week 6 Tue 28/08/18	Engineering economy Part II – Interest rate, present worth, annual worth, future worth analysis	Chapter 10, 11, 12, 13 and Lecture notes	Questions on interest rate, PW, AW, FW
Week 7 Tue 04/09/18	Engineering economy Part III – Rate of return analysis, breakeven, sensitivity and payback analysis	Chapter 14, 15 and Lecture notes	Questions on IRR, breakeven, sensitivity and payback
Week 8 Tue 11/09/18	Statistical process control – process variables, process attributes, capability analysis	Chapter 8 and Lecture notes	Questions on statistical process control
Week 9 Tue 18/09/18	Process improvement I – JIT, Agile, process reengineering	Lecture notes only	Case study discussion and assignment support
Week 10 Tue 2/10/18	Process improvement II – Six Sigma	Chapter 8, 21 and Lecture notes	Case study discussion and assignment support
Week 11 Tue 09/10/18	Process improvement III – Maintenance theory	Lecture notes only	Case study discussion and assignment support

Date	Lecture Content (Chemical Science M17) 09:00 – 11:00	Suggested Readings	Demonstration (Chemical Science M17) 11:00 – 12:00
Week 12 Tue 16/10/18	Process improvement IV – Project management	Chapter 20 and Lecture notes	Case study discussion and assignment support
Week 13 Tue 23/10/18	TBA	TBA	TBA

6. Assessment

Assessment overview

Assessment	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Online Quiz x 3	Multiple choice and short answer questions	45%	1, 2, 3 and 4	• Quiz 1: Lecture + Tutorial Material Week 1-4 • Quiz 2: Lecture + Tutorial Material Week 5-8 • Quiz 3: Lecture + Tutorial Material Week 8-12	Beginning of Week 5, 9 and 13	End of Week 5, 9 and 13	Immediately after the quiz is closed
Assignment progress evaluation 1	500 words per team	10%	1 and 2	Performance outcomes from business simulation study	Week 4 14/08/18 5pm on Moodle	1 week after the due date	Within 2 weeks after submission
Assignment progress evaluation 2	500 words per team	10%	1 and 2	Performance outcomes from business simulation study	Week 8 11/09/18 5pm on Moodle	1 week after the due date	Within 2 weeks after submission
Group assignment	5000 words per team	35%	1, 2, 3 and 4	See below	Week 13 23/10/18 5pm on Moodle	1 week after the due date	Upon release of final results

Assignments

The assignments will be posted on Moodle or handed out in class, and a reminder announcement will be made about due dates for the assignments. The assignments support the learning outcomes by incorporating an appropriate mix of activities such as issue analysis, fact-based data analysis that support the design of appropriate solutions and strategies. The assignments also support collaborative team work and integration of different ideas and components into an overall coherent quality management strategy.

The following criteria will be used to grade assignments:

Written reports:

- Analysis and evaluation of assignments by integrating knowledge gathered in lectures, demonstration sessions 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

Presentation

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
d. Pass/Fail assessment tasks.

Marking

The following criteria will be used to grade assignments:

- Analysis and evaluation of requirements by integrating knowledge and methods learned in lectures and demonstrations
- 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 engineering techniques and methodologies used
- Accuracy of numerical answers and comprehensiveness of methods and techniques employed
- Evidence of quality data and analysis-based decision making
- All workings shown where required
- 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
- Professional nature of verbal presentation during the practical demonstration
- Technical quality of your work seen during the practical demonstration

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.

Other assessments

Additional assessments may be given in class to reinforce topics and provide early feedback. These assessments will not contribute to the final mark.

Examinations

There is no final exam in this course.

Online Quiz

Three quizzes (quiz 1, 2 and 3) will be conducted online via Moodle. The format of the quiz is like those that are done on paper, which consists of multiple choice questions, calculations and short answer questions. The link to the quiz will be available on Monday of the quiz week; the link will remain open until 5pm, Friday of the same week. Each student gets ONE attempt to complete the quiz within a set time limit. The feedback of the quiz will be provided after the quiz is closed. Note that the quiz questions are randomly drawn from a question

bank with similar theme and difficulty, numerical questions may appear with random input numbers, so students will not expect to get the exact same question. Students are expected to complete the quiz individually.

You must be available for all tests and examinations.

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 shown 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 School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an "Approved" sticker will not be allowed into the examination room.

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

Lecture notes for all topics will be posted on Moodle. For all e-Books and reference books please visit the UNSW Library website: https://www.library.unsw.edu.au/

Textbooks

The prescribed textbook for this course is:

MMAN4400 ENGINEERING MANAGEMENT – McGraw-Hill, 2013. ISBN-13: 978-1-12-179435-1.

You can purchase the textbook from UNSW bookshop. Alternatively, you can purchase the eBook version (at a lower price) directly from the publisher at:

http://www.mheducation.com.au/9781307074352-aus-engineering-management (link to be confirmed)

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 a business simulation-based group project.

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

Dr Ron Chan
Dr Erik van Voorthuysen
July, 2018

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