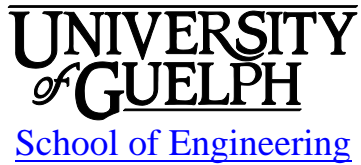# ENGG*4050 Quality Control
Winter 2015

UNIVERSITY of GUELPH

School of Engineering

(Revision 0: January 5, 2015)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Soha Eid Moussa, Ph.D., P.Eng.
Office: THRN 1341, ext. 56141
Email: smoussa@uoguelph.ca
Office hours: Open door policy or by appointment

1.2 Lab Technician

Technician: NA
Office:
Email:

1.3 Teaching Assistants

GTA	Email	Office Hours
Farhad Shafigh	shafigh@uoguelph.ca	TBA on Courselink
Abdul-Rahman El-Sayed	elsayeda@uoguelph.ca	TBA on Courselink

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, and announcements will be regularly posted to the ENGG*4050 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources

1. Montgomery, Douglas C, <u>Introduction to Statistical Quality Control</u>, Seventh Edition, Wiley, 2013.

   An electronic version of this book may be rented/accessed at the following web site:
   http://www.coursesmart.com/IR/4030454/9781118146811?__hdv=6.8

2.3 Recommended Resources

1. NA

2.4 Additional Resources

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

Lab Information: NA

Assignments: Download the assignments, all the solutions will be posted.

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

2.5 Communication & Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

3 ASSESSMENT

3.1 Dates and Distribution

Midterm test 1: 25%
> Thursday Feb 5, 2:30-3:50, duration 60 minutes, Room TBA on Courselink

Midterm test 2: 25%
> Thursday March 12, 2:30-3:50, duration 60 minutes, Room TBA on Courselink

Final Exam: 50%
> April 10, 11:30 – 1:30, Room TBA on Webadvisor

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*

3.2 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.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

The basic techniques and regulations surrounding quality control in a generic manufacturing environment are covered. The topics covered include the statistics of sampling, sampling rates and measurements. Destructive and non destructive methodologies of product examination are

discussed. The student is exposed to relevant ISO and related regulations, and through case studies is given the opportunity to see how these regulations are implemented in local industries.

Prerequisite(s): **STAT 2120** – Introductory Probability and Statistics

4.2 Course Aims

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

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability 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 2^k Factorial Design

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 3 7, 8	Midterms, Exams
2. Problem Analysis	1, 2, 3, 4, 5, 6, 7, 8, 9	Midterms, Exams
3. Investigation	-	-
4. Design	4, 6	Midterms, Exams
5. Use of Engineering Tools	1, 5, 7	Midterms, Exams
6. Communication	-	-
7. Individual and Teamwork	-	-
8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	-	-

10. Ethics and Equity	1	-
11. Environment, Society, Business, & Project Management	-	-
12. Life-Long Learning	1, 2, 3, 4, 5, 6, 7, 8, 9	-

4.5   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/D2L but these are not intended to be stand-alone course notes. 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 project.

4.6   Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. 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.

4.7   Relationships with other Courses & Labs

Previous Courses:

STAT*2120: Statistical distributions

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5   TEACHING AND LEARNING ACTIVITIES

5.1   Timetable

Lectures:
Tuesday		2:30 – 3:50	RICH 2529
Thursday		2:30 – 3:50	RICH 2529

Tutorials:
Wednesday	3268	11:30 – 1:20	MCKN 238
Wednesday	3269	3:30 – 5:20	MCKN 237

5.2 Lecture Schedule: *The proposed schedule of topics is shown below.*

Topic	Learning Objectives
Total Quality Management: dimensions of quality, costs of poor quality	1
Six Sigma, the DMAIC Process, Analytical Tools: flow chart, run chart, Pareto analysis, checksheet, histogram, cause & effect diagram	1
Reliability: product reliability, failure rates	1
Statistical Process Control: tools, Sources and types of Variation, Ways to use control charts	2, 3, 5
Control Charts for Variables (x-bar and R chart)	3, 4, 5,
Control Charts for Attributes (p, np, c, u)	3, 4, 5
Process Capability Analysis	8
CUSUM and Exponentially Weighted Moving Average Control Charts	3, 4, 5
Engineering Process Control and SPC	3, 4, 5
Acceptance Sampling: Inspection (when to inspect), Sampling (how much to inspect)	6, 7
Sampling Plans: single-sampling plans, double-, multiple-sampling plans, acceptable quality level (AQL), lot tolerance proportion defective (LTPD), operating characteristic curve, average outgoing quality (AOQ), average sample number (ASN)	6, 7
Designing sampling plans for attributes using Military Standard 105E	6, 7
Design of Experiments, 2^k factorial design	9

5.3 Design Lab Schedule

NA

5.4 Lab Schedule

NA

5.5 Other Important Dates

Monday, January 5 2015: First day of class
Monday, February 16 – Friday, February 20 2015: Winter Study Break
Friday, March 6 2015: drop date – 40th class day
Thursday, April 2 2015: last day of class

6 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.

If the laboratory rules are not followed, consequences will include removing student's access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

7 ACADEMIC MISCONDUCT

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 discourages misconduct. 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.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

9 RECORDING OF MATERIALS

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

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index