AP® Statistics
Syllabus 3

Course Design

This AP® Statistics course is taught as an activity-based course in which students actively construct their own understanding of the concepts and techniques of statistics.   **[C4]**
Topics include "Exploring Data," "Planning and Design of a Study," "Anticipating Patterns," and "Statistical Inference."

C4—The course teaches students how to communicate methods, results, and interpretations using the vocabulary of statistics.

Important Remark

We believe that AP Statistics should be an activity-centered course in which students routinely use technology to construct their own understanding of the principles and practices of statistics. Therefore, the following syllabus relies heavily on students' active engagement in doing statistics with appropriate technological tools throughout the course, including using:

- Fathom statistical software
- Minitab statistical software, and
- TI-83 and TI-83+ graphing calculators.   **[C5]**

C5—The courses teaches students how to use graphing calculators and demonstrates the use of computers and/or computer output to enhance the development of statistical understanding through exploring and analyzing data, assessing models, and performing simulations.

Primary Textbooks

Bohan, James F. *AP Statistics: Preparing for the Advanced Placement Examination.* New York: AMSCO School Publications, 2000.

Freedman, David, Robert Pisani, and Roger Purves. *Statistics*. 3rd ed. New York: W. W. Norton, 1998.

Rossman, Allan J., Beth L. Chance, and Robin H. Lock. *Workshop Statistics: Discovery with Data and Fathom*. 2nd ed. Emeryville, CA: Key College Publishing, 2001.

Course Outline

C2a: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on exploring data.

Unit	Time	Topics and Activities	Resources
1	4 weeks	Exploring Data Distributions *To include, but not limited to using boxplots, dotplots, stem plots, back-to-back stem plots, histograms, frequency plots and parallel boxplots* 1. Data, Variables, and Distributions 2. Data, Variables, and Technology	[C2a] Rossman—Topic 1

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		3. Displaying and Describing Distributions 4. Measures of Center 5. Measures of Spread 6. Exploring Univariate Data 7. Readings and Report	Rossman—Topic 2 Rossman—Topic 3 Rossman—Topic 4 Rossman—Topic 5 Bohan—Chapter 2 Freedman—pp. 29–40, 53–60, 61–69	
2	6 weeks	Exploring Data Relationships *To include, but not limited to, using boxplots, dotplots, stem plots, back-to-back stem plots, histograms, frequency plots and parallel boxplots* 1. Comparing Distributions I: Quantitative 2. Comparing Distributions II: Categorical 3. Graphical Displays of Association 4. Correlation Coefficient 5. Least-Squares Regression 6. Exploring Bivariate Data (including logarithmic and power transformations for linearity) 7. Readings and Report	**[C2a]** Rossman—Topic 6 Rossman—Topic 7 Rossman—Topic 8 Rossman—Topic 9 Rossman—Topics 10 & 11 Bohan—Chapter 3 Freedman—pp. 111–127, 142–145, 149–166, 191–202	**C2a**: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on exploring data.
3	3 weeks	Collecting Data 1. Sampling 2. Designing Studies (bias, blinding, placebo effect) 3. Planning and Conducting a Study: Deciding What and How to Measure (generalizablity of results in observations and experiments) 4. Readings and Report	**[C2b]** Rossman—Topic 12 Rossman—Topic 13 Bohan—Chapter 4 Freedman—	**C2b**: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on sampling and experimentation.

			pp. 1–9, 11–16, 306–321	
4	6 weeks	Randomness in Data *To include but not limited to the study of the Law of Large Numbers, expected value, t-distribution, and chi-square distribution* 1. Probability 2. Anticipating Patterns: Producing Models 3. Normal Distributions 4. Anticipating Patterns: Producing Models 5. Sampling Distributions I: Proportions 6. Sampling Distributions II: Means 7. Central Limit Theorem 8. Sampling Distributions 9. Readings and Report	**[C2c]** Rossman—Topic 14 Bohan—Chapter 5 Rossman—Topic 15 Bohan—Chapter 5, Sections 6–10 Rossman—Topic 16 Rossman—Topic 17 Rossman—Topic 18 Bohan—Chapter 6, Sections 1–3, 5 Freedman—pp. 207–221, 223–235, 77–82, 83–66, 283–293	**C2c**: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on anticipating patterns.
5	7 weeks	Inferences from Data: Principles 1. Confidence Intervals I: Proportions 2. Confidence Intervals I: Means 3. Statistical Inference 4. Tests of Significance: Proportions 5. Tests of Significance: Means 6. Statistical Inference 7. More Inference Considerations 8. Statistical Inference 9. Readings and Report	**[C2d]** Rossman—Topic 19 Rossman—Topic 20 Bohan—Chapter 7, Sections 1–3 Rossman—Topic 21 Rossman—Topic 22 Bohan—Chapter 7, Sections 4–5 Rossman—Topic 23	**C2d**: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on statistical inferences.

				Bohan— Chapter 7, Section 6 Freedman— pp. 429–436, 442–448	
6	5 weeks	Inference from Data Comparisons and Relationships *To include but not limited to the study of Margins of error, point estimators, and least-squares regression line – slope test* 1. Statistical Inference 2. Comparing Two Proportions 3. Comparing Two Means 4. Statistical Inference 5. Inference for Two-Way Tables 6. Statistical Inference 7. Inference for Correlation and Regression 8. Statistical Inference 9. Readings and Report	**[C2d]**	C2d: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on statistical inferences.
	3–4 weeks	Review for the AP Exam	Bohan— Chapter 6, Sections 4 & 7 Rossman— Topic 23 Rossman— Topic 24 Bohan— Chapter 7, Sections 3–5 Rossman— Topic 25 Bohan— Chapter 7, Section 8 Rossman— Topic 26 Bohan— Chapter 7, Section 7 Freedman— pp. 455–461, 475–489, 179–184	

Instruction on technology, with particular emphasis on the TI-83 calculator and Minitab and Fathom software, is incorporated into the pursuit of the regular class activities. **[C5]** Some allowances in the time schedule for the early units have been made to accommodate direct instruction within the context of an assigned activity.

C5—Evidence of Curricular Requirement: The courses teaches students how to use graphing calculators and demonstrates the use of computers and/or computer output to enhance the development of statistical understanding through exploring and analyzing data, assessing models, and performing simulations.

Teaching Strategies

This course is organized as an activity-based experience for students. Lecture is held to a minimum, with the students actively engaged in the discovery and exploration of statistical realities and relationships. This design is consistent with the constructivist philosophy of education. The

teacher attempts to facilitate and guide the students' explorations and formations of hypotheses. Students learn appropriate statistical techniques and a variety of ways to communicate them within the context of statistical activities and experiences. **[C4]**
They learn better than they can from lecture-based teaching of the techniques.

The discovery and exploration are fully supported with technology, particularly the TI-83 calculator and secondarily Minitab and Fathom statistical software. Students are required to have graphing calculators with a full menu of statistical functions; the Mathematics Department does not require any particular brand or model of calculator. However, mathematics teachers at our school tend to prefer the TI-83 calculator.

The course is also devoted to developing the students into competent interpreters and investigators of statistical data and information.
The classroom activities of decision-making and validating/justifying statistical hypotheses are of the highest importance. In this manner, students are required to demonstrate critical connections between the analysis and conclusions of all statistical design experiments. **[C3]**
Because the goal is to develop competent users and receivers of statistical information, proof and algebraic justification are utilized to deepen the students' understanding of statistics and further empower them.

Once the AP Exam has been administered, students explore a variety of statistical topics, including an Analysis of Variance and such other regression models as Multiple Linear Regression. Time is also devoted to polishing each student's major project report.

Assessment
Competency-Based Assessment

At the beginning of the course, each student is presented with a list of competencies for AP Statistics. The categories of evaluations are Excellent, Proficient, Adequate, Marginal, and Unsatisfactory. An example of a student Competency List is given below. Each Competency Grade is subject to revision *at any time throughout the balance of the course*. Revision is accomplished either by administration of a retest of that competency, or by the presentation of evidence by the student in a conference with the teacher. This second option is by far the more popular and provides the beneficial requirement that the student must argue for any changes in rating.

Sample Student Competency List
AP Statistics

Name:_____ Date: _____

Competency	Unit	Exc	Prof	Adeq	Marg	Unsat
Comparing distributions of univariate data graphically: back-to-back stemplots, parallel histograms, multiple boxplots, segmented bar graphs						
Construction and interpretation of graphical displays of bivariate data: scatterplots, regression lines, residual plots, outliers, and influential points	2					
Meaning of and calculation formula for correlation coefficient						
Meaning of and derivation of least-squares line						
Transformations to produce linearity						
Types of studies, experimental design	3					
Random sampling: concept and strategies						