City College of San Francisco  
Course Outline of Record

I. GENERAL DESCRIPTION  
A. Approval Date  
   October 2012  
B. Department  
   Mathematics  
C. Course Number  
   MATH 45  
D. Course Title  
   Preparation for Statistics  
E. Course Outline Preparer(s)  
   Hal Huntsman and Lily Lum  
F. Department Chair  
   Dennis Piontkowski  
G. Dean  
   David Yee

II. COURSE SPECIFICS  
A. Hours  
   Lecture: 4 weekly (70 total)  
   Conference: 2 weekly (35 total)  
   5  
B. Units  
   MATH E1, MATH E3, MATH 35, or placement in MATH 40  
C. Prerequisites  
   None  
   None  
   Corequisites  
   Advisories  
   D. Course Justification  
   This course develops basic mathematical computational, reasoning, and algebraic skills and basic statistical concepts that prepare students for college-level statistics courses.  
E. Field Trips  
   No  
F. Method of Grading  
   Letter  
G. Repeatability  
   0

III. CATALOG DESCRIPTION  
Accelerated preparation for transfer-level statistics. Algebra necessary for college-level statistics, including variables, formulas, and linear equations. Ratios, rates, and proportional reasoning; fractions, decimals and percents; evaluating expressions; analyzing algebraic forms of statistical measures; modeling bivariate data with trend lines; graphical and numerical descriptive techniques for quantitative and categorical data.

IV. MAJOR LEARNING OUTCOMES  
Upon completion of this course a student will be able to:  
A. Formulate and research questions that can be addressed with data, then organize, display, and analyze relevant data to address these questions.  
B. Demonstrate numerical and algebraic reasoning skills to support statistical analysis.  
C. Using mathematical concepts, effectively interpret statistical data, both orally and in writing.  
D. Demonstrate the characteristics of an effective learner of mathematics.
V. CONTENTS

A. Introduction to Algebra
   1. Recognizing and generating equivalent forms of fractions, decimals, and percents
   2. Comparing fractions with the same and different denominators
   3. Comparing fractions, decimals, and percents
   4. Rounding off to a specified place value
   5. Graphing fractions, decimals, and signed numbers on a number line
   6. Forming and comparing ratios and rates
   7. Operations with real numbers, including opposites and absolute values
   8. Exponents and roots
   9. Scientific notation
   10. Use of calculators
   11. Variables and formulas
       a. Evaluation of expressions with real numbers using order of operations
       b. Evaluation of formulas
       c. Use of algebraic formulas to understand statistical measures and concepts
   12. Linear equations
       a. Constant rate of change
       b. Graphs in the Cartesian plane
       c. Solutions of linear equations in one variable
       d. Applications — trend lines
   13. Summation notation, including subscripts

B. Introduction to Logical Statements
   1. “And” statements
   2. “Or” statements
   3. “Not” statements

C. Categorical Variables
   1. Constructing and reading graphs of distributions of categorical data
      a. Bar graphs
      b. Pie charts
      c. Using fractions, decimals and percents to interpret bar graphs and pie charts
   2. Contingency tables

D. Quantitative Variables
   1. Graphs of univariate distributions of quantitative data
      a. Histograms
      b. Boxplots
   2. Measures of central tendency
      a. Mean
      b. Median
      c. Mode
   3. Descriptions and measures of spread
      a. Variance
      b. Standard deviation
      c. Quartiles
      d. Percentiles
   4. Shape of distribution
a. Symmetric
b. Unimodal and bimodal
c. Asymmetric (skewed to the left and skewed to the right)
d. Outliers

E. Geometric and Graphical Interpretation of Standard Deviation
   1. Signed distance from the mean
   2. Average of squared distances from the mean
   3. Standard deviation as a rough measure of average distance from the mean
   4. Why data associated positively in a scatterplot gives positive correlation

F. Bivariate Distributions of Quantitative Variables
   1. Creating and analyzing scatterplots
   2. Intuitive understanding of least squares regression using linear models
   3. Intuitive and graphical understanding of correlation coefficient ($r$)

G. Data Production
   1. Introduction to forming research questions
   2. Study design
   3. Sample surveys
      a. Sample statistics vs. population parameters
      b. Randomness of samples
   4. Observational studies vs. experiments

H. Study/Learning Skills
   1. Study skills
      a. Organization and time management
      b. Test preparation and test-taking
      c. Note taking
   2. Self-assessment skills
      a. Using performance criteria to judge and improve one's own work
      b. Analyzing and correcting errors on homework and tests
   3. Identifying, using, and evaluating the effectiveness of resources in improving one's own learning (e.g., peer study groups, computer resources, lab services)

VI. INSTRUCTIONAL METHODOLOGY
   A. Assignments
      1. In-class assignments
         a. Daily group work activities devoted to learning and applying topics and procedures such as using contingency tables to make arguments about data, creating and graphing linear functions using real data, finding means, medians, and variations of real data sets, and creating and exploring a research study design
         b. Creation and development of a group project, including forming a research question, developing a survey, analyzing results of the survey and preparing and end-of-semester presentation for the class
      2. Out-of-class assignments
         a. Regular out-of-class reading assignments from the textbook or other materials
         b. Regular homework to practice and apply procedures taught such as using self assessment skills, using contingency tables to explore relationships among data, creating and graphing linear functions using real data, finding means, medians, and variations of real data sets, and creating and analyzing a research study design

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c. A group project focused on the collection and analysis of raw data, including the
development of research questions, surveys, and direct gathering of data

B. Evaluation
1. Homework, as described above
2. Project, as described above
3. Exams - four or five suggested over the course of the semester that assess each
   student's proficiency in topics such as creating and graphing linear functions using real
data, finding means, medians, and variations of real data sets, and creating and
analyzing a research study design
4. Comprehensive final examination in key topics such as creating and graphing linear
   functions using real data, finding means, medians, and variations of real data sets, and
creating and analyzing a research study design

C. Textbooks and other instructional materials
   2009
2. Other materials created by the instructor, developed in conjunction with the textbook
3. Computer software and/or a graphing calculator may be required (e.g., Tinkerplots
   from Key Curriculum Press, Fathom from Key Curriculum Press)

VII. TITLE 5 CLASSIFICATION
CREDIT/DEGREE APPLICABLE (meets all standards of Title 5. Section 55002(a)).