ENGG*4050 Quality Control

01

Winter 2020
Section(s): C01

School of Engineering
Credit Weight: 0.50
Version 1.00 - January 05, 2020

---

1 Course Details

1.1 Calendar Description

The basic techniques and regulations surrounding quality control in a generic manufacturing environment are covered. The topics covered include: total quality management including relevant ISO regulations, six sigma, reliability, statistical process control, acceptance sampling and 2k factorial design of experiments.

Pre-Requisites: STAT*2120

1.2 Course Description

The main goal of this course is teach you total quality management, the use of process control charts, acceptance sampling and process capability.

1.3 Timetable

Lectures:

Monday	03:30PM- 4:20PM	ROZH 102
Wednesday	03:30PM - 4:20PM	ROZH 102
Friday	03:30PM - 4:20PM	ROZH 102

Tutorials:

Monday	0101	12:30PM - 02:20PM	MCKN 233
Friday	0102	08:30AM - 10:20AM	ALEX 028
Friday	0103	12:30PM - 02:20PM	ALEX 028

1.4 Final Exam

April 8, 7:00 – 9:00 pm, Room TBA on Webadvisor

---

2 Instructional Support

2.1 Instructional Support Team

Instructor: Jhantu Kumar Saha Ph.D., EIT
Email: jsaha@uoguelph.ca
Telephone: +1-519-824-4120 x53385
Office: THRN 2361
Office Hours: TBA on CourseLink or by appointment

2.2 Teaching Assistants

Teaching Assistant: Dolapo Obimuyiwa
Email: dobimuyi@uoguelph.ca
Office Hours: TBA on CourseLink or by appointment

Teaching Assistant: Jyothi Shiva Swaraj Vutukuru
Email: jvutukur@uoguelph.ca
Office Hours: TBA on CourseLink or by appointment

---

3 Learning Resources

3.1 Required Resources

Courselink (Website)
https://courselink.uoguelph.ca
Course material, news, and announcements will be regularly posted to the ENGG*4050 Courselink site. You are responsible for checking the site regularly.

Introduction to Statistical Quality Control (Textbook)
Montgomery, Douglas C, Eighth Edition, Wiley, 2019.

3.2 Additional Resources

Lecture Information (Notes)
All the lecture notes will be posted on the web page (week #1-#12).

Assignments (Notes)
Download the assignments, all the solutions will be posted.

Miscellaneous Information (Other)
Other information may also be posted on the web page.

---

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Apply the concepts of Total Quality Management including use of tools such as Pareto Charts, scatter diagrams, etc.
2. Identify sources and types of variation affecting a process.
3. Identify the appropriate Statistical Process Control Chart.
4. Design a Statistical Process Control Chart with appropriate parameters to meet the needs of the organization/process.
5. Evaluate whether a process is in Statistical Control.
6. Design an appropriate Acceptance Sampling Plan.
7. Evaluate whether a lot is acceptable or unacceptable based on acceptance sampling plans.
8. Utilize knowledge of Process Capability to determine whether a process is capable.
9. Apply concepts of 2k Factorial Design

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1, 2, 3, 7, 8
1.1	Recall, describe and apply fundamental mathematical principles and concepts	1, 2, 3, 7, 8
1.2	Recall, describe and apply fundamental principles and concepts in natural	1, 2, 3, 7, 8

#	Outcome	Learning Outcome
	science	
1.3	Recall, describe and apply fundamental engineering principles and concepts	1, 2, 3, 7, 8
1.4	Recall, describe and apply program-specific engineering principles and concepts	1, 2, 3, 7, 8
2	Problem Analysis	1, 2, 3, 4, 5, 6, 7, 8, 9
2.1	Formulate a problem statement in engineering and non-engineering terminology	1, 2, 3, 4, 5, 6, 7, 8, 9
2.2	Identify, organize and justify appropriate information, including assumptions	1, 2, 3, 4, 5, 6, 7, 8, 9
2.3	Construct a conceptual framework and select an appropriate solution approach	1, 2, 3, 4, 5, 6, 7, 8, 9
2.4	Execute an engineering solution	1, 2, 3, 4, 5, 6, 7, 8, 9
2.5	Critique and appraise solution approach and results	1, 2, 3, 4, 5, 6, 7, 8, 9
3	Investigation	1
3.3	Analyze and interpret experimental data	1
4	Design	4, 6
4.1	Describe design process used to develop design solution	4, 6
4.2	Construct design-specific problem statements including the definition of criteria and constraints	4, 6
4.3	Create a variety of engineering design solutions	4, 6
4.4	Evaluate alternative design solutions based on problem definition	4, 6
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	4, 6
5	Use of Engineering Tools	1, 5, 7
5.1	Select appropriate engineering tools from various alternatives	1, 5, 7

#	Outcome	Learning Outcome
5.2	Demonstrate proficiency in the application of selected engineering tools	1, 5, 7
5.3	Recognize limitations of selected engineering tools	1, 5, 7
10	Ethics & Equity	1
10.1	Summarize ethical theories and equity, diversity, and inclusivity principles	1
10.2	Determine an ethical course of action by applying ethical theories and the PEO Code of Ethics	1
10.3	Demonstrate values consistent with good ethical practice, including equity, diversity, and inclusivity	1
12	Life Long Learning	1, 2, 3, 4, 5, 6, 7, 8, 9
12.1	Identify personal career goals and opportunities for professional development	1, 2, 3, 4, 5, 6, 7, 8, 9
12.2	Self-assess skills relative to career goals and SOE defined learning outcomes	1, 2, 3, 4, 5, 6, 7, 8, 9
12.3	Demonstrate capability for continuous knowledge and skill development in a changing world	1, 2, 3, 4, 5, 6, 7, 8, 9

4.3 Relationships with other Courses & Labs

Previous Courses: STAT*2120: Statistical distributions

---

5 Teaching and Learning Activities

5.1 Lecture

Topics: Total Quality Management: dimensions of quality, costs of poor quality
Learning Outcome: 1

Topics: Six Sigma, the DMAIC Process, Analytical Tools: flow chart, run chart, Pareto analysis, checksheet, histogram, cause & effect diagram
Learning Outcome: 1

Topics: Reliability: product reliability, failure rates
Learning Outcome: 1

Topics:	Statistical Process Control: tools, Sources and types of Variation, Ways to use control charts
Learning Outcome:	2, 3, 4, 5
Topics:	Control Charts for Variables (x-bar and R chart)
Learning Outcome:	2, 3, 4, 5
Topics:	Control Charts for Attributes (p, np, c, u)
Learning Outcome:	2, 3, 4, 5
Topics:	Process Capability Analysis
Learning Outcome:	8
Topics:	CUSUM and Exponentially Weighted Moving Average Control Charts
Learning Outcome:	3, 4, 5
Topics:	Engineering Process Control and SPC
Topics:	Acceptance Sampling: Inspection (when to inspect), Sampling (how much to inspect)
Learning Outcome:	6
Topics:	Sampling Plans: single-sampling plans, double-, multiple-sampling plans, acceptable quality level (AQL), lot tolerance proportion defective (LTPD), operating characteristic curve, average outgoing qua
Learning Outcome:	6, 7
Topics:	Designing sampling plans for attributes using Military Standard 105E
Learning Outcome:	6, 7
Topics:	Design of Experiments, 2k factorial design
Learning Outcome:	9

5.2 Other Important Dates

Monday, January 6, 2020: Classes commence

Monday, February 17 – Friday, February 21, 2020: Winter Study Break

Friday, April 3, 2020: Classes conclude, Last day to drop

---

6 Assessments

6.1 Assessment Details

Midterm test 1 (18%)
Date: Mon, Jan 27, 3:30 PM, in class
Learning Outcome: 1, 2
duration 40 minutes

Midterm test 2 (18%)
Date: Mon, Mar 2, 3:30 PM, in class
Learning Outcome: 2, 3, 4, 5
duration 40 minutes

Midterm test 3 (18%)
Date: Mon, Mar 23, 03:30 PM, in class
Learning Outcome: 4, 5, 8
duration 40 minutes

Final Exam (46%)
Date: Wed, Apr 8, 7:00 PM - 9:00 PM, Room TBA on Webadvisor
Learning Outcome: 6, 7, 9

6.2 Disclaimer

The instructor reserves the right to change any of the above mid-term dates in the event of appropriate circumstances, subject to University of Guelph Academic Regulations

---

7 Course Statements

7.1 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: In order to pass the course, you must obtain a grade of 50% or higher in the course.

Missed midterm tests: If you miss a test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam. There will be no makeup midterm tests.

8 School of Engineering Statements

8.1 Instructor's Role and Responsibility to Students

The instructor’s role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

8.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars
