

**PALOMAR COLLEGE**  
**COURSE OUTLINE OF RECORD FOR**  
**DEGREE CREDIT COURSE**

X Transfer Course X A.A. Degree applicable course  
(check all that apply)

**COURSE NUMBER AND TITLE:** QAT 110 Statistical Quality Control - Theory

**UNIT VALUE:** 3

**MINIMUM NUMBER OF SEMESTER HOURS:** 48

**BASIC SKILLS REQUIREMENTS:** Appropriate language and computational skills.

**ENTRANCE REQUIREMENTS**

**PREREQUISITE:** None.

**COREQUISITE:** None.

**RECOMMENDED PREPARATION:** QAT 100.

**SCOPE OF COURSE:**

Basic statistical concepts of quality control which have a wide range of industrial applications. Methods used in many countries throughout the world to improve product and process quality and reduce costs, e.g., various types of acceptance sampling systems and procedures. Methods are presented for evaluation of sample data and determining population characteristics including measures of central tendency and variation, and underlying distributions.

**SPECIFIC COURSE OBJECTIVES:**

Successful students will be able to:

1. Identify appropriate sampling plans and risks in order to evaluate product and process output and capabilities.
2. Identify and apply probability theory and probability functions to evaluate and justify product and process acceptance.
3. Recognize, set up, and implement attributes and variables control charts.
4. Choose appropriate statistical methods to evaluate sample data and determine lot acceptability.
5. Analyze product and process quality. Characterize using statistical terminology.

## **CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:**

- I. Mathematical Principles
  - A. Review of mathematical operations in elementary algebra
  - B. Review of mathematical concepts including algebra, geometry, square roots, inequalities, set theory, probability, hypothesis writing, hypothesis testing, and correlation and regression testing
  - C. Practical exercises for each section
  
- II. Probability and Probability Distributions
  - A. Introduction to probability theory, probability definitions, independent events, multiplication and addition theorems, mutually exclusive events
  - B. Combinations, permutations, discrete probability functions, binomial and poisson distributions, hyper geometric distributions
  - C. Continuous probability functions, the normal distribution, the central limit theorem, approximations to the binomial
  - D. Exercises in probability problems with emphasis on the normal distribution, relationship of the normal distribution to process capability studies and control charting
  
- III. Estimates and Sample Sizes
  - A. Determination of appropriate sample sizes
  - B. Determination of risks and quantifying alpha and beta risks
  - C. Expressing estimates of central tendency and variation with a quantified confidence level and interval
  
- IV. Hypothesis Testing
  - A. Writing hypotheses
  - B. Determining the appropriate hypothesis test, risk, critical values, test statistic, testing the significance of the data, and expressing and interpreting results
  - C. Testing measures of central tendency and variation for one sample
  - D. Testing measures of central tendency and variation for two samples.
  - E. Correlation and regression testing, predicting values and predicting variation
  - F. Multinomial testing, evaluating differences between observed and expected values
  - G. Contingency testing, evaluating the independence of data
  - H. ANOVA (analysis of variance) testing
  
- V. Quality Control Charts
  - A. Introduction to control charts, measures of process variability, types of control charts
  - B. Variables control charts, application of X and R charts, application of X and s charts, and control limits
  - C. Attributes control charts, p,c,np,and u charts
  
- VI. Non-Parametric Statistics
  - A. Sign tests
  - B. Wilcoxon signed-rank tests
  - C. Wilcoxon rank-sum tests
  - D. Kruskal-Wallis tests
  - E. Rank correlation
  - F. Run tests for randomness

**REQUIRED READING:**

Triola, Mario F. Elementary Statistics. 8<sup>th</sup> edition. Reading, MASS: Addison-Wesley, 2001.

**SUGGESTED READING:**

Grant, James and Richard S. Leavenworth. Statistical Quality Control. New York: McGraw-Hill, 1988.

Huff, Darrell. How To Lie With Statistics. New York: W.W. Norton & Company, 1993.

**REQUIRED WRITING:**

Completion of problems for each chapter, explanation of results, and solutions presentations consisting of at least one paragraph each.

**OUTSIDE ASSIGNMENTS:**

**Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short-term classes.**

Read assignments from the textbook and instructor prepared handouts. Study lecture notes. Complete assigned textbook problems.

**INSTRUCTIONAL METHODOLOGY:**

**Check all that apply:**

- lecture
- laboratory
- lecture-laboratory combination
- directed study

**DISTANCE LEARNING:**

**This course may be offered as a distance learning course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.**

Yes  No

**If yes, check all that apply:**

- Television Course (Video one-way, e.g. ITV, video cassette, etc.)
- Online Course (Text one-way, e.g. newspaper, correspondence, electronic file, etc.)
- Two-Way Video Conferencing (Two-way interactive video and audio)
- One-Way Video Conferencing (One-way interactive video and two-way interactive audio)
- Computer Assisted Instruction (A specialized form of mediated instruction relying primarily on student access to information and prepared lessons or teaching materials through a computer terminal, but not under immediate supervision of a qualified instructor.)

**GRADING POLICY AND STANDARDS** (include methods of determining whether the stated objectives have been met by students):

The course grading policy will be determined by individual instructors and may include the following:

- Exams
- Quizzes
- Research projects
- Writing assignments
- Classroom presentations
- Research papers
- Lab assignments
- Journal writing
- Classroom participation & discussion
- Homework

**IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?**

Yes \_\_\_\_ No X Number of times course may be taken for credit: 1

If yes, identify specific provision of Title 5 Division 2 section(s), 55761-55763 and 58161 which qualifies course as repeatable:

**CONTACT PERSON:** Director, Occupational & Noncredit Programs, Ext. 2286

<b>SIGNATURES ON FILE:</b>
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