ÇANKAYA UNIVERSITY
Department of Industrial Engineering

IE 326– Quality Engineering

Spring 2025

Instructor
Assist. Prof. Dr. Çiğdem Sıcakyüz
E-mail: csicakyuz@cankaya.edu.tr
Office: L-309

Teaching Assistant
Elif Ecem ÇELTEK
E-mail:elifecemceltek@cankaya.edu.tr
Office: L-305

Course Schedule
Section 1: *Lecture:* Monday 09:15- 11:10 (HA01), Thursday 13:15-15:10 (HA01)
Section 2: *Lecture:* Monday 11:15- 13:10 (HA01), Thursday 15:15-17:10 (HA01)

Office Hours
(Will be announced)

Textbook:

Montgomery, D.C. (2019). *Introduction to Statistical Quality Control* (8th Edition). Wiley.

This textbook provides a foundational understanding of statistical quality control concepts and methodologies, including DMAIC processes, control charts, process capability analysis, and design of experiments. It will serve as the primary reference for lectures, assignments, and problem-solving exercises.

Lectures
Teaching will be conducted face-to-face. Microsoft PowerPoint slides, along with on-the-board problem-solving techniques, will be utilized during the lectures to enhance understanding. In class, it will focus on solving problems related to the topics covered in the associated week. Students are advised to keep their calculators and computers readily available during classes.

Course Description:
This course provides a comprehensive introduction to the principles and practices of quality and quality improvement. It covers fundamental concepts and methodologies essential for understanding and implementing quality improvement processes in engineering and manufacturing environments.

Key topics include the DMAIC process, statistical tools for quality analysis, and advanced methods such as control charts, process capability analysis, acceptance sampling, and designed experiments. Students will learn to use tools like value stream mapping and visual aids to identify areas for improvement, manage processes, and maintain quality standards.

The course also explores the application of engineering standards and quality management systems, preparing students to analyze and design effective quality systems in professional practice. Practical case studies and hands-on exercises reinforce theoretical knowledge, ensuring students are well-prepared to address real-world quality challenges.

Course Objectives:

The main aim of this course is:

- ✓ to introduce the concepts and statistical methods employed in the assurance of product conformance to specification limits.
- ✓ to introduce different statistical process control techniques.
- ✓ to enlighten students on the importance of reduction in variability in process.
- ✓ to introduce acceptance sampling techniques.
- ✓ to teach how to conduct and use design of experiments to improve quality of products and processes.

Course Learning Outcomes:

On successful completion of this course, all students will have developed:

- ✓ knowledge of statistical and other problem-solving methods like DMAIC in quality applications.
- ✓ skill in constructing and interpreting appropriate control charts.
- ✓ skill in collecting and analyzing data related with quality of products/services, using acceptance sampling techniques and evaluating process capability.
- ✓ skill in use of statistical packages for quality analysis.
- ✓ skill in conducting experimental design for quality improvements; analyzing and interpreting the results.

On successful completion of this course, all students will have improved:

- ✓ skill in oral presentation.

On successful completion of this course, all students will be:

- ✓ involved in teamwork.
- ✓ aware of ethical issues and engineering standards.

Tentative Course Topics:

A tentative outline of the topics is provided below. Please note that the instructors reserve the right to make changes to the topics and schedule as necessary:

Week	Topic
1	Introduction to Quality and Quality Improvement Concept
2	DMAIC Process
3	Review of fundamental statistical concepts
4	Value Stream Mapping and other visual tools for quality improvement
5	Statistical Process Control methods and techniques
6	Control Charts for Variables: X-R
7	Control Charts for Variables: X-S
8	Control Charts for Attributes
9	Process Capability Analysis
10	Acceptance Sampling for Attributes
11	Acceptance Sampling for Variables
12	Designed Experiments: 2^k Factorial Design
13	Two Level Fractional Factorial Designs
14	Quality Management Systems and Engineering Standards

Course Web Page:

A course web page will be available at https://webonline.cankaya.edu.tr. Students should regularly access this page for updates on class announcements, lecture notes, and assignments. Lecture slides may not cover

all in-class discussions and problem solutions, so students are encouraged to attend classes and take detailed notes.

Grading:

Midterm and final exams will be held according to the university policies. Please follow the university web page for any update/change on how exams will be held.

Method	Number	Contribution (%)
Midterm	1	35%
Final Exam	1	40%
Project	1	15%
Assignments	2	10%

Details:

During the semester, there will be one quiz and one homework, **each contributing 5%** to the overall course grade.

Assignments:

- **Homework:** Teamwork is essential for the homework, and students will be responsible for collaborating on problem-solving and report writing. Assignments will be completed in groups of at least 3 and at most 5 students. Group formation is the responsibility of the students. Those who do not form a group will be assigned by the instructor. Further details and submission deadlines will be announced during the semester.
- **Quiz:** The quiz will assess students' understanding of the topics covered up to that point in the course. The format and date of the quiz will be announced in advance.

Project:

A term project will be assigned to apply and research statistical concepts covered in this course. The project will be conducted in teams of four or five students. Detailed guidelines for the term project will be provided on the course website. The final project report must be submitted by the end of **Week 14**.

By **Week 7**, students must form their project groups and inform the instructor via email. The deadline for group formation is **Friday of Week 6 at 23:55**. Each group must consist of **four or five students**. Students who do not or cannot form a group will be assigned to one by the instructor. These groups will be valid only for the term project. Further details regarding the project content will be announced later.

Classroom Policy:

Students are expected to maintain a professional and respectful environment in class. Disruptive behavior, including the use of mobile devices for non-course-related purposes, will not be tolerated. Participation in discussions and problem-solving exercises is highly encouraged to enhance learning.

You are responsible for all announcements made in class and on the class web page, as well as printing the lecture notes and other cited materials from the class web page and other sources.

Honesty Policy:

Academic integrity is expected of students of Cankaya University at all times, whether in the presence or absence of the faculty. All students should declare their understanding and belief in the Honor Code for the examinations and assignments. This statement is a reminder to uphold your obligation as a student and to be honest in all work submitted and exams taken in this course and all others.

If you conduct any dishonest act during an examination or for the completion of an assignment (i.e., cheating on an exam, using any extra material that you are not allowed to use during an exam, copying

material off of someone else's homework or assignment, using solution keys from previous years, copying material from published and electronic sources without paraphrasing and/or citing appropriately), you will get a credit of zero on that particular exam or assignment. Necessary disciplinary action, as dictated by the rules of the University, will also be taken.

Make-up Policy:

A make-up examination for the midterm or final exam will only be given under exceptional circumstances (such as serious health problems). The student must contact the instructor as early as possible and provide proper documentation (e.g., a medical report certified by Çankaya University's Health Center). A make-up exam might contain different type of questions than the regular exam.

Attendance:

Attendance will be recorded manually at the start of each class session. Students are required to sign the attendance sheet to confirm their presence. Failure to sign the sheet will result in the student being marked absent for that session.

Students are required to attend **at least 70% of the lecture hours** to be eligible to take the final exam. Failure to meet this requirement will result in the letter grade **NA (Not Attended)**, meaning the student will not be allowed to take the final exam and will not receive a passing grade for the course.

Although the minimum requirement is 70% attendance, students are strongly encouraged to attend all classes to fully understand the material and perform well in class activities and quizzes.

Conditions that Lead to an "NA" Grade:

Any of the following may lead to receiving the letter grade **NA (Not Attended)**:

- If a student fails to attend at least **70%** of the lectures, they will not be allowed to take the final exam and will receive a grade of **NA**.
- If a student fails to take the **midterm exam** or the **final exam** without valid documentation, they will receive the letter grade **NA**.

If a student achieves a grade of **DD** or higher after completing all exams, and assignments but has less than the required attendance, they may still pass the course conditionally, depending on their overall GPA, as per university regulations.

Changes to the Syllabus:

The instructor reserves the right to make changes to the syllabus as necessary. Any changes will be announced on the course website.