

## Course Outline

### 1. COURSE INFORMATION

<b>Session Offered</b>	Winter 2021	
<b>Course Name</b>	Quality Control and Assurance Methods	
<b>Course Code</b>	MANTECH 3LS3	
<b>Date(s) and Time(s) of lectures</b>	Monday Jan 6 <sup>th</sup> to Monday Apr 6 <sup>th</sup> 2020. 6:30-9:30 pm	
<b>Program Name</b>	Manufacturing Engineering Technology	
<b>Calendar Description</b>	<i>Formerly MANTECH 4LS3</i> Detail understanding of Six sigma, Kaizen, KANBAN, supply chain and outsourcing. Concepts on planning, measurement, control, improvement of quality, analysis of variation and sampling techniques.	
<b>Instructor(s)</b>	Lynn McNeil	E-Mail: mcneil2@mcmaster.ca Office Hours & Location: On-line, Mon. after 4:30 pm

### 2. COURSE SPECIFICS

<b>Course Description</b>			
<b>Instruction Type</b>	<b>Code</b>	<b>Type</b>	<b>Hours per term</b>
	C	Classroom instruction	36
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	3
	DE	Distance education	
	<b>Total Hours</b>		39
<b>Resources</b>	<b>ISBN</b>	<b>Textbook Title &amp; Edition</b>	<b>Author &amp; Publisher</b>
	9781118146811	Introduction to Statistical  Quality Control 7 <sup>th</sup> edition	Douglas C Montgomery, John Wiley & Sons
	<b>Other Supplies</b>	<b>Source</b>	
	<ul style="list-style-type: none"> <li>• Minitab® Statistical Software</li> <li>• Quality Trainer®</li> <li>• Laptop</li> <li>• Calculator with statistics functions (Casio)</li> </ul>	-access to licensed version on ETB server  -web access, registration provided -bookstore or other -bookstore or other	
<b>Prerequisite(s)</b>			
<b>Corequisite(s)</b>			
<b>Antirequisite(s)</b>			
<b>Course Specific Policies</b>	This course will be using a range of software. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and		

	<p>program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.</p> <p>The instructor may also use other software including: e-mail, Avenue, LearnLink, web pages, capa, Moodle, Thinking Cap, etc.</p> <p>It is expected that students read session materials prior to class. Students are expected to actively participate during class sessions.</p> <p>Late assignments will not be accepted. One tutorial assignment mark will be dropped from the semester. If an MSAF was submitted for an assignment, the associated assignment becomes the dropped mark.</p> <p>Late projects will not be accepted.</p> <p>MSAF is not permissible for weights on evaluation that are greater than or equal to 25% (Midterm, Final exam). Any attempt to submit a falsified MSAF for this course for a missed test or midterm exam constitutes academic dishonesty and charges may be filed with the Office of Academic Integrity</p>	
<b>Departmental Policies</b>	<p>Students must maintain a GPA of 3.5/12 to continue in the program.</p> <p>In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of “out-of-class” work for every scheduled hour in class. “Out-of-class” work includes reading, research, assignments and preparation for tests and examinations.</p> <p>Where group work is indicated in the course outline, such collaborative work is mandatory.</p> <p>The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception.</p> <p>Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class.</p> <p>Instructor has the right to submit work to software to identify plagiarism.</p>	
<b>3. SUB TOPIC(S)</b>		
Week 1	Quality Management frameworks, Quality systems and standards including ISO, Six Sigma/DMAIC  Introduction to Minitab and Quality Trainer	Chp 1 &2
Week 2	Fundamental statistical methods part 1 -graphing and interpreting data -descriptive statistics	Chp: 3, 3.1-3.4 QT: 1-3

	<ul style="list-style-type: none"> <li>-probability models</li> <li>-sampling distributions (part 1)</li> <li>Using Minitab for statistical methods</li> </ul>	
Week 3	Fundamental statistical methods part 2 <ul style="list-style-type: none"> <li>-sampling distributions (cont'd)</li> <li>-confidence intervals (cont'd)</li> <li>-hypothesis testing</li> <li>-statistical inferences (t-tests, ANOVA)</li> </ul>	Chp: 4 QT: 6-7 Lab 1: (Review of Statistical Methods)
Week 4	Design of Experiments part 1 <ul style="list-style-type: none"> <li>-Overview of Experimental Design (purpose, objectives and outputs)</li> <li>-Steps in designing experiments</li> <li>-Examples of designed experiments for process/product improvement including planning, execution, analysis and data synthesis</li> <li>DOE Project overview</li> </ul>	Chp: 13 QT: 9.1 Quiz based on Lab 1
Week 5	Design of Experiments part 2 – Factorial experiments <ul style="list-style-type: none"> <li>-detailed set-up and analysis of two-level factorial experiment</li> <li>-determining main effects and interactions effects</li> <li>-calculating standard errors</li> <li>-producing and interpreting ANOVA tables</li> <li>Using Minitab for factorial designs</li> </ul>	Chp 13 QT: 9.2-9.3 Lab 2: Factorial Experiments
Week 6	Midterm Recess: Monday, February 15 to Sunday, February 21	
Week 7	Design of Experiments part 3 – Factorial experiments cont'd <ul style="list-style-type: none"> <li>-deriving model equations from DOE</li> <li>-blocking and confounding</li> <li>-<math>2^k</math> factorial experimental design</li> <li>-fractional factorial designs</li> <li>Using Minitab for fractional factorial designs</li> </ul>	Chp 13 QT: 9.4 Quiz Base on Lab 2 Lab 3: Fractional Factorial Experiments
Week 8	MIDTERM 2 hours , core class is cancelled On-line	
Week 9	Statistical Process Control (SPC) Overview <ul style="list-style-type: none"> <li>-assignable and chance causes in variation</li> <li>-structure and elements of the control chart</li> <li>-control limits</li> <li>-out of control action plans (OCAPs)</li> <li>-the 'Magnificent seven' quality tools</li> <li>-implementation of SPC</li> </ul>	Chp: 5 Quiz based on Lab 3
Week 10	Control Charting for Variables <ul style="list-style-type: none"> <li>-determining control limits</li> <li>-developing and producing control charts for variables</li> <li>-interpreting control charts</li> <li>-determining process capability</li> </ul>	Chp: 6 QT: 4.1-4.2 Lab 4: SPC Variable Charts

	-Shewhart control chart for individual measurements Using Minitab to construct control charts and assess process capability	
Week 11	Control charts for Attributes -developing and producing control charts for attributes -interpreting control charts Using Minitab to construct control charts for attributes -introduction to process capability	Chp: 7 QT: 4.3-4.4, 5 Quiz base on Lab 4 Lab 5: SPC Attribute Charts <b>DOE PROJECT DUE</b>
Week 12	Process and Measurement System Capability -constructing process capability histograms -determining process capability ratios -producing and interpreting process capability control charts -determining gauge and measurement systems capability (gauge R&R)	Chp: 8 QT: 5, 8 Quiz based on Lab 5 Gauge R&R Study
Week 13	Process Robustness -response surface methodology for process optimization -overview of Taguchi methods -assessing process robustness	Chp 14
Week 14	Review	<b>Gauge R&amp;R Study due</b>

Classes end: Wednesday, April 14

Final Examination Period: Thursday, April 15 to Friday, April 30

All examinations MUST be written during the scheduled examination period.

Note that this structure represents a plan and is subject to adjustment term by term.

The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

<b>4. ASSESSMENT OF LEARNING *including dates*</b>	<b>Weight</b>
Quality Trainer Module Completion	5%
Minitab Lab – must be submitted on-line	5%
Quizzes base on Minitab Labs: (5 of 6 will be included in final mark)	10%
Mid-term test	25%
Project - DOE	15%
Project – Gauge R&R Study	10%
Final examination (tests cumulative knowledge)	30%
<b>TOTAL</b>	<b>100%</b>
<b>TOTAL</b>	<b>100%</b>

Percentage grades will be converted to letter grades and grade points per the University calendar.

#### **5. LEARNING OUTCOMES**

1. Demonstrate an understanding of Quality Management frameworks including ISO 9000 and Six Sigma.
2. Demonstrate an understanding of statistical process control techniques

3. Design a statistical process control program for assessing and monitoring whether a process is running within acceptable limits
4. Demonstrate an understanding of experimental design and analysis
5. Plan, design, execute and analyze a statistically designed experiment using statistical software
6. Demonstrate an understanding of Quality Management frameworks including ISO 9000 and Six Sigma.

## **6. COURSE OUTLINE – APPROVED ADVISORY STATEMENTS**

### **ANTI-DISCRIMINATION**

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.

[http://www.mcmaster.ca/policy/General/HR/Discrimination\\_Harassment\\_Sexual\\_Harassment-Prevention&Response.pdf](http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf)

### **ACADEMIC INTEGRITY**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>

The following illustrates only three forms of academic dishonesty: The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

### **AUTHENTICITY / PLAGIARISM DETECTION**

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

### **COURSES WITH AN ON-LINE ELEMENT**

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to

this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

#### **ONLINE PROCTORING**

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

#### **COMMUNICATIONS**

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

#### **CONDUCT EXPECTATIONS**

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

#### **ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES**

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

#### **REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK**

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

#### **ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)**

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests. <http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf>

### **COPYRIGHT AND RECORDING**

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

### **EXTREME CIRCUMSTANCES**

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.