

Fall 2019

# IE 461-101: Product Quality Assurance

George Abdou

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**NEW JERSEY INSTITUTE OF TECHNOLOGY**  
 Department of Mechanical & Industrial Engineering  
**IE 461**

**Product Quality Assurance**

**Fall 2019**

**INSTRUCTOR:** George Abdou, Associate Professor, Room ME306  
 Tel. (973) 596-3651 Fax. (973) 642-4282 e-mail: [abdou@njit.edu](mailto:abdou@njit.edu)  
**OFFICE HOURS:** Tuesday: 3:00 - 5:00 p.m. and by appointment or good fortune  
**LECTURE:** Wednesday: 6:00 - 9:05 p.m. CKB220

**Course Lectures and Requirements:** available at <http://canvas.njit.edu/>

**TEXT:** "Quality Improvement" D. Besterfield, Prentice Hall, 9<sup>th</sup> 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:**

Week	TOPICS	Chapter	ASSIGNMENT
09/04	Introduction	1	<b>Handout</b>
09/11	Lean Mfg. & Six Sigma	2, 3	<b>3.</b> 1, 2(MIE dept.)
09/18	Statistical Process Control	4	<b>4.</b> 13 (Ex. 1, 3, 6,7,8)
09/25	Fundamentals of Statistics	5	<b>5.</b> 36,38,[41,56 (Ex. 9, 20, 32)]
10/2	Control Charts for Variables	6	<b>6.</b> 3, 5, 7, 19, 32(Ex. 25, 27)
10/9	Continuous/Batch/Short Runs SPC	7	<b>7.</b> 5, 9, 12, 17, 19 (Ex.9)
10/16	Fundamentals of Probability	8	<b>8.</b> 9, 10, 24,38,39,45
10/23	***** <b>Mid Term</b> *****		
10/30	Control Charts for Attributes	9	<b>9.</b> 6, 24, 27(Ex.13,17,21)
11/6	Acceptance Sampling Plan	10	<b>10.</b> 4, 7, 9, 16, 27, 30
11/13	Quality in Service Sector	<b>Handout</b>	<b>Handout</b>
11/20	Reliability	11	<b>11.</b> 6, 7, 10, 11, 13, 23, 24, 28, 29
<b>(11/28-12/1)</b>	<b><i>Thanksgiving Recess - No Classes Scheduled</i></b>		
12/4	Experimental Design	13	<b>13.</b> 4, 6, 11, 12, 15
12/11	Taguchi Method	14	<b>14.</b> 2, 13, 17, 19, 23
12/18	***** <b>Final Exam</b> *****		

## 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 Minitab. 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

- (a) **An ability to apply knowledge of mathematics, science, and engineering**
- (b) **An ability to design and conduct experiments, as well as to analyze and interpret data**
- (c) **An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**
- (d) An ability to function on multi-disciplinary teams
- (e) **An ability to identify, formulate, and solve engineering problems**
- (f) *An understanding of professional and ethical responsibility*
- (g) *An ability to communicate effectively*
- (h) *The broad education necessary to understand the impact of engineering solutions in a global and societal context*
- (i) *A recognition of the need for, and the ability to engage in life-long learning*
- (j) *A knowledge of contemporary issues*
- (k) **An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice**

## IE 461 Outcomes of Instruction:

- 1 Understand how to apply Statistical Methods (a,b).
- 2 Able to apply Excel and Minitab functions to Quality Control (a,b,c).
- 3 Understand the concepts of Process Capability and DOE (h,j,k).
- 4 Develop more proficient problem solving skills (e,g).