



**UNSW**  
AUSTRALIA

# Course outline

Semester 1 2017

Never Stand Still

Engineering

Mechanical and Manufacturing Engineering

## **GSOE9810**

# **PRODUCT AND PROCESS QUALITY IN ENGINEERING**

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# 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 is preferred.

# 2. 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 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
Lectures	Thursday	18:00 – 19:30	Ainsworth G03
Demonstrations	Thursday	19:30 – 21:00	Ainsworth G03

## Summary of the course

This course will introduce you to the cornerstones of creating and sustaining an effective organisation by covering several quality engineering approaches, industrial cases, videos

etc. Several topics as well as methods and tools for improved product and process design will be covered, which are essential to take organisations into the next generation with significantly improved organisational effectiveness. Managing quality is considered critical in business and organizational governance, and this includes all aspects of the engineering discipline, from analysis to design to implementation and improvement. GSOE9810 can therefore be considered an important and logical element of a graduate engineering degree or diploma.

### Aims of the course

This course is designed to cover the core concepts and dynamic approaches in quality engineering field. They do not simply reiterate the textbooks, but build on the lecture topics using examples (many taken from several industries) to show you how successfully and unsuccessfully these approaches are applied in practice.

Demonstration sessions are designed to support your learning process with opportunities for more interaction as well as to enhance individual and team participation through discussion on problems, questions and cases.

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 manufacturing environment.	PE2.1, PE2.2, PE2.4, PE3.4
2.	State how an organisation can improve its processes and integrate its several functions through the best use of quality engineering.	PE1.3, PE1.5
3.	Be able to determine whether a process is capable of producing a product or service to specifications	PE1.2, PE1.3
4.	Be able to integrate very popular topics like total quality management, Six-Sigma, and Benchmarking into organisations.	PE1.6, PE2.2, PE3.4

## 3. Teaching strategies

Today's organisations are evermore focused on improving supply chain performance. Key to this improvement is quality management. Therefore, quality engineering in product and process design continues to be an evolving, interesting and challenging topic. It has moved from beyond an emphasis on management of quality to a focus on the quality of managing, operating and integrating the design, manufacturing, delivery, marketing, information, customer service and financial areas throughout an organisation's quality value chain including the entire supply chain.

Therefore, a wide variety of concepts and tools of analysis will be covered and you will be interacting with other students in the lectures and demonstration sessions, either online or face-to-face, sometimes in teams or individually. You become more engaged in the learning process if you can see the relevance of your studies to professional, disciplinary and/or personal contexts, and the relevance is shown in the lectures, face-to-face and web-based contents by way of examples drawn from different industries.

Several case discussions will take place in lectures and face-to-face demonstrations as well as through UNSW Moodle page. These aim to give several opportunities to each of you to interact, exchange ideas, knowledge and experiences with the facilitators and other students through:

- reading from a wide range of cases studies and synthesizing a range of perspectives,
- reflecting on your own experience and knowledge in the light of new learning,
- exchanging views and challenging each other's thinking in a structured learning environment, and
- analysing case studies and relating learnings to your own context, working collaboratively on a hypothetical project.

Lectures, demonstration sessions and assessments in the course are designed to cover the core knowledge areas in Quality Engineering. 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 demonstration sessions 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 professional and academic background, your experiences are drawn on to illustrate various aspects of cases covered, and this helps to increase motivation and engagement.

A team of around three to four students in UNSW Moodle will be set and each team will be assigned to two case assignments. Lecturers will provide you with feedback and discussion on the assignment, and to understand the concepts and problems in greater depth.

## **4. Course schedule**

<b>Date</b>	<b>Lecture Content (Old Main Building - OMB149) 18:00-19:30</b>	<b>Suggested Readings</b>	<b>Demonstration Session (OMB149) 19:30-21:00</b>
<b>Week 1</b> Thu 2/03/17	Perspectives and scope of Quality Engineering and Issue analysis	Chapter 1 and Lecture notes	Assignment I discussion and Team forming instruction
<b>Week 2</b> Thu 09/03/17	Quality Theory and KFS analysis	Chapter 2 and Lecture notes	FedEx case study
<b>Week 3</b> Thu 16/03/17	Global Supply Chain Quality, Quality Standards	Chapter 3 and 8 and Lecture notes	Aston Martin case study
<b>Week 4</b> Thu 23/03/17	Strategic Quality Planning	Chapter 4 and Lecture notes	Ames Rubber case study
<b>Week 5</b> Thu 30/03/17	Design Theory	Lecture notes only	Axiomatic Design and VDI-2221 case study
<b>Week 6</b> Thu 06/04/17	Voice of the Customer and Voice of the Market	Chapter 5,6, 7 and Lecture notes	Assignment I support
<b>Week 7</b> Thu 13/04/17	Acceptance Sampling	Chapter 9, Lecture notes and Supplement online material *	Assignment II discussion Questions on Acceptance Sampling
<b>Week 8</b> Thu 27/04/17	Tools of Quality	Chapter 10 and Lecture notes	Questions on Basic 7 and New 7 Tools

<b>Week 9</b> Thu 04/05/17	Statistical Process Control I	Chapter 11 and Lecture notes	Questions on variable control charts
<b>Week 10</b> Thu 11/05/17	Statistical Process Control II	Chapter 12 and Lecture notes	Questions on attribute control charts and capability analysis
<b>Week 11</b> Thu 18/05/17	Six-Sigma Management and Tools	Chapter 13 and Lecture notes	Minitab session at the computer lab
<b>Week 12</b> Thu 25/05/17	Wrap-up session and Exam Revision I	Lecture notes	Assignment II support and exam revision
<b>Week 13</b> Thu 01/06/17	Exam Revision II	Lecture notes	<i>Exam revision</i>

[\\*http://wps.prenhall.com/wps/media/objects/14746/15100872/M09\\_FOST7982\\_05\\_SE\\_Appendix.pdf](http://wps.prenhall.com/wps/media/objects/14746/15100872/M09_FOST7982_05_SE_Appendix.pdf)

## 5. Assessment

### Assessment overview

Assessment	Max. Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Group assignment 1	2000 words	20%	1, 2,3 and 4	Material from week 1 to week 6 (inclusive)	Week 7 14/04/17 5pm on Moodle	Fri 21/04/17	Two weeks after submission
Group assignment 2	2000 words	20%	1, 2,3 and 4	All material from week 1 to week 11 (inclusive)	Week 13 02/06/17 5pm on Moodle	Fri 9/06/17	Upon release of final results
Record of meetings	No limit	10%	1, 2,3 and 4	Team contribution	Friday weekly from week 2 to week12 5pm on Moodle	N/A	Upon release of final results (Early feedback will be provided before the census date)
Final exam	Multiple choice questions, 2 hours	50%	1, 2 and 4	Material from week 1 to week 12 (inclusive)	TBC	N/A	Upon release of final results

You will be assessed by a final examination as well as your continuous participation in completing two major web-based assignments. They may involve calculations, descriptive material and discussions. The assessments are based to allow you to obtain an understanding of the material being taught and will allow you to apply the concepts learnt in the course.

In order to achieve a PASS (PS) in this course, you need to both achieve a total mark of **at least 50%**.

## Assignments

The assignments will be posted on Moodle or handed out in class and a reminder announcement made about due date 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

### *Record of meetings*

Student teams are expected to meet regularly (at least once a week) to discuss the progress of their assignment. Each team meeting should be chaired by the chairman and the weekly progress needs to be recorded in a properly formatted minute (minute template will be provided on Moodle). The minute needs to be uploaded on Moodle weekly so the course instructor can assess the team progress on regular basis.

Team must show in their weekly minutes:

- Timely interaction with your team members.
- Evidence that your contributions help the team focus on the core issues and solutions.
- Identification of key facts and the integration of those facts in a logical development
- Clarity of communication—this includes development of a clear and orderly structure and the highlighting of core arguments

### *Presentation*

All 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*

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 [student.unsw.edu.au/special-consideration](http://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.

### *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**

There will be a two (2) hour final examination scheduled at the end of session, covering all material and all chapters in the prescribed textbook.

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see the [Exams](#) section on the intranet.

### *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](http://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 School [intranet](#), and the information on UNSW's [Special Consideration page](#).

## 6. Expected resources for students

The prescribed textbook for this course is:

S. Thomas, Foster, *Managing Quality: Integrating the Supply Chain: International Edition* (5e), Pearson Higher Ed, 2012. ISBN: 9780273768258.

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.pearson.com.au/products/D-G-Foster/Managing-Quality-Integrating-the-Supply-Chain-International-Edition/9780273768258?R=9780273768258>

You can find a limited number of the prescribed textbook (3<sup>rd</sup> edition) from the UNSW library. You may browse for the location and availability of the textbook via:

<https://www.library.unsw.edu.au/>

## 7. 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 having record of meetings for both major assignments so that student teams can keep track of their weekly progress. In addition, teams can flag team related issues earlier to avoid work contribution conflict toward the assignment due date.

## 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 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](http://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](#).

## 9. Administrative matters

All students are expected to read and be familiar with School guidelines and policies, 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)
- [Academic Honesty and Plagiarism](#)
- [Student Equity and Disabilities Unit](#)
- [Health and Safety](#)
- [Student Support Services](#)

*Erik van Voorthuysen and Ron Chan  
February 2017*

## Appendix A: Engineers Australia (EA) Stage 1 Competencies for Professional Engineers

	<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