



## UNSW Course Outline

# GSOE9810 Process and Product Quality in Engineering - 2024

Published on the 02 Feb 2024

## General Course Information

**Course Code :** GSOE9810

**Year :** 2024

**Term :** Term 1

**Teaching Period :** T1

**Is a multi-term course? :** No

**Faculty :** Faculty of Engineering

**Academic Unit :** School of Mechanical and Manufacturing Engineering

**Delivery Mode :** Multimodal

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Postgraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

This course introduces the foundation of quality management within an engineering context. It covers the basic theories of quality management as well as the methods and tools for improved product and process design and statistical process control. Since quality management covers all

functions within an organisation, the course takes a holistic and integrated approach to identifying and solving quality issues across the organisation as well as from the point of view of the supply chain in which the organisation is a participant. 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.

## Course Aims

This course is designed to cover the core concepts and dynamic approaches in quality engineering. These include the evolution of quality theory and strategic thinking within a quality context, the multi-dimensional nature of the definition of quality, the traditional seven basic methods and the seven new methods for quality improvement as well as statistical theory in terms of acceptance sampling, statistical process control for variables and statistical quality and process control for attributes. Today's organizations 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 organization's quality value chain including the entire supply chain.

## Relationship to Other Courses

N/A

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : State what an organisation needs to do to remain competitive from a quality perspective in today's manufacturing environment
CLO2 : State how an organisation can improve its products and processes in a systematic and integrated manner using information driven analysis techniques and strategies
CLO3 : Be able to determine whether a process is capable of producing a product or service to conformance specifications.
CLO4 : Be able to integrate cross-functional strategies and processes such as issue analysis, design structure matrix methods, total quality management, Six-Sigma, and benchmarking into organisations.

Course Learning Outcomes	Assessment Item
CLO1 : State what an organisation needs to do to remain competitive from a quality perspective in today's manufacturing environment	<ul style="list-style-type: none"> <li>• Online Quiz</li> <li>• Quality Strategy Assignment</li> <li>• Statistical Process Control Assignment</li> <li>• Final Exam</li> </ul>
CLO2 : State how an organisation can improve its products and processes in a systematic and integrated manner using information driven analysis techniques and strategies	<ul style="list-style-type: none"> <li>• Online Quiz</li> <li>• Quality Strategy Assignment</li> <li>• Statistical Process Control Assignment</li> <li>• Final Exam</li> </ul>
CLO3 : Be able to determine whether a process is capable of producing a product or service to conformance specifications.	<ul style="list-style-type: none"> <li>• Online Quiz</li> <li>• Quality Strategy Assignment</li> <li>• Statistical Process Control Assignment</li> <li>• Final Exam</li> </ul>
CLO4 : Be able to integrate cross-functional strategies and processes such as issue analysis, design structure matrix methods, total quality management, Six-Sigma, and benchmarking into organisations.	<ul style="list-style-type: none"> <li>• Online Quiz</li> <li>• Quality Strategy Assignment</li> <li>• Statistical Process Control Assignment</li> <li>• Final Exam</li> </ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

## Additional Course Information

Lectures and tutorials will be held in face-to-face mode for this course in T1, 2024. Lecture videos will be posted on Moodle after the lecture for you to watch or revise them in your own time. Tutorials will be held synchronously (in real time) and you are encouraged to attend these.

## Assessments

### Assessment Structure

Assessment Item	Weight	Relevant Dates
Online Quiz Assessment Format: Individual	5%	Start Date: Week 4 commencing at 3:00PM Due Date: Week 4 finishing at 4:00pm
Quality Strategy Assignment Assessment Format: Group	20%	Start Date: Not Applicable Due Date: 5pm Friday Week 7
Statistical Process Control Assignment Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: 5pm Friday, Week 10
Final Exam Assessment Format: Individual	50%	Start Date: Refer to Term 1 Exam Timetable Due Date: Refer to Term 1 Exam Timetable

# **Assessment Details**

## **Online Quiz**

### **Assessment Overview**

**Assessment length:** 1 hour

The online quiz covers critical material from early in the course and will focus on the key definitions, theory and concepts of Quality Management.

### **Assessment criteria**

The quiz will be conducted online and will be of one (1) hour in duration. The format of the quiz consists of multiple choice, calculations and short answer questions.

### **Additional details**

Each student gets one attempt to complete the quiz within the 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.

### **Course Learning Outcomes**

- CLO1 : State what an organisation needs to do to remain competitive from a quality perspective in today's manufacturing environment
- CLO2 : State how an organisation can improve its products and processes in a systematic and integrated manner using information driven analysis techniques and strategies
- CLO3 : Be able to determine whether a process is capable of producing a product or service to conformance specifications.
- CLO4 : Be able to integrate cross-functional strategies and processes such as issue analysis, design structure matrix methods, total quality management, Six-Sigma, and benchmarking into organisations.

### **Detailed Assessment Description**

#### **Assessment Length**

1 hour

#### **Assessment information**

Details will be posted on TEAMS. Each student gets ONE attempt to complete the quiz within the set time limit. The quiz will automatically shut down at 4:00pm, regardless of the time the quiz

was started. 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.

## Quality Strategy Assignment

### Assessment Overview

**Assessment length:** 4 pages of typewritten text maximum

A quality management case study forms the basis for identifying and understanding engineering quality issues and problems and students are to critically analyse these issues against various drivers (customer requirements, competitors, regulations, organisational skills and capabilities etc.) and to generate appropriate and innovative solutions (hypotheses) to these issues.

You will conduct a detailed issue analysis as a team, and in addition, each team member is to write 150 words giving a reflection of how the team worked together, what worked well and what did not work so well. How would you improve the process of Issue Analysis for your team?

The assignment will be marked according to the rubric described below. Marks will be awarded for constructing an effective Issue Analysis - the purpose of which is to identify critical quality issues for the case study described in the assignment. This means that key issues need to be identified as well as a path to solving them. This involves identifying solutions or hypotheses as well as what information, knowledge and understanding is required to prove that these solutions may succeed.

An Issue Analysis consists of five (5) key elements and each of these elements carry equal weight and need to be carefully thought through and documented. They are:

1. Identification of Issues. Some issues will be obvious and even explicit. Many important issues and subissues may not be.
2. Development of Hypotheses. This element asks for creativity, innovation and insight in terms of what degrees of freedom you can identify and what may solve the issues identified in Part 1.
3. What information, knowledge and understanding do you need to have in order to prove or disprove your Hypotheses? This is the start of the analysis phase. This can be considered a

critical part of deductive reasoning.

4. Analysis. How will you get this information. You do not have to actually perform the analysis but you do have to identify what analysis you will perform, based on what you have learned in the course so far.

5. Data. What data will be analysed and where will this data come from?

6. The individual reflection will be marked based on the insight provided into how the team performed and how well the issue analysis was carried out and what the team member would propose to do differently next time in order to improve the outcome of the issue analysis.

Feedback will be provided to the class as part of a class discussion after submission and individual feedback is also made available.

### **Course Learning Outcomes**

- CLO1 : State what an organisation needs to do to remain competitive from a quality perspective in today's manufacturing environment
- CLO2 : State how an organisation can improve its products and processes in a systematic and integrated manner using information driven analysis techniques and strategies
- CLO3 : Be able to determine whether a process is capable of producing a product or service to conformance specifications.
- CLO4 : Be able to integrate cross-functional strategies and processes such as issue analysis, design structure matrix methods, total quality management, Six-Sigma, and benchmarking into organisations.

### **Detailed Assessment Description**

Student will be working in a group of 4-5 members. The page limit of 4 pages of typewritten text applies to the group report only. Individual reports are limited to 200 words per person.

### **Assessment Length**

4 pages of typewritten text maximum

### **Submission notes**

A link will be provided on Moodle for submission

### **Assessment information**

Details of the assignment will be posted on TEAMS and Moodle. The group report will be submitted via Moodle and the individual section of this report will also be submitted via Moodle.

# Statistical Process Control Assignment

## Assessment Overview

Students are required to analyse a large dataset containing process performance and quality data and to apply appropriate statistical methods to identify the nature and extent of the problems and issues and to use this analysis to suggest improvements to the process.

## Assessment criteria

The marks will be allocated as follows:

1. Executive Summary (3 marks)
2. Data visualisation of the data provided in the case study (5 marks)
3. Statistical Process Control - analysis and results (5 marks).
4. Analysis of Process Capability (5 marks)
5. Identification of Key Process Drivers (3 marks)
6. Completion of the Issue Analysis and development of a contingent and coherent quality strategy for the business (3 marks)

The length of submission should be limited to six (6) pages of typewritten text. Since this is the final assignment for this course, marks will be returned upon release of results, at which point individual feedback will also be available.

## Course Learning Outcomes

- CLO1 : State what an organisation needs to do to remain competitive from a quality perspective in today's manufacturing environment
- CLO2 : State how an organisation can improve its products and processes in a systematic and integrated manner using information driven analysis techniques and strategies
- CLO3 : Be able to determine whether a process is capable of producing a product or service to conformance specifications.
- CLO4 : Be able to integrate cross-functional strategies and processes such as issue analysis, design structure matrix methods, total quality management, Six-Sigma, and benchmarking into organisations.

## Submission notes

A link will be provided on Moodle for you to submit the assignment

## Assessment information

Student will be working in a group of 4-5 members. The page limit of 6 pages of typewritten text applies to the group report. Assignment details will be posted on TEAMS and Moodle.

## **Final Exam**

### Assessment Overview

The final exam covers all material taught in the course. It will be an online exam consisting of multiple choice as well as calculation questions. The duration of the exam is two (2) hours.

### Assessment criteria

The exam will consist of multiple-choice questions as well as questions requiring you to enter numerical results. In each case, there will be only one correct answer.

### Course Learning Outcomes

- CLO1 : State what an organisation needs to do to remain competitive from a quality perspective in today's manufacturing environment
- CLO2 : State how an organisation can improve its products and processes in a systematic and integrated manner using information driven analysis techniques and strategies
- CLO3 : Be able to determine whether a process is capable of producing a product or service to conformance specifications.
- CLO4 : Be able to integrate cross-functional strategies and processes such as issue analysis, design structure matrix methods, total quality management, Six-Sigma, and benchmarking into organisations.

### Assessment information

The Final Exam will be held during the exam period set by UNSW.

## **General Assessment Information**

In addition to a short quiz in Week 4, the main assessments consist of two written assignments and a final exam. Assignment 1 focuses on a quality management case study that forms the basis for identifying and understanding engineering quality issues and problems. Students are to critically analyse these issues against various drivers (customer requirements, competitors, regulations, organisational skills and capabilities etc) and generate appropriate and innovative solutions (hypotheses) to these issues. The first assignment also contains an individually marked component. For Assignment 2, students are required to analyse a large dataset containing process performance and quality data and to apply appropriate statistical methods to identify the nature and extent of the problems and to use this analysis to suggest improvements to the process.

The assignments will be posted on Moodle and a reminder announcement will be made about the 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.

### Grading Basis

Standard

## Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 5 February - 11 February	Other	No activities scheduled for O-Week
Week 1 : 12 February - 18 February	Lecture	Perspectives and scope of Quality Engineering and Issue analysis. Chapter 1 and Lecture notes.
	Other	Formation of Teams and Administration
Week 2 : 19 February - 25 February	Lecture	Quality Theory and KFS analysis. Chapter 2 and Lecture notes.
	Tutorial	Tutorial Discussion of the FEDEX case study. Introduction to Assignment 1.
Week 3 : 26 February - 3 March	Lecture	Global Supply Chain Quality, Quality Standards. Chapter 3 and 8 and Lecture notes.
	Tutorial	Case Study discussion. Details will be posted on Moodle.
Week 4 : 4 March - 10 March	Lecture	Introduction to Statistics and Minitab.
	Assessment	Online quiz worth 5% of the total course mark will be held this week.
Week 5 : 11 March - 17 March	Lecture	Strategic Quality Planning and Design Theory. (Chapter 4 of the textbook and lecture notes).
	Tutorial	Assignment support and if time allows, Axiomatic Design and VDI-2221 case study
Week 6 : 18 March - 24 March	Lecture	Voice of the Customer and Voice of the Market.
	Tutorial	Assignment 1 support.
Week 7 : 25 March - 31 March	Lecture	Acceptance Sampling Theory and the Operating Characteristic Curve. Chapter 5,6, 7 and Lecture notes. The Tools of Quality. Chapter 9,10 Lecture notes and Supplement online material .
	Tutorial	Assignment 1 support prior to submission. Assignment 1 is due Friday this week.
Week 8 : 1 April - 7 April	Lecture	Statistical Process Control I. Chapter 11 and Lecture notes.
	Tutorial	Questions on variable control charts Assignment II discussion. Questions on Acceptance Sampling, Basic and New 7 tools.
Week 9 : 8 April - 14 April	Lecture	Statistical Process Control II. Chapter 12 and Lecture notes.
	Tutorial	Questions on attribute control charts and capability analysis.
Week 10 : 15 April - 21 April	Lecture	Six-Sigma Management and Tools, Revision. Chapter 13 and Lecture notes.
	Tutorial	Assignment II Support prior to submission. Assignment 2 is due Friday this week.

## Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

# Course Resources

## Prescribed Resources

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:

S. Thomas, Foster, Managing Quality: Integrating the Supply Chain: International Edition (6e), Pearson Higher Ed, 2012. ISBN: 9780273768258.

You can purchase the eBook version directly from the publisher at: <https://www.pearson.com.au>

The print version is available from the UNSW bookstore: <https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9781292154213>

UNSW Library website: <https://www.library.unsw.edu.au/>

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

## Recommended Resources

Not available

## 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.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Dr Erik van Voorthuysen		ME507	9385 4147	During and immediately after tutorials, on Moodle, Teams and by appointment	No	Yes
Lecturer	Dr Ron Chan		ME507	9385 1535	During and immediately after tutorials, on Moodle, Teams and by appointment	No	No

# Other Useful Information

## Academic Information

### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

### II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

### III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

### IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

## 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, visit: <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.

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 or contract cheating) 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)

## **Submission of Assessment Tasks**

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) 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. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be 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 will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

### **Faculty-specific Information**

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

### **Phone**

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School-specific Information

### Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

### Review of Results

The purpose of a review of results is if there was a marking error. Review of results is for when you have cause to believe that there is a marking error. Review of Results cannot be used to get feedback. If you would like feedback for assessments prior to the final exam, you are welcome to contact the course convenor directly. No feedback will be provided on final exams.

### Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

## School Contact Information

### Location

UNSW Mechanical and Manufacturing Engineering

Ainsworth building J17, Level 1

Above Coffee on Campus

### Hours

9:00–5:00pm, Monday–Friday\*

\*Closed on public holidays, School scheduled events and University Shutdown

## Web

[School of Mechanical and Manufacturing Engineering](#)

[Engineering Student Support Services](#)

[Engineering Industrial Training](#)

[UNSW Study Abroad and Exchange \(for inbound students\)](#)

[UNSW Future Students](#)

## Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

(+61 2) 9385 4097 – School Office\*\*

\*\*Please note that the School Office will not know when/if your course convenor is on campus or available

## Email

[Engineering Student Support Services](#) – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

## School Office – School general office administration enquiries

- NB: the relevant teams listed above must be contacted for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

## Important Links

- [Student Wellbeing](#)
- [Urgent Mental Health & Support](#)
- [Equitable Learning Services](#)
- [Faculty Transitional Arrangements for COVID-19](#)
- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)