

**INDUSTRIAL QUALITY CONTROL
IE330, SPRING 2017**

COURSE INFORMATION

Course Meeting Times: TuTh 9:30-10:50AM
Classroom: 165 Noyes Laboratory
Credit Hours: 3 hours
Course Website: Located at <https://compass2g.illinois.edu/> (access restricted to enrolled students)
Instructor: Douglas M. King, Ph.D. ([dmking@illinois.edu](mailto:dmkng@illinois.edu))
Office Location: 3 Transportation Building
Office Hour*: Wednesday, 2:00-2:50PM

Teaching Assistant: Tinghao Guo (guo32@illinois.edu)
Office Hour*: Monday, 11:00-11:50AM, room 316 Transportation
* - Office hours may also be available by appointment (please arrange by email, providing at least 24-hours of advance notice)

Textbook: "Introduction to Statistical Quality Control" (7th Edition) by Douglas C. Montgomery [US Version]

Course Description: This course is intended to be an introduction to and survey of statistical methods for industrial quality control. A student should complete this course with the ability to understand both the statistical foundations of quality control methods and the procedures for successfully applying them in practice.

Learning Outcomes: Following the completion of this course, students should be able to...
(^{a-k}: ABET outcomes)

- ...connect concepts of quality control to previous coursework in probability and statistics^a
- ...construct and interpret statistical process control charts^{a,e,h,j}
- ...quantify process capability based on observed data^{a,e}
- ...conduct a designed experiment to quantify influence of controllable parameters on critical outputs^{a,e,h,j}
- ...apply outcomes from a designed experiment to improve process performance^{a,e,h,j}
- ...apply appropriate acceptance sampling procedures^{a,e,h,j}

Prerequisites: IE300 (required)
Course Type: Selected Elective

Students with Disabilities: All reasonable accommodations required for students with disabilities will be provided, as ensured by Article 1, Part 1 of the Student Code. Please alert the instructor by the end of the first week of class regarding accommodations, to ensure that accommodations can be made available when needed.

GRADING AND POLICIES

Grades will be based on the following:	Midterm exam	30%
	Final exam	40%
	Homework assignments	20%
	Quizzes/Participation	10%

Assignment Policies:

- *Schedule:* Approximately five homework assignments will be collected throughout the semester.
- *Submitting Assignments:* Instructions for how to submit homework assignments will be provided. Please follow these instructions carefully! **Late submissions will not be accepted!** To accommodate unanticipated tardiness, each student's lowest homework score will be dropped.
- *Assignment Groups:* You may submit assignments in groups of up to three students, with the following restrictions:
 - (a) Groups must submit a Group Agreement Form before the due date. Details will be available on Compass.
 - (b) Once a group has been formed, no new members can join that group.
 - (c) Each group must turn in one assignment; all group members will receive the same grade for the assignment.
 - (d) If you are a member of a group, you may decide to leave that group, but you cannot join another group (i.e., you must complete all future assignments on your own). You must notify the group members of your current group before leaving.

Attendance: You are expected to attend all course meetings and participate in class discussions. Important course announcements will be made during class; you are responsible for being aware of these announcements. Moreover, extra course-related opportunities or benefits (e.g., participation points) may be provided to students who attend and participate in lecture, at the discretion of the instructor.

Exam Policies (Midterm and Final):

- *Schedule:* Exam dates will be announced in class.
- *Absences:* To ensure that student performance is assessed uniformly, make-up exams are only offered in rare circumstances. Missed examinations will receive a grade of zero. Make-up midterm exams will only be offered if required by University policy. However, I understand that extraordinary and unavoidable circumstances may arise that negatively impact midterm exam performance. To accommodate such circumstances, when determining each student's final course grade, their midterm exam score will be replaced by **the lowest of** (a) their final exam score, (b) the average of **all** their homework assignment scores, and (c) the average of **all** their quiz scores. Such replacement will only be applied if it improves the student's course grade; a student who takes a make-up midterm exam for any reason will not be eligible to replace their midterm exam score in this way. Make-up final examinations are only offered if required by University policy, or a student has made arrangements with their college to receive an "I" (Incomplete) grade in the course. Please notify the instructor as early as possible if you believe you will need to take a make-up exam. Make-up exam arrangements will be made on a case-by-case basis.
- *Allowed materials:* Exams are closed-book and closed-notes. Some types of calculators are allowed (see the Calculator Policy). **Cell phones and other electronic devices should not be brought to exams!**
- *Regrades:* To request that your exam be regraded, you must return your exam to the instructor within one week of when exams were first returned in class. **Do not write on or alter your exam in any way!** On a separate sheet of paper, provide a written explanation of why you believe additional credit should be awarded (and how many points), based on your work as it was completed when you originally took the exam. If you request a regrade, your entire exam will be reviewed and regraded.

Quiz/Participation Policies: In-class quizzes will be held to assess understanding of the concepts covered in the course.

- *Schedule:* Quizzes will be held during lecture, and dates may or may not be announced in advance. Participation credit may also be awarded under other circumstances at the discretion of the instructor.
- *Attendance:* On some occasions, class attendance and participation will count toward participation credit, such that only students who attend the entirety of a particular class period or activity are given such credit.
- *Absences:* Make-up quizzes are not offered. Any student who is absent from a quiz will receive a grade of zero. To accommodate unavoidable absences that may occur during the semester, each student's lowest quiz score will be dropped. If you anticipate an extended period of unavoidable absences, please alert the instructor as soon as possible; such cases will be handled on a case-by-case basis.
- *Allowed materials:* Quizzes are closed-book and closed-notes. Some types of calculators are allowed (see the Calculator Policy).

Calculator Policy: You may use one scientific calculator (**not a graphing calculator!**) on exams and quizzes as long as it does not have communication abilities. This calculator may be inspected at any time. Calculators should only be used for numerical computation purposes; all work must be shown.

Academic Integrity: It is expected that your exams and quizzes will contain only your own work, and that your assignments will contain only the work of your group. Any student who misrepresents their work in an exam or quiz, or group who misrepresents their work on an assignment, will receive a grade of zero on that exam, quiz, or assignment; other sanctions may also be pursued, as allowed by University policy. Any homework assignment, quiz, or exam on which an academic integrity infraction has occurred cannot be dropped or replaced when computing a student's final course grade.

Cell Phones and Other Devices: Please turn off all cell phones before class. Use of other electronic devices (tablets, laptops, etc.) is allowed for course-related purposes only. The instructor may restrict device usage for the benefit of class participation. Do not bring any electronic devices (except an approved calculator) to exams.

NOTE: The policies contained in this syllabus are subject to change. Any such changes will be posted on Compass, and will often be discussed in class beforehand.

TENTATIVE LIST OF TOPICS

Introduction to quality control	- Process capability (C_p, C_{pk})
- Introduction and definitions	- Cumulative sum charts
- Historical perspectives (e.g., Deming, Taguchi)	
- Review of critical statistical concepts	Design of experiments
	- Goals and general structure of designed experiments
Statistical process control	- Analysis of Variance (ANOVA)
- General structure of process control charts	- Factorial experiments
- Connection to hypothesis testing	- Interpretation of outcomes from designed experiments
- Rational subgrouping and sample size selection	- Fractional factorial experiments (time permitting)
- Control charts for variables (e.g., \bar{x} and R , \bar{x} and S)	
- Control charts for attributes (p, np, c, u)	Acceptance Sampling
