STATISTICS AP UNIT OUTLINE AND SUPPLY LIST

Unit 1 Displaying Data: Describing patterns and departures from patterns (25 days)
A. Constructing and interpreting graphical displays of distributions of univariate data (dotplot, stemplot, histogram, cumulative frequency plot)
1. Center and spread
2. Clusters and gaps
3. Outliers and other unusual features
4. Shape

B. Summarizing distributions of univariate data
1. Measuring center: median, mean
2. Measuring spread: range, interquartile range, standard deviation
3. Measuring position: quartiles, percentiles, standardized scores (z-scores)
4. Using boxplots
5. The effect of changing units on summary measures

C. Comparing distributions of univariate data (dotplots, back-to-back stemplots, parallel boxplots)
1. Comparing center and spread: within group, between group variation
2. Comparing clusters and gaps
3. Comparing outliers and other unusual features
4. Comparing shapes

D. Exploring categorical data
1. Frequency tables and bar charts
2. Marginal and joint frequencies for two-way tables
3. Conditional relative frequencies and association
4. Comparing distributions using bar charts

Unit 2 Linear Relationships (20 days)
E. Exploring bivariate data
1. Analyzing patterns in scatterplots
2. Correlation and linearity
3. Least-squares regression line
4. Residual plots, outliers, and influential points
5. Transformations to achieve linearity: logarithmic and power transformations

Unit 3. Sampling and Experimentation: Planning and conducting a (20 days)
A. Overview of methods of data collection
1. Census
2. Sample survey
3. Experiment
4. Observational study

B. Planning and conducting surveys
1. Characteristics of a well-designed and well-conducted survey
2. Populations, samples, and random selection
3. Sources of bias in sampling and surveys
4. Sampling methods, including simple random sampling, stratified random sampling, and cluster sampling

C. Planning and conducting experiments
1. Characteristics of a well-designed and well-conducted experiment
2. Treatments, control groups, experimental units, random assignments, and replication
3. Sources of bias and confounding, including placebo effect and blinding
4. Completely randomized design
5. Randomized block design, including matched pairs design

D. Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys

Unit 4. Probability and Random Variables (18 days)
A. Probability
1. Interpreting probability, including long-run relative frequency interpretation
2. "Law of Large Numbers" concept
3. Addition rule, multiplication rule, conditional probability, and independence
4. Discrete random variables and their probability distributions, including binomial and geometric
5. Simulation of random behavior and probability distributions
6. Mean (expected value) and standard deviation of a random variable, and linear transformation of a random variable

B. Combining independent random variables
1. Notion of independence versus dependence
2. Mean and standard deviation for sums and differences of independent random variables

C. The normal distribution
1. Properties of the normal distribution
2. Using tables of the normal distribution
3. The normal distribution as a model for measurements

D. Sampling distributions
1. Sampling distribution of a sample proportion
2. Sampling distribution of a sample mean
3. Central Limit Theorem
4. Sampling distribution of a difference between two independent sample proportions
5. Sampling distribution of a difference between two independent sample means
6. Simulation of sampling distributions
7. t-distribution
8. Chi-square distribution

Unit 5 Statistical Inference: Estimating population parameters and testing hypotheses for proportions (20 days)
A. Estimation (point estimators and confidence intervals)
1. Estimating population parameters and margins of error
2. Properties of point estimators, including unbiasedness and variability
3. Logic of confidence intervals, meaning of confidence level and confidence intervals, and properties of confidence intervals
4. Large sample confidence interval for a proportion
5. Large sample confidence interval for a difference between two proportions
6. Logic of significance testing, null and alternative hypotheses; p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power
7. Large sample test for a proportion
8. Large sample test for a difference between two proportions

Unit 6 Statistical Inference for Means (10 days)
1. Confidence interval for a mean
2. Confidence interval for a difference between two means (unpaired and paired)
3. Confidence interval for the slope of a least-squares regression line
4. Test for a mean
5. Test for a difference between two means (unpaired and paired)

Unit 7. Tests of significance
1. Chi-square test for goodness of fit, homogeneity of proportions, and independence (one- and two-way tables)
2. Test for the slope of a least-squares regression line

Supplies:
Graph paper
TI-84 graphing calculator
Pencil
Binder with at least 5 dividers (will probably add two more dividers)

Robin Fowler/Fall 2012