

**Course Outline**

**1. COURSE INFORMATION**

<b>Session Offered</b>	Fall 2020	
<b>Course Name</b>	Quality Control and Assurance Methods	
<b>Course Code</b>	GENTECH 3LS3	
<b>Date(s) and Time(s) of lectures</b>	Lecture: Tuesday 7:30-9:30pm Tutorials: Monday 2:30; Tuesday 2:30 and 3:30; Friday 9:30 and 10:30	
<b>Program Name</b>	Automotive and Vehicle Engineering Technology / Automation Engineering Technology / Biotechnology	
<b>Calendar Description</b>	Statistical tools, tests, design and analysis of planned experiments, Taguchi methods, control charts for variables and attributes, capability analysis, acceptance sampling, elements of reliability, quality assurance, ISO 9000 certification.	
<b>Instructor(s)</b>	Karen Lawrence, MSc, LEL	Email: lawrek@mcmaster.ca Office: ETB/204 Office Hours: By appointment only

**2. COURSE SPECIFICS**

<b>Course Description</b>	The course focuses on planning, measurement, control, and improvement of quality using statistical tools, tests and methods such as Design of Experiments (DOE), Taguchi methods, control charts, capability, measurement systems analysis, and acceptance sampling. Quality Management strategies (i.e. Six Sigma) and ISO standards are introduced. Course assessment will include software tutorials, projects, a midterm and a comprehensive final examination.		
<b>Instruction Type</b>	<b>Code</b>	<b>Type</b>	<b>Hours per term</b>
	C	Classroom instruction	
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	
	DE	Distance education	36
		<b>Total Hours</b>	36
<b>Resources</b>	<b>ISBN</b>	<b>Textbook Title &amp; Edition</b>	<b>Author &amp; Publisher</b>
	9781119399308	Introduction to Statistical Quality Control, Enhanced eText, 8 <sup>th</sup> Ed	Douglas C. Montgomery, John Wiley & Sons, Inc.
	<b>Other Supplies</b>		<b>Source</b>
	<ul style="list-style-type: none"> <li>• Minitab® Statistical Software</li> <li>• Quality Trainer®</li> <li>• Scientific calculator w/ stat functions (Casio)</li> </ul>		Download (Avenue) Registration (Avenue) Bookstore
<b>Prerequisite(s)</b>	ENG TECH 2ES3 or 3ES3 and registration in Level III or above in Automotive and Vehicle Engineering Technology; Automation Engineering Technology; Biotechnology		
<b>Corequisite(s)</b>	n/a		
<b>Antirequisite(s)</b>	GENTECH 3TO3 and 4SS3		

**Course Specific Policies**

This course will be using **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 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.

It is expected that students read the material that is coming under discussion **prior to class** and complete assigned homework. Students are expected to actively participate during class sessions offering insight, comment, reinforcement, argument, contrary views and underscoring examples.

**Homework:** Your out-of-class homework includes online *Quality Trainer*<sup>®</sup> modules, chapter exercises, module practice problems, and readings as assigned per module on Avenue. These are the required *minimum preparation* for the quizzes and final exam.

**Minitab<sup>®</sup> Tutorials:** Written instructions on how to use the software, interpret output and connect to statistical concepts. Completed offline as preparation for **quizzes and projects**. The Minitab<sup>®</sup> tutorial instructions are found in the Content area of *Avenue*. The link to download Minitab<sup>®</sup> is found on the course homepage.

**Quizzes:** Online. Dates are given in the *Weekly Timetable*. Assess statistical software competency and conceptual understanding of the topics taught in lecture. One (1) quiz mark will be **dropped**. *NOTE: If an MSAF is submitted for a quiz, that quiz is considered as the dropped mark.* There will be **no make-up/deferred** quizzes. If, in *exceptional documented and communicated circumstances*, a student misses more than one quiz, the value(s) will be applied to the cumulative final examination.

**Projects:** Two group projects are scheduled. Designed to extend course content beyond technical computation and formulation. Late **projects** will receive an **immediate 10% deduction from the assignment mark up to 24 hours past due (when the assignment box closes)**. Assignments that have not been submitted within 24 hours after the due date will not be graded and will receive a mark of ZERO

**Midterm:** Online - restrictions and requirements are included. Format TBD. Please note that there are no make-up or deferred midterm examinations in this course. If, for any reason, a student misses the midterm examination, the weight will be applied to the cumulative final examination (**i.e. a missed midterm exam will result in the cumulative final examination being weighted at 50% of the final grade**).

**Final Exam (cumulative).** Online - restrictions and requirements are included. Format TBD

MSAF is not permissible for weights on evaluations (i.e. midterm, final exam) that are greater than or equal to 25%. Any attempt to submit a falsified MSAF for this course

	<b>for a missed midterm exam constitutes academic dishonesty and charges may be filed with the Office of Academic Integrity.</b>	
<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>	<b>Details found by Module on Avenue and Weekly Timetable</b>	
Week 1	Management strategies, Quality systems and standards (ISO), DMAIC process (Six Sigma)	<b>Quiz 1 (Assignment)</b> Chapter 1-2
Week 2	Review of Statistical Methods for Quality	<b>Quiz 2</b> Chapter 3-4
Week 3	Design of Experiments (DOE): Introduction to Factorial Experiments	Chapter 1
Week 4	Design of Experiments (DOE): Model diagnostics and analysis procedures	<b>Quiz 3</b> Chapter 13
Week 5	Design of Experiments (DOE): Fractional Factorial Experiments	<b>Quiz 4</b> Chapter 13
	<i>Break</i>	
Week 6	Project work: DOE project	<b>Midterm</b>
Week 7	Methods and Philosophy of SPC	<b>DOE Project Due</b> Chapter 5
Week 8	Controls Charts for Variables & Process Capability	<b>Quiz 5</b> Chapter 6
Week 9	Control Charts for Attributes	<b>Quiz 6</b> Chapter 7
Week 10	Process and Measurement System Capability	<b>Quiz 7</b> Chapter 8
Week 11	Project work: Gauge R&R	Chapter 14 Chapter 15-16
Week 12	Process Optimization and robust procedures	<b>Gauge R&amp;R reports due</b>
Week 13	<i>Wrap-up</i>	
<b>Midterm Recess: Monday, October 12 to Sunday, October 18</b> <b>Classes end: Wednesday, December 9</b>		

**Final examination period:** Thursday, December 10 to Wednesday, December 23  
 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.

**ASSESSMENT OF LEARNING \*including dates\***

Tutorials/Quizzes <i>(as scheduled above)</i>	25%
Projects	25%
DOE (proposal 3%, report 12%) <i>{week 7}</i>	
Gauge R&R (report 10%) <i>{week 12}</i>	
Midterm <i>{week 6}</i>	15%
Final Examination {comprehensive} <i>(Exam period)</i>	35%
<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 Strategies and ISO 9000 standards and their complementary function in operations.
2. Apply quality improvement tools in a variety of settings and for a variety of processes.
3. Integrate statistical techniques (DOE, SPC, Capability, MSA) within a framework of quality improvement.
4. Evaluate statistical experiments with the aid of statistical software and verify the benefits and limitations of different types of designs (including Taguchi techniques) with the aid of statistical software.
5. Select appropriate statistical process control tools to determine if a process is running within acceptable industrial standards with the aid of statistical software.
6. Plan, design, perform, analyze and report on a statistically designed experiment with the aid of statistical software. Topic is of student choice.
7. Plan, design, perform, analyze and write a report on Gauge R&R including the determination of variance components and gauge capability. Topic is of student choice.

**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](mailto: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.