



# Course Outline

Semester 2 2015

Never Stand Still

Engineering

Mechanical and Manufacturing Engineering

## **MMAN4400**

# **Engineering Management**

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# 1. Staff Contact Details

## Contact details and consultation times for course convenor

Dr Erik van Voorthuysen  
Electrical Building G17, Room 414  
Tel: (02) 9385 4147  
Email: [erikv@unsw.edu.au](mailto:erikv@unsw.edu.au)

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

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

Dr Ronald Chan  
Electrical Building G17, Room 414  
Tel: (02) 9385 4147  
Email: [ting.chan@unsw.edu.au](mailto:ting.chan@unsw.edu.au)

# 2. Course details

## Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves <insert hours> 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

Lectures	Day	Time	Location
Week 1 to 13	Monday	10am – 1pm	Ainswth102
<b>Demonstrations</b>			
Week 2 to 13	Wednesday	10am – 12pm	CivEng 101
Week 2 to 13	Thursday	12pm – 2pm	Ainswth102

## Summary of the Course

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

- Investment analysis and engineering economy
- Costing and operations analysis
- Quality management, including design
- Project management

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 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.

## Aims of the Course

This course is designed to help you to learn how to manage the operations in organisations 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 emphasising the strategic impact of operations decisions and the interfaces between operations and the other functional areas of organisations, 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 demonstrations 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 demonstrations.

### 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 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
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

## 3. 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 completions and project role playing will take place. Since each of you may have come from a different engineering stream, your experiences are drawn on to illustrate various aspects of cases covered, and this helps to increase motivation and engagement.

## 4. Course schedule

<b>Topic</b>	<b>Date</b>	<b>Location</b>	<b>Lecture Content</b>	<b>Demonstration/ Lab Content</b>	<b>Suggested Readings</b>
Investment, Processes, Systems and Cost Analysis	27/7/15	Ainswth102	Operations and supply chain management	No demonstration in Week 1	Chapter 1, 2 and 3 in the prescribed text
Process Mapping, Costs and the Issue of Variability	3/8/15	Ainswth102	Process flow diagram, process capacity, utilisation and workload	FedEx case study and discussion	Chapter 4, 5 and 6 in the prescribed text
Design and MRP	10/8/15	Ainswth102	Process design, V models, axiomatic design	Aston Martin Cygney case study and discussion	Chapter 7 in the prescribed text
Quality Management	17/8/15	Ainswth102	Key contributors to quality theory, Basic 7 and New 7 tools	Proto Labs QFD exercise	Chapter 8 in the prescribed text
Engineering Economy 1	24/8/15	Ainswth102	Cash flow analysis	Exercise in cash flow analysis	Chapter 9, 10 and 11 in the prescribed text
Engineering Economy 2	31/8/15	Ainswth102	Present worth, annual worth analysis	Exercise in present worth and annual worth analysis	Chapter 12 and 13 in the prescribed text
Engineering Economy 3	7/9/15	Ainswth102	Internal rate of return, breakeven analysis	Exercise in internal rate of return and breakeven analysis	Chapter 14 and 15 in the prescribed text

Statistical Process Control 1	14/9/15	Ainswth102	Acceptance sampling, operating characteristics curves	Exercise in operating characteristics curves	Chapter 19 and 20 in the prescribed text
Statistical Process Control 2	21/9/15	Ainswth102	Variable and attribute control charts	Exercise in variable and attribute control charts	Chapter 19 and 20 in the prescribed text
Project Management	5/10/15	Ainswth102	PERT and CPM	Exercise in project network analysis	Chapter 8 in the prescribed text
Lean Management	12/10/15	Ainswth102	Lean supply chain management	Assignment presentation	Chapter 21 in the prescribed text
Improving Efficiency, Effectiveness, Reliability, Quality	19/10/15	Ainswth102	Six sigma, process reengineering and improvement	Assignment presentation	Lecture notes available on Moodle
Course evaluation	26/10/15	Ainswth102	CATEI evaluation and Q/A for students	Assignment presentation	-

## 5. Assessment

Assessment task	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date, time, and submission requirements
Quiz 1	80 minutes	15%	1 and 4	Week 1 to 4 materials	27/8/15, 12:15pm
Quiz 2	80 minutes	15%	2	Week 5 to 7 materials	17/9/15, 12:15pm
Quiz 3	80 minutes	15%	3	Week 8 to 11 materials	22/10/15, 12:15pm
Class participation	-	10%	1, 2, 3 and 4	Participation in demonstration sessions	Week 2 to 11 demonstration sessions
Group assignment	Approx. 4500 words	45%	1, 2, 3 and 4	Issue analysis, fact based data analysis and report writing skills	Midnight, Friday 30 <sup>th</sup> October via Moodle

In order to achieve a PASS (PS) in this course, you need to achieve a composite mark of at least 50. Note that a 'double-pass' is not required for this course.

The dates for the assignments will be communicated to you in class and provided on Moodle as the course progresses.

### Assignments

#### Group forming

By Friday of Week 2, at 5pm, you will need to self-enroll into a group on Moodle. Each group is set to consist of four to six members. Instruction to the self-enroll system can be found on Moodle by Week 1. Please note that any students who are not enrolled in a group by Friday of Week 2, at 5pm, they will be automatically assigned to a new group.

#### Presentation

All submissions should have a standard School cover sheet which is available from this subject's Moodle page.

All submissions are expected to be neat, and clearly set out. Your results are the pinnacle of all your hard work. Presenting them clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.



## Submission

Late submissions will be penalised 5 marks per calendar day (including weekends). An extension may only be granted in exceptional circumstances. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the course convenor **before the due date**. Special consideration for assessment tasks of 20% or greater must be processed through <https://student.unsw.edu.au/special-consideration>.

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

## **Examinations**

You must be available for all tests and examinations. There are 3 quizzes that count toward 45% of the course. There is no final examination in this course.

For further information on exams, please see [Administrative Matters](#).

## 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 <https://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 [Administrative Matters](#), available on the School website and on Moodle, and the information on UNSW’s [Special Consideration page](#).

## **Class Participation**

Starting from Week 2, the demonstrators will randomly call out students during the practical sessions: Wednesday 0900-1100 & Thursday 1100-1300. Students will be asked to attempt the practical question on the board, along with their explanation of the question to their fellow classmates. The demonstrators will assess the quality of the solution/explanation of the student as their class participation mark. The marking criteria will be divided into three categories. A – the student demonstrated clear and extensive understanding of the concept, even the solution may not be correct, B – the student demonstrated basic and limited understanding of the concept, C – the student refused to attempt the question or they are absent (without a valid explanation) from the practical session. Each student will be called at least once between Week 2 to 11, it is also possible that some students may be called more

than once. Their class participation will be converted into a mark at the end of the semester, which worth 10% of the final course mark.

## 6. Expected Resources for students

### Prescribed textbook

The prescribed textbook for this course is:

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

It is expected that each of you will purchase your own copy.

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

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

### Additional materials provided in UNSW Moodle

This course uses UNSW Moodle which list of assignments, answers to the numerical questions, suggested answers to case studies and assignments.

Logging on to UNSW Moodle using the following Web address:

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

## 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 changes to the demonstration formats and assessments. Instead of two presentations there will now be only a single presentation by each group to be held later in the session. This frees up additional demonstration time to work on problems and to prepare better for quizzes.

## 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.

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:

<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](#), available on the School website.

## 9. Administrative Matters

You are expected to have read and be familiar with *Administrative Matters*, available on the School website: [https://www.engineering.unsw.edu.au/mechanical-engineering/sites/mech/files/u41/S2-2015-Administrative-Matters\\_20150721.pdf](https://www.engineering.unsw.edu.au/mechanical-engineering/sites/mech/files/u41/S2-2015-Administrative-Matters_20150721.pdf)

This document contains important information on student responsibilities and support, including special consideration, assessment, health and safety, and student equity and diversity.

*Erik van Voorthuysen  
Ronald Chan  
July 2015*

## 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