

ITT Technical Institute
IE1420
Statistical Process Control
Onsite and Online Course

SYLLABUS

Credit hours: 4.5


Contact/Instructional hours: 56 (34 Theory Hours, 22 Lab Hours)

Prerequisite(s) and/or Corequisite(s):

Prerequisite: MA1310 College Mathematics II or equivalent

Course Description:

This course introduces statistical concepts and application, such as X-bar and R-charts, p-charts, u-charts, c-charts, and basic quality management concepts



COURSE SUMMARY

COURSE DESCRIPTION

This course introduces statistical concepts and application, such as X-bar and R-charts, p-charts, u-charts, c-charts, and basic quality management concepts.

MAJOR INSTRUCTIONAL AREAS

1. Quality principles and the evolution of modern statistical process control
2. Use of statistical information to identify the shortcomings within a process
3. Creation and interpretation of statistical process control charts
4. Use of process capability to measure the consistency of a process
5. Probability concepts for creation of attribute control charts

COURSE LEARNING OBJECTIVES

1. Understand basic vocabulary and concepts related to statistical process control and quality management.
2. Demonstrate the ability to calculate and interpret basic statistical formulas.
3. Demonstrate the ability to create X-bar and R statistical process control charts.
4. Demonstrate the ability to interpret and use X-bar and R statistical process control charts to identify, investigate, and solve problems.
5. Calculate process capability indices C_p and C_{pk} .
6. Create and interpret a run chart and a chart for individuals with a moving range.
7. Demonstrate the ability to calculate and interpret basic probability distribution formulas.
8. Demonstrate the ability to create p, u, and c statistical process control charts.

1.

COURSE OUTLINE

MODULE 1: QUALITY CONCEPTS AND STATISTICAL PROCESS CONTROL

COURSE LEARNING OBJECTIVES COVERED

- Understand basic vocabulary and concepts related to statistical process control and quality management.

TOPICS COVERED

- Quality Basics
- Quality Advocates

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: <i>Quality</i> (5 th ed.), Chapter 1, pp. 3–21 and Chapter 2, pp. 24–40	No	2.5 hrs.
Lesson: Study lesson.	No	1.5 hrs.
Exercise: Submit the assessment titled “Quality Basics.”	Yes	1 hr.
Exercise: Submit the assessment titled “Quality Advocates.”	Yes	2.5 hrs.
Quiz: Prepare for Quiz 1.	No	2 hrs.

Total Out-Of-Class Activities: 9.5 Hours

MODULE 2: GRAPHICAL AND ANALYTICAL DATA ANALYSIS

COURSE LEARNING OBJECTIVES COVERED

- Demonstrate the ability to calculate and interpret basic statistical formulas.

TOPICS COVERED

- Accuracy, Precision, and Measurement Error
- Histograms and Frequency Diagrams
- Mean, Mode, and Median
- Measures of Dispersion
- Central Limit Theorem

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: <i>Quality</i> (5 th ed.), Chapter 4, pp. 107–136	No	4 hrs.
Lesson: Study lesson.	No	2.5 hrs.
Exercise: Submit the assessment titled “Construct and Interpret a Histogram.”	Yes	2.5 hrs.
Lab: Submit the assessment titled “Measures of Central Tendency and Dispersion.”	Yes	2 hrs.
Exercise: Submit the assessment titled “Normal Curve.”	Yes	2.5 hrs.
Quiz: Take Quiz 1.	Yes	N/A

Total Out-Of-Class Activities: 13.5 Hours

MODULE 3: CONTROL CHARTS FOR VARIABLES

COURSE LEARNING OBJECTIVES COVERED

- Demonstrate the ability to create X-bar and R statistical process control charts.

TOPICS COVERED

- Control Charts for Variables
- Chance and Assignable Causes
- Variation
- Steps to Create X-bar and R Charts

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: <i>Quality</i> (5 th ed.), Chapter 5, pp. 150–160.	No	1.5 hrs.
Lesson: Study lesson.	No	2 hrs.
Exercise: Submit the assessment titled “Chance and Assignable Causes.”	Yes	1 hr.
Lab: Submit the assessment titled “Creating X-bar and R Charts.”	Yes	1.5 hrs.
Analysis: Submit the assessment titled “Quality Control for Variables—Part 1 and Part 2.”	Yes	4 hrs.
Quiz: Prepare for Quiz 2.	No	2 hrs.

Total Out-Of-Class Activities: 12 Hours

MODULE 4: CONTROL CHART INTERPRETATION AND PROCESS CAPABILITY

COURSE LEARNING OBJECTIVES COVERED

- Demonstrate the ability to interpret and use X-bar and R statistical process control charts to identify, investigate, and solve problems.
- Calculate process capability indices C_p and C_{pk} .

TOPICS COVERED

- Variable Control Charts
- Process Capability

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: <i>Quality</i> (5 th ed.), Chapter 5, pp. 160–173, Chapter 6, pp. 216–229	No	3.5 hrs.
Lesson: Study lesson.	No	2.5 hrs.
Lab: Submit the assessment titled “Interpreting X-bar and R Charts.”	Yes	1.5 hrs.
Analysis: Submit the assessment titled “Quality Control for Variables—Part 3 and Part 4.”	Yes	4 hrs.
Analysis: Submit the assessment titled “Process Capability.”	Yes	4 hrs.
Quiz: Take Quiz 2.	Yes	N/A

Total Out-Of-Class Activities: 15.5 Hours

MODULE 5: ADDITIONAL CONTROL CHARTS FOR VARIABLES

COURSE LEARNING OBJECTIVES COVERED

- Create and interpret a run chart and a chart for individuals with a moving range.

TOPICS COVERED

- Charts for Individual, Moving Average, and Moving Range
- Median and Range Charts
- Precontrol Charts
- Short Run Control Charts
- Run Charts
- Multi-Vari Analysis

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: <i>Quality</i> (5 th ed.), Chapter 7, pp. 240–263	No	2 hrs.
Lesson: Study lesson.	No	2 hrs.
Lab: Submit the assessment titled “Creating Charts for Individual and Moving Range.”	Yes	1.5 hrs.
Lab: Submit the assessment titled “Creating Multi-Vari Chart.”	Yes	1.5 hrs.
Analysis: Submit the assessment titled “Creating Precontrol Chart.”	Yes	4 hrs.
Analysis: Submit the assessment titled “Creating a Run Chart.”	Yes	4 hrs.
Final Exam: Prepare for the Exam.	No	5 hrs.

Total Out-Of-Class Activities: 20 Hours

MODULE 6: PROBABILITY DISTRIBUTIONS AND ATTRIBUTES CONTROL CHARTS

COURSE LEARNING OBJECTIVES COVERED

- Demonstrate the ability to calculate and interpret basic probability distribution formulas.
- Demonstrate the ability to create p, u, and c statistical process control charts.

TOPICS COVERED

- Discrete Probability Distributions
- Permutation and Combination
- Control Charts for Attributes

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: <i>Quality</i> (5 th ed.), Chapter 8, p. 275 and pp. 280–294 and Chapter 9, pp. 302–330	No	4.5 hrs.
Lesson: Study lesson.	No	2 hrs.
Lab: Submit the assessment titled “Calculating Probability and Creating Attribute Control Charts.”	Yes	2 hrs.
Final Exam: Take the Final Exam.	Yes	N/A

Total Out-Of-Class Activities: 8.5 Hours

EVALUATION AND GRADING

EVALUATION CRITERIA

The graded assignments will be evaluated using the following weighted categories:

CATEGORY	WEIGHT
Exercise	15%
Lab	25%
Analysis	25%
Quiz	10%
Final Exam	25%
TOTAL	100%

GRADE CONVERSION

The final grades will be calculated from the percentages earned in the course, as follows:

GRADE	PERCENTAGE
A (4.0))	90–100%
B+ (3.5))	85–89%
B (3.0))	80–84%
C+ (2.5))	75–79%
C (2.0))	70–74%
D+ (1.5))	65–69%
D (1.0))	60–64%
F (0.0)	<60%

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LEARNING MATERIALS AND REFERENCES

REQUIRED RESOURCES

COMPLETE TEXTBOOK PACKAGE

- Summers, Donna. C. S. (2010). *Quality (5th ed.)*. Upper Saddle River, NJ: Pearson.

RECOMMENDED RESOURCES

- ITT Tech Virtual Library (accessed via Student Portal | <https://studentportal.itt-tech.edu>)
 - Professional Organization
 - ITT Tech Virtual Library> School of Study> School of Drafting and Design> Research guides> Industrial Engineering Technology> Associations> American Society for Quality
<http://www.asq.org/>
 - ITT Tech Virtual Library> School of Study> School of Drafting and Design> Research guides> Industrial Engineering Technology> Associations> American Productivity & Quality Center
<http://www.apqc.org>
 - ITT Tech Virtual Library> School of Study> School of Drafting and Design> Professional organizations> Society of Manufacturing Engineers
<http://www.sme.org/>
 - ITT Tech Virtual Library> School of Study> School of Drafting and Design> Professional organizations> Product Development and Management Association
<http://www.pdma.org/>
 - Recommended Links
 - ITT Tech Virtual Library> School of Study> General Education Information> Recommended links> Mathematics> MathWorld
 - ITT Tech Virtual Library> School of Study> General Education Information> Recommended links> Articles and books> NIST/SEMATECH e-Handbook of Statistical Methods

INSTRUCTIONAL METHODS AND TEACHING STRATEGIES

The curriculum employs a variety of instructional methods that support the course objectives while fostering higher cognitive skills. These methods are designed to encourage and engage you in the learning process in order to maximize learning opportunities. The instructional methods include but are not limited to lectures, collaborative learning options, use of technology, and hands-on activities.

To implement the above-mentioned instructional methods, this course uses several teaching strategies, such as scenarios, online lessons, and labs. The lessons in this course will focus on step-by-step illustration of creating graphs along with tips, guidance, and dos and don'ts wherever possible. The lessons will also include application-level practice questions about the covered concepts to help build your confidence. Your progress will be regularly assessed through a variety of assessment tools including exercises, analyses, labs, quizzes, and final exam.

OUT-OF-CLASS WORK

For purposes of defining an academic credit hour for Title IV funding purposes, ITT Technical Institute considers a quarter credit hour to be the equivalent of: (a) at least 10 clock hours of classroom activities and at least 20 clock hours of outside preparation; (b) at least 20 clock hours of laboratory activities; or (c) at least 30 clock hours of externship, practicum or clinical activities. ITT Technical Institute utilizes a "time-based option" for establishing out-of-class activities which would equate to two hours of out-of-class activities for every one hour of classroom time. The procedure for determining credit hours for Title IV funding purposes is to divide the total number of classroom, laboratory, externship, practicum and clinical hours by the conversion ratios specified above. A clock hour is 50 minutes.

A credit hour is an artificial measurement of the amount of learning that can occur in a program course based on a specified amount of time spent on class activities and student preparation during the program course. In conformity with commonly accepted practice in higher education, ITT Technical Institute has institutionally established and determined that credit hours awarded for coursework in this program course (including out-of-class assignments and learning activities

described in the “Course Outline” section of this syllabus) are in accordance with the time-based option for awarding academic credit described in the immediately preceding paragraph.

ACADEMIC INTEGRITY

All students must comply with the policies that regulate all forms of academic dishonesty or academic misconduct. For more information on the academic honesty policies, refer to the Student Handbook and the School Catalog.

INSTRUCTOR DETAILS

Instructor Name	
Office Hours	
Contact Details	

(End of Syllabus)