NEW JERSEY INSTITUTE OF TECHNOLOGY
Department of Mechanical & Industrial Engineering
IE 461
Product Quality Assurance   Fall 2024

INSTRUCTOR: **George Abdou**, Associate Professor, Room ME306
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OFFICE HOURS: Wednesday: 3:00 - 5:00 p.m. and by appointment or good fortune
LECTURE: Wednesday: 6:00 - 8:50 p.m. GITC 2311

Course Lectures and Requirements: available at   **http://canvas.njit.edu/**
TEXT: "**Quality Improvement**"   D. Besterfield, Prentice Hall, 9th edition, 2013.

Course Description
Prerequisite: IE 331. Methods used to achieve higher product quality, to prevent defects, to locate chronic sources of trouble, to measure process capability, and to use inspection data to regulate manufacturing processes are emphasized. Preparation of statistical control charts and selection of suitable sampling plans

Course Objectives
- **Probability and Basic Statistics.** Understand how to apply basic statistical methods to interpret data, and to combine these methods with visual data displays to understand the effect of variability in controlling and improving quality and reliability.
- **Data Analysis.** Investigate Random and Non-Random patterns in process performance.
- **Software Use.** Learn how to use MS Excel to analyze various Control Charts and Sampling Plan problems.
- **Problem Solving.** Learn different techniques and Standards to problem solving, and the most effective approach for optimum quality improvement.

GRADING: **Final Exam …** 30% **Mid-term** ...30%   **Homework**...20%   Quizzes…**20%**

Course Outline: [the ****indicates the Quiz Date]

Week	TOPICS	Chapter	ASSIGNMENT
9/4	Introduction	1	**Handout**
9/11	Lean Mfg. & Six Sigma	**2, 3**	**3**. 1, 2
9/18	Statistical Process Control	**4**	**4**. **1**3 (Ex. 1, 3, 6,7,8)
9/25****	Fundamentals of Statistics	**5**	**5.** 36,38,[41,56 (Ex. 9, 20, 32)]
10/2	Control Charts for Variables	**6**	**6.** 3, 5, 7, 19, 32(Ex. 25, 27)
10/9	Continuous/Batch/Short Runs SPC	**7**	**7.** 5, 9, 12, 17, 19 (Ex.9)
10/16****	Fundamentals of Probability	**8**	**8.** 9, 10, 24,38,39,45
10/23	***** **Mid Term *****		
10/30	Control Charts for Attributes	**9**	**9.** 6, 24, 27(Ex.13,17,21)
11/6****	Acceptance Sampling Plan	**10**	**10.** 4, 7, 9, 16, 27, 30
11/13	Quality in Service Sector	**Handout**	**Handout**
11/20	Reliability	**11**	**11.** 6, 7, 10, 11, 13, 23, 24, 28, 29
(11/28-12/1)	*Thanksgiving Recess - No Classes Scheduled*		
12/4****	Experimental Design	**13**	**13.** 4, 6, 11, 12, 15
12/11	Taguchi Method	**14**	**14.** 2, 13, 17, 19, 23
12/18/2024	***** **Final Exam 6:00-7:30 pm GITC 2311*****		

Important Notes

1. The use of any electronic devices during classes; including but not limited to: laptops, cell phones, tablets, social media, etc.., is **prohibited** for non-class related functions.

2. **Homework** is due the week following the date they are assigned. It is expected that class participants will observe specified deadlines. There will be no deviations from scheduled due dates and test dates. The assignments **will not be accepted after the noted deadline**. However, because you know all deadlines and assignments by no later the second week of classes, deadlines should present no problems to class participants.

3. **Exams will consider all materials covered in the lectures**, **which may not be in the book**. Therefore, attendance of lectures is very important.

4. **HONOR & ETHICS**
   The code of unspoken ethics in a professional work environment in the US will apply in the classroom. That is, honesty and ethical conduct will not only be expected, but demanded. Please see me if you have any confusion on what I mean. Clearly, cheating on an exam is not permitted. Students caught in violation of this policy will earn a failing grades on their exam. Cooperation in responding to homework questions is not only permitted, but encouraged, as part of the cooperative learning framework of the course. You may discuss homework problems but not copy someone else's work. Any persons caught copying as well as the person providing the homework will be penalized.

Software Applications

To help reinforce the use of computer software to solve assignments, there are two packages: Excel and SPC. You will be required to submit your assignments in either format of the abovementioned software, and a printout of worksheet with explanation. In some cases, the computations that you perform must be visualized by a graph.

BSIE Program Educational Objectives

1. Program graduates use the fundamental principles and major areas of Industrial Engineering in their professional practice.

2. Program graduates are life-long learners, pursuing graduate education, and professional growth in Industrial Engineering and related fields.

3. Program graduates pursue diverse career paths and advance in a variety of industries.

BSIE Student Outcomes

(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 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 judgements, which must consider the impact of engineering solutions in global, economic, environmental, and social 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 conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions

(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

IE 461 Outcomes of Instruction:

1. Understand how to apply Statistical Methods (1).
2. Able to apply Excel and Minitab functions to Quality Control (1).
3. Understand the concepts of Process Capability and DOE (1).
4. Develop more proficient problem-solving skills (4).