EASTERN MEDITERRANEAN UNIVERSITY
Faculty of Engineering
Department of Industrial Engineering
Fall 2025-2026
COURSE OUTLINE

Course Code	IENG/MANE484	**Course Level**	4th year
Course Title	Quality Engineering	**Course Type**	Required
Credit Value	(4, 1) 4	**ECTS Value**	8
Pre-requisites	IENG385, MATH322	**Co-requisites**	----------
Prepared by	Res. Asst. Cemil TUĞCAN		

Course on Web: staff.emu.edu.tr and course lms site				
Course Schedule: **Lecture hrs: Monday & Thursday** 10:30-12:20; **Lab hrs- Thursday**: 12:30-13:20				
	Name (group)	**e-mail**	**Office**	**Telephone**
Instructor	Cemil Tuğcan, Res. Asst.	cemil.tugcan@emu.edu.tr	IE-C104	3161
Assistant(s)	Sonia Rashidian, Res. Asst.	sonia.rashidian@emu.edu.tr	IE-B207	1586

COURSE 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.

COURSE OBJECTIVES (CO)

To help students understand:

1. The evolution and philosophies of statistical quality control (SQC)
2. Quality improvement tools, standards, reliability, lean methodology and six sigma
3. How to construct control charts used to control variable quality characteristics
4. How to apply process capability analysis
5. The construction of control charts used to control attribute quality characteristics
6. Development and comparison of acceptance sampling plans for finished goods
7. How to use computer software packages for SQC and improvement (organizing data and constructing control charts with SPSS, Minitab, and Excel).
8. How to apply statistical quality control techniques to a real-life problem (Term project).

COURSE LEARNING OUTCOMES

On successful completion of this course, all students are expected to have knowledge and understanding of:

- Basic concepts of quality, lean, six sigma and reliability in industries,
- Basic philosophies of quality by statistical quality control experts,
- Various control charts to maintain statistical process control,
- Acceptance or rejection of finished products using acceptance sampling plans,
- Analyzing case studies.

On successful completion of the course, all students are expected to have 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 the course, all students are expected to have appreciation of and respect for values and attitudes regarding the:

- Importance of statistical process control in industries,
- Importance of acceptance sampling &QC and Improvement procedures in vendor selection,
- Importance of modern process control software

TEXTBOOK/S

Fundamentals of Quality Control and Improvement, Amitava Mitra, 5rd Edition, Wiley, 2021.
Introduction to Statistical Quality Control, Douglas C. Montgomery, 6th Edition, Wiley, 2009
Quality Improvement, Dale H. Besterfield**,** 9th Edition, Prentice Hall, 2012

RECOMMENDED READING
Statistical Process Control and Quality Improvement, Gerald M. Smith, Prentice Hall 5th Edition, 2004. Statistical Quality Design and Control, DeVor, Chang and Sutherland, 2nd Edition, Prentice Hall, 2007 Quality, Donna C.S. Summers, 5th edition, Prentice Hall, 2010

COURSE SCHEDULE

Session	Topics
Week 1	• Review of course outline • Evolution of quality control. • Philosophies of quality: Deming's, Crosby's, and Juran's approach
Week 2	• Quality Management: Practices, Tools, and Standards
Week 3	• Lean Enterprise, benefits, lean fundamentals: types of waste, categories of waste, workplace organization, concepts of flow, inventory control, visual management, kaizen, and value stream • Six Sigma: statistical aspects, improvement methodology DMAIC • Review of normal distribution
Week 4	• **QUIZ - I** • Graphical methods for quality improvement
Week 5	• Statistical process control using control charts
Week 6	• Control charts for variables: mean and range, mean and standard deviation, individuals and moving range
Week 7	• Process capability analysis, 6σ, C_p, C_r, C_{pk} • Review of **PROJECT OUTLINE**
Week 8-9	**MIDTERM EXAMINATION**
Week 10	• Control Charts for attributes: p-chart for a) constant and b) variable sample size
Week 11	• Control Charts for attributes: np-, c-, u- and U-charts
Week 12	• Acceptance Sampling: fundamental concepts, advantages and disadvantages of sampling, types of sampling plans, random sample selection
Week 13	• **QUIZ - II** • Consumer producer relationship, producer's risk, consumer's risk, AQL, LQL, Comparing sampling plans: OC curves, AOQ, ASN, and ATI
Week 14	• Acceptance Sampling: design of single and double sampling plans
Week 15	• Reliability: definition, system reliability, determining reliability in a) a series system b) a parallel system
Week 16-18	**FINAL EXAMINATION**

Class Schedule	Tutorial Schedule	Laboratory Schedule	Presentation
4 hours of lecture per week by the course instructor	-------	**1-2 hrs of Lab per week** with the course assistants. SPSS, Minitab and Excel software packages will be used.	-------

GRADING POLICY:

- Laboratory 10%
- Project 10%
- Quiz I 10%
- Quiz II 10%
- Midterm Exam I 25%
- Final exam 35%

Note that the instructor reserves the right to modify the grading policy in case (s)he finds it necessary.

Method of Instruction and assessment
The course is designed to provide active-interactive, and team based collaborative learning. Students will conduct pre-work such as watching short videos, required reading, optional reading and answering questions. Students will be active during the lecture hours completing class work and conducting team work as instructed by the lecturer.

Make-up and re-sit exams: Make-up examinations will only be offered to students who provided adequate documentation for the reason for their absence within four working days at the latest after the examination date. No make-up or re-sit exams will be held for quizzes. University regulations apply for graduation make-up and re-sit exams.

Term Project: Details and requirements can be found in the Term Project Guidelines (uploaded to Course LMS site)

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES

	Level of Contribution		
Student Outcomes	**No**	**Moderate**	**High**
(1) an ability to identify, formulate, and solve complex engineering 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	☐	☐	☑

CONTRIBUTION OF COURSE TO MEETING THE REQUIREMENTS OF ABET CRITERION 5

Mathematics and Basic Sciences : 2
Engineering Topics : 2 (with design content)
Other : -

Attendance/ Participation and NG Criteria

A student is expected to attend all lecture sessions, complete pre-work and class group exercises. Students who do not complete sufficient pre-class/in-class work will fail from the course and get NG grade.

ACADEMIC HONESTY – PLAGIARISM

Cheating is copying from others or providing information, written or oral, to others. Plagiarism is copying without acknowledgement from other people's work. According to university by laws cheating and plagiarism are serious offences punishable with disciplinary action ranging from simple failure from the exam or project, to more serious action (letter of official warning suspension from the university for up to one semester). Disciplinary action is written in student records and may appear in student transcripts.

PLEASE KEEP THIS COURSE OUTLINE FOR FUTURE REFERENCE AS IT CONTAINS IMPORTANT INFORMATION

I read the IENG484 course outline, are aware of the course requirements and accept to follow the course norms and expectations. I am aware that if I do not complete sufficient pre-lecture/in-lecture work I will fail from this course.

Student Number:

Name-Surname:

Signature:

Date: