

## Syllabus Development Guide: AP Statistics

**To the AP teacher: Please take full advantage of this guide. It is designed to support you as you develop your syllabus for the AP Course Audit. The guide contains the following sections and information:**

<b>Curricular Requirements</b>	The curricular requirements are the core elements of the course. Your syllabus must provide clear evidence that each requirement is fully addressed in your course.	<b>Important Considerations</b>	Aligned with the Evaluation Guidelines, these statements provide advice on the type of evidence your syllabus should include.
<b>Scoring Components</b>	Some curricular requirements consist of complex, multi-part statements. These particular requirements are broken down into their component parts and restated as “scoring components”. Reviewers will look for evidence that each scoring component is included in your course.	<b>Reference</b>	As appropriate, references to specific sections of the official AP Course Description or other pertinent publications are included here.
<b>Key Terms</b>	To ensure the clarity of certain terms or expressions that may have multiple meanings, each of these terms is clearly defined.	<b>Samples of Evidence</b>	For each scoring component, three separate samples of evidence are provided. These statements provide either verbatim samples from actual authorized syllabi or clear descriptions of what acceptable evidence should look like.
<b>Evaluation Guidelines</b>	These are the exact guidelines used by reviewers as they evaluate the evidence in your syllabus. Use these to interpret any requirement you may find ambiguous.		

Curricular Requirements	Scoring Components, Key Terms, Evaluation Guidelines, Important Considerations, References and Samples of Evidence			
<p><b>Curricular Requirement 1:</b> The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:</p> <p><b>Exploring data</b> Sampling and experimentation Anticipating patterns Statistical inference</p>	<b>Scoring Component 1*: The course provides instruction in exploring data.</b>			
	<b>*Note Each Curricular Requirement may be subdivided into two or more distinct Scoring Components.</b>			
	Key Term(s)	Evaluation Guideline(s)	Important Consideration(s)	Reference
	<p><b>Exploring data:</b> includes calculations of numerical summary statistics, interpreting those summary statistics in context, and creating graphical representations of data and interpreting those graphical representations in context.</p>	<p>The syllabus must provide evidence of both graphical and statistical methods of exploring data. Covering only one of the two approaches is not sufficient.</p> <p>There must be evidence that students are calculating and interpreting statistical results in context.</p>	<p>The syllabus should provide information on the coverage of preparing statistical graphs, calculating summary statistics, and interpreting in context.</p> <p>The summary statistics should include median-based as well as mean-based statistics.</p> <p>Interpreting in context should include a description or an example, not just assignments.</p>	<p>For more information, see course descriptions pages 6-7.</p>
	Samples of Evidence			
	Sample 1	Sample 2	Sample 3	
<p>Students calculate and interpret numerical descriptive statistics and create and interpret graphical statistical displays of data.</p>	<p>When mentioning exploring data, the syllabus states, "Students become familiar with graphical portrayal of data, for example using box and whisker plots, stem plots, and histograms." The syllabus states the, "Students become familiar with descriptive statistics such as the five-number summary, median, mean, variance, and standard deviation."</p>	<p>When mentioning exploring data, the syllabus states, "Samples of graphics and numerical statistics from USA Today are reviewed on a regular basis, with students critiquing the presentations. The class makes extensive use of data sets with students entering data, calculating the summary statistics, and presenting their results graphically."</p>		

<p><b>Curricular Requirement 1 (continued):</b> The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:</p> <ul style="list-style-type: none"> <li>Exploring data</li> <li><b>Sampling and experimentation</b></li> <li>Anticipating patterns</li> <li>Statistical inference</li> </ul>	<b>Scoring Component 2: The course provides instruction in sampling.</b>			
	<b>Key Term(s)</b>	<b>Evaluation Guideline(s)</b>	<b>Important Consideration(s)</b>	<b>Reference</b>
	All terminology in the Scoring Component is clear. No clarification is needed.	Scoring Component is clear and explicit. No Evaluation Guideline is needed.	<p>The syllabus should include mention of the impact of bias in the context of sampling.</p> <p>The idea of planning a sampling procedure, not just knowing the definitions, should be stressed on the syllabus.</p> <p>Simple random sampling, stratified sampling, and cluster sampling should be referenced or mentioned on the syllabus.</p>	For more information, see course description page 7.
	<b>Samples of Evidence</b>			
	<b>Sample 1</b>	<b>Sample 2</b>	<b>Sample 3</b>	
The syllabus states, "The methods of simple random, stratified random, and systematic sampling are discussed and their appropriateness for different situations evaluated."	In the sampling unit, the syllabus states, "Students plan and justify a sampling procedure for given real-life sampling problems. These scenarios span the sampling procedures, and include situations where different possible strategies are arguably reasonable. In student planning, specific issues of potential bias must be addressed. It is not necessary to actually solve completely any issues of bias, but limitations must be noted."	The syllabus provides examples of assignments that provide sufficient detail that students are involved in planning sampling procedures (to include simple random sampling, stratified sampling, and cluster sampling) for a variety of situations. The assignments require that students consider potential bias.		

<p><b>Curricular Requirement 1 (continued):</b> The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:          Exploring data  <b>Sampling and experimentation</b>          Anticipating patterns          Statistical inference</p>	<b>Scoring Component 3: The course provides instruction in experimentation.</b>			
	<b>Key Term(s)</b>	<b>Evaluation Guideline(s)</b>	<b>Important Consideration(s)</b>	<b>Reference</b>
	All terminology in the Scoring Component is clear. No clarification is needed.	Scoring Component is clear and explicit. No Evaluation Guideline is needed.	<p>Students should be actively involved in the design and execution of an experiment.</p> <p>The role of random assignment should be stressed within the syllabus.</p> <p>The role of blocking should be stressed within the syllabus.</p>	For more information, see course description page 7.
	<b>Samples of Evidence</b>			
	<b>Sample 1</b>	<b>Sample 2</b>	<b>Sample 3</b>	
In the experimentation unit, the syllabus states, "Students are presented with problems of experimental design gleaned from newspapers and/or newsmagazine reports. Students must (a) explain the design issues as presented in the report, and (b) flesh out the details as they would improve on the experiment."	Examples of assignments provide sufficient detail on experimental design and stress random assignment and blocking.	Details on chapter coverage include sufficient information on experimental design including the execution of an experiment.		

<p><b>Curricular Requirement 1 (continued):</b> The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:  Exploring data  Sampling and experimentation  <b>Anticipating patterns</b>  Statistical inference</p>	<b>Scoring Component 4: The course provides instruction in anticipating patterns.</b>			
	<b>Key Term(s)</b>	<b>Evaluation Guideline(s)</b>	<b>Important Consideration(s)</b>	<b>Reference</b>
	<b>Anticipating patterns:</b> exploring random phenomena using probability and simulation, including distributions of both discrete and continuous random variables. Probability is a tool for anticipating what the distribution of data should look like under a given model.	The syllabus must include coverage of probability, combining independent random variables, the normal distribution, and sampling distributions.	The elementary rules of probability as they apply to statistics and an understanding of variability should be mentioned on the syllabus.	For more information, see course description page 8.
	<b>Samples of Evidence</b>			
	<b>Sample 1</b>	<b>Sample 2</b>	<b>Sample 3</b>	
A combination of assignments and detailed chapter coverage provides students with instruction in using probability and simulation to model random behavior in real contexts.	The chapter details provided in the syllabus include coverage of instruction on probability, combining independent random variables, the normal distribution, and sampling distributions.	The syllabus includes a variety of assignments related to the graphic and numeric interpretation of chance behavior. In one assignment students study patterned outcomes of chance events by constructing relative frequency histograms of simulated experiments with discrete random variables, and in another students compute probabilities using the normal distribution and other sampling distributions of statistics.		

<p><b>Curricular Requirement 1 (continued):</b> The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:          Exploring data          Sampling and experimentation          Anticipating patterns  <b>Statistical inference</b></p>	<b>Scoring Component 5: The course provides instruction in statistical inference.</b>			
	<b>Key Term(s)</b>	<b>Evaluation Guideline(s)</b>	<b>Important Consideration(s)</b>	<b>Reference</b>
	<b>Statistical inference:</b> the use of sample statistics to make conclusions about the broader population from which the sample was drawn. For the statistics student, statistical inference involves computing and interpreting in context the confidence intervals and hypothesis tests enumerated in the Course Description.	Scoring Component is clear and explicit. No Evaluation Guideline is needed.	The confidence intervals and hypothesis tests as identified in the AP Statistics Course Description should all be explicitly addressed within the syllabus.	For more information, see course description pages 8-9.
	<b>Samples of Evidence</b>			
	<b>Sample 1</b>	<b>Sample 2</b>	<b>Sample 3</b>	
	The syllabus includes detailed coverage of chapters on confidence intervals for a proportion, the difference between two proportions, the mean, the difference between two means, and the slope of the regression line. The syllabus also provides coverage on hypothesis testing for a proportion, the difference between two proportions, the mean, the difference between two means, goodness of fit, homogeneity of proportions, independence, and the slope of the regression line.	The syllabus includes detailed information on assignments covering confidence intervals for a proportion, the difference between two proportions, the mean, the difference between two means, and the slope of the regression line. The syllabus also includes information on assignments on hypothesis testing for a proportion, the difference between two proportions, the mean, the difference between two means, goodness of fit, homogeneity of proportions, independence, and the slope of the regression line.	The syllabus includes a combination of assignments and chapters covering confidence intervals for a proportion, the difference between two proportions, the mean, the difference between two means, and the slope of the regression line. The syllabus also includes a combination of assignments and chapters covering hypothesis testing for a proportion, the difference between two proportions, the mean, the difference between two means, goodness of fit, homogeneity of proportions, independence, and the slope of the regression line.	

<b>Curricular Requirement 2:</b> The course draws connections between all aspects of the statistical process including design, analysis, and conclusions.	<b>Scoring Component 6: The course draws connections between all aspects of the statistical process including design, analysis, and conclusions.</b>			
	Key Term(s)	Evaluation Guideline(s)	Important Consideration(s)	Reference
	<b>Draws connections:</b> assignments or activities that require the students to draw connections among all aspects of the statistical process (exploring data, sampling and experimentation, anticipating patterns, and statistical inference) in a manner that demonstrates an understanding of the overall process of quantitative research. With equivalent emphasis on drawing connections within the four conceptual themes, students should be taught to connect various parts of the statistical process through either a single project or activity or a sequence of project activities. Assignments that demonstrate specific aspects of the course without explicit indication of linking of the conceptual themes are not sufficient.	Simply stating that students complete projects <b>does not</b> provide sufficient evidence. Project descriptions <b>must</b> provide enough detail to infer that students use all aspects of the process.  Reviewers will look for projects or activities that require students to bring together all aspects of the statistical process, including design, analysis, and conclusions. Simply stating that students complete projects <b>does not</b> provide sufficient evidence. Project descriptions <b>must</b> provide enough detail to infer that students use all aspects of the process.	Students should be taught to connect the various parts of the statistical process through either a single project/activity or a sequence of projects/activities.	No references to external documents are needed for this Scoring Component.
	<b>Samples of Evidence</b>			
	Sample 1	Sample 2	Sample 3	
Students (either individually or in pairs) conduct a substantial project using the statistical techniques learned during the course. The project may involve the collection of data or the use of available data and must require that students engage in all stages of the research process.	The syllabus includes an assignment where students complete a written report of their project involving the design and administration of a survey from which they collect and analyze data using descriptive and inferential statistics, drawing conclusions from their analysis.	In the introduction, the syllabus states, "Student projects are assigned as a major and formal assignment in the second semester. Students must, in stages: (a) plan the sampling procedure, (b) clearly define their measurement strategy, (c) anticipate confounding variables in the case of experiments and issues of bias in an observational study (d) suggest their statistical analysis at the planning stage, (e) conduct their analysis, (f) interpret their results in context, and (g) present their results. Both a written report and a short question-and-answer in front of the class are required."		

<p><b>Curricular Requirement 3:</b> The course teaches students how to communicate methods, results and interpretations using the vocabulary of statistics.</p>	<b>Scoring Component 7: The course teaches students how to communicate methods, results and interpretations using the vocabulary of statistics.</b>			
	Key Term(s)	Evaluation Guideline(s)	Important Consideration(s)	Reference
	<p><b>Communicate:</b> formal written and/or oral presentation of data collection methods, analysis via descriptive and/or inferential statistics, and interpretation of the results of analysis in the context of the problem being studied using statistical language. Informal class discussion or answering free response items, for example, do not meet this definition.</p>	<p>The syllabus must include at least one assignment to demonstrate that students communicate methods, results and interpretations using the vocabulary of statistics.</p>	<p>The syllabus should include descriptions of writing and/or presenting reports or assignments that will exemplify how students describe methods, statistical analysis, and interpretation of findings. This description could be of original work, or description and analysis of an existing study.</p>	<p>No references to external documents are needed for this Scoring Component.</p>
	<b>Samples of Evidence</b>			
	Sample 1	Sample 2	Sample 3	
<p>The syllabus states that students write formal assignments (e.g. essays, projects, or formal classroom presentations) that require students to use the language and vocabulary of statistics to describe methods, results, and interpretations in order to complete the assignment.</p>	<p>The syllabus includes a final project that requires a formal written and/or oral presentation that includes statistical methods, vocabulary and interpretations.</p>	<p>The syllabus illustrates an assignment that requires students to provide formal written and/or oral presentations of research reported in newspapers, news magazines, or academic journals. The assignment requires students to describe the statistical methods, vocabulary, and interpretations of their findings.</p>		

<p><b>Curricular Requirement 4:</b> The course 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 exploration and analysis of data, assessment of models, and simulations.</p>	<b>Scoring Component 8: The course teaches students how to use graphing calculators to enhance the development of statistical understanding through exploring data, assessing models, and/or analyzing data.</b>			
	Key Term(s)	Evaluation Guideline(s)	Important Consideration(s)	Reference
	<p><b>Enhance the development:</b> use of technology to enhance development of statistical understanding includes the process of using calculators, computers, or examples of computer output to facilitate student learning of statistical content.</p>	<p>The calculator must be tied to specific assignments and specific uses.</p>	<p>Mentioning that calculators are required for the course is not sufficient.</p> <p>A general statement saying, "The calculator will be used throughout the course to do xxxx" is sufficient evidence.</p> <p>Description of calculator use should permeate the syllabus, not be simply a single "unit" of instruction or a single mention</p>	<p>For more information, see course description pages 9-10.</p>
	<b>Samples of Evidence</b>			
	Sample 1	Sample 2	Sample 3	
<p>In the graphing calculators section, the syllabus states, "In the data exploration chapters students are taught to calculate the relevant statistics and use the List features of their calculators."</p>	<p>Calculator usage is detailed in the chapter coverage throughout the course</p>	<p>The syllabus may state that "Technology is incorporated throughout the text, including the use of graphing calculators. Each chapter in the text has a section on calculator use to give the students instruction and practice with the statistical capabilities of the calculator."</p>		

<p><b>Curricular Requirement 4:</b> The course 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 exploration and analysis of data, assessment of models, and simulations.</p>	<b>Scoring Component 9: The course teaches students how to use graphing calculators, tables, or computer software to enhance the development of statistical understanding through performing simulations.</b>			
	Key Term(s)	Evaluation Guideline(s)	Important Consideration(s)	Reference
	All terminology in the Scoring Component is clear. No clarification is needed.	Scoring Component is clear and explicit. No Evaluation Guideline is needed.	Explicit mention of simulation on the syllabus is sufficient evidence.	No references to external documents are needed for this Scoring Component.
	<b>Samples of Evidence</b>			
	Sample 1	Sample 2	Sample 3	
The syllabus states that, "Simulation of sampling distributions is performed and results of different estimators are analyzed using the German Tank problem."	The textbook procedure for performing simulations is used by the students to simulate probabilistic events.	Students use statistical software to design and execute simulations of chance behavior.		

<p><b>Curricular Requirement 4:</b> The course 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 exploration and analysis of data, assessment of models, and simulations.</p>	<p><b>Scoring Component 10: The course demonstrates the use of computers and/or computer output to enhance the development of statistical understanding through exploring data, analyzing data, and/or assessing models.</b></p>			
	<p>Key Term(s)</p>	<p>Evaluation Guideline(s)</p>	<p>Important Consideration(s)</p>	<p>Reference</p>
	<p><b>Computers and/or computer output:</b> includes the use of statistical computer programs and/or output to facilitate data analysis and simulations.</p>	<p>Mentioning that computers, computer lab, or computer software will be required for the course is not sufficient. The use of computers for word processing, presentation software (e.g. PowerPoint), or related activities is not sufficient.</p> <p>Explicit mention of the use of computer output in the primary text or supplemental materials only is not sufficient.</p>	<p>In the syllabus the use of computers and computer output should be tied to specific topics of the course, in addition to providing examples.</p>	<p>For more information, see course description pages 9-10.</p>
	<p><b>Samples of Evidence</b></p>			
	<p>Sample 1</p>	<p>Sample 2</p>	<p>Sample 3</p>	
	<p>Students use computer software and/or computer output to display transformed data.</p>	<p>The students use statistical software in the completion of assignments or semester projects.</p>	<p>The syllabus states that Minitab, SPSS, or other statistical output are available in the text and used throughout the course.</p>	