EASTERN MEDITERRANEAN UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE OUTLINE
SPRING 2025-26

COURSE CODE	IENG/MANE484	COURSE LEVEL	4th Year
COURSE TITLE	Quality Engineering	COURSE TYPE	Required
CREDIT VALUE	(4, 1) 4	ECTS	8
PRE-REQUISITE(S)	IENG/MANE385, MATH322	CO-REQUISITE(S)	-
	Name(s)	E-mail	Office
LECTURER(S)	Asst. Prof. Dr. Ali Baştaş	ali.bastas@emu.edu.tr	IE-C207
ASSISTANT(S)	TBC		

CATALOG DESCRIPTION

The purpose of the course is to make an introduction and lay the foundations of modern methods of statistical quality control and improvements that are used in the manufacturing and service industries. The course also introduces the basics of experimental design in determining quality products and reliability models. The students will first be introduced to some of the philosophies of quality control experts and their impact on quality. After a quick review of normal probability distribution, a few graphical methods used to monitor quality improvement will be given. Control charts for variables and attributes will be given with examples. Acceptance sampling plans for variables and attributes are to follow. Principles of design of experiments along with Taguchi method will be presented. Finally, reliability of systems like series, parallel, series – parallel and parallel – series systems and their design will be discussed.

OBJECTIVES (COs)

At the end of this course, the student will:
- CO1. Explain the major philosophies of quality control experts and discuss how these ideas influence quality improvement in manufacturing and service industries.
- CO2. Apply basic probability concepts (with emphasis on the normal distribution) and use graphical quality tools to summarize, visualize, and interpret process/quality data for improvement purposes.
- CO3. Construct, interpret, and use control charts for variables and attributes to assess process stability and support quality improvement decisions.
- CO4. Select and apply acceptance sampling plans for variables and attributes and interpret sampling results for incoming/outgoing quality decisions.
- CO5. Apply core principles of design of experiments (DOE) to investigate factors affecting quality and draw statistically supported conclusions.
- CO6. Use the Taguchi method (e.g., orthogonal arrays, S/N ratios) to recommend settings that improve quality performance.
- CO7. Model and analyze the reliability of systems (series, parallel, series–parallel, parallel–series) and evaluate how configuration choices affect overall system reliability.

COURSE LEARNING OUTCOMES (CLOs)

On successful completion of this course, students are expected to **develop knowledge** and **understanding** of:
- Quality Control and Improvement Notion and Philosophies
- Graphical Methods for Quality Improvement
- Statistical Process Control
- Process Capability Analysis
- Acceptance Sampling
- Reliability of Systems

- Design of Experiments and Taguchi Method

On successful completion of this course, students are expected to **develop their skills in**:
The definition of quality in different applications,
- The statistical tools that are used to improve manufacturing processes,
- Methods to inspect incoming lots of finished goods,
- Selecting appropriate control charts for various process characteristics under different environments,
- Interpretation of the control charts developed,
- Application of software tools in process control.

On successful completion of this course, students are expected to **develop their appreciation of** and respect for **values and attitudes regarding the issues of**:
- Importance of Quality Control and Improvement
- Importance of Working as a Team to Apply Quality Engineering concepts such as Statistical Process Control, Acceptance Sampling and Design of Experiments
- Importance of Deploying Modern Software including Minitab for Quality Engineering Analyses

COURSE TEXTBOOKS
1. Mitra, A. (2021). Fundamentals of Quality Control and Improvement (5th ed.). John Wiley & Sons.
2. Montgomery, D. C. (2020). Introduction to Statistical Quality Control (8th ed.). John Wiley & Sons.

CONTRIBUTION OF THE COURSE TO MEETING THE REQUIREMENTS OF CRITERION 5
Mathematics and Basic Sciences: 2
Engineering Topic: 2 (with design content)
Other: -

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES

Student Outcomes	Level of Contribution		
	NO	Moderate	High
1. an ability to identify, formulate, and solve complex problems by applying principles of engineering, science, and mathematics	☐	☐	☑
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	☐	☑	☐
3. an ability to communicate effectively with a range of audiences	☐	☑	☐
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	☑	☐	☐
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	☐	☑	☐
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	☐	☐	☑
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	☐	☐	☑

GRADING CRITERIA

Exams: All examinations will be based on lecture materials.

To pass these exams students will need to have studied the material well in advance in order to understand the concepts, procedures and techniques. All EMU, academic integrity, ethics and disciplinary procedures apply to all assessment activities of this course. Descriptions of these assessments are as following:

Make-up Policy:

Students missing the Midterm or Final examination should provide **a valid, evidencable excuse within three days following the examination they missed**. On the basis of the confirmation of the evidence provided (e.g. valid medical report) for missing the exam, student may qualify for one make-up examination only.

This only applies to the exams and not the quizzes. Thus, there will be **no make-up examinations for the students that miss the quizzes**, irrespective of the excuse provided.

METHOD OF ASSESSMENT

Although the student's overall grade will be based on the general assessment of the instructor, the following percentages may give an idea about the relative importance of various assessment tools:

Participation: 10%

Quizzes (2):   15%

Midterm Exam: 20%

Final Exam: 25%

Term Project: 30%

Letter grade equivalents of numerical performances will be announced by the Registrar's Office after the last day for the submission of letter grades.

NG (Nil-grade) Policy: The following conditions **MAY** result in the student getting an NG grade from this course:

1. Not attending the Final Exam without a valid excuse.

2. Not attending the Midterm Exam without a valid excuse.

3. Cheating and/or plagiarism during the exams, quizzes and/or project assignments.

4. Not attending and/or conducting the project presentation without a valid excuse.

5. Not participating and/or contributing sufficiently to the term project (including its presentation and compilation of the report).

Term Project – Late Submissions: A penalty (at least 50% reduction in the grade) for late submissions will be applied if the project report is not submitted on the specified due date and time. The project tasks will be advised in separate documentation.

LEARNING / TEACHING METHOD

The teaching/learning method adopted this semester will be in-class lectures, and through application of course materials in the form of a group term project. Labs will also be delivered at specified weeks, providing additional examples and software usage demonstrations as applicable. All relevant course materials will be provided via the course page implemented on the EMU Learning Management System LMS. The students

will be provided with updates during the lectures and through posts on the course page on the EMU LMS (and through MS Teams course page if available). The students are expected to regularly monitor the course page on the LMS, and to regularly check their emails for updates.

DETAILED WEEKLY COURSE PLAN

			IENG/MANE484 Quality Engineering Spring 2025/26 Term Plan		
Week	Week Commencing (Monday)	Slides	Module	Textbook Ref.*	Quiz
WK1	23-Feb		Course Outline & Intro		
WK2	02-Mar	L1	Notion and Philosophies of Quality	T1 - C1&2	
WK3	09-Mar	L2	Graphical Methods for Quality Engineering	T1 - C3.6&4.6	
WK4	16-Mar	L3	SPC and Control Charts for Variables	T1 - C6	
WK5	23-Mar			T1 - C7	
WK6	30-Mar	L4	SPC and Control Charts for Attributes	T1 - C8	Quiz 1
WK7	06-Apr	L5	Process Capability Analysis	T1 - C9	
MTW			Midterm Exams: 10-25 April		
MTW					
WK8	27-Apr	L6	Acceptance Sampling Plans for Attributes	T2 - C15	
WK9	04-May				
WK10	11-May	L7	Acceptance Sampling Plans for Variables	T2 - C16	
WK11	18-May	L8	Reliability of Systems	T1 - C10	
WK12	25-May	L9	Design of Experiments and Taguchi Method	T1 - C11	
WK13	01-Jun				Quiz 2
WK14	08-Jun		Review & Term Project Presentations	N/a	
FW	15-Jun		Final Exams: 15-27 June		
FW	22-Jun				
Course Textbooks*					
T1: Mitra, A. (2021). Fundamentals of Quality Control and Improvement (5th ed.). John Wiley & Sons.					
T2: Montgomery, D. C. (2020). Introduction to Statistical Quality Control (8th ed.). John Wiley & Sons.					

ACADEMIC HONESTY, PLAGIARISM & CHEATING

This is intentionally failing to give credit to sources used in writing regardless of whether they are published or unpublished. Plagiarism (which also includes any kind of cheating in exams) is a disciplinary offence and will be dealt with accordingly. According to university by laws cheating and plagiarism are serious offences punishable with disciplinary action ranging from simple failure from the exam or project/report, to more serious action (suspension from the university for up to one semester). Disciplinary action is written in student records and may appear in student transcripts. Any act not suitable for a university student will not be tolerated and may lead to formal disciplinary action. Example of this are: getting someone else to take the examinations for you, misrepresentation of your own answer sheet as another's work, cheating, knowingly assisting other students to cheat, abusing the tolerance or breaking the discipline of the class.

The term project reports will be submitted to the Turnitin portal on LMS, and penalties will apply to project reports exceeding a similarity limit of 25%.