

Curriculum Map for: General Statistics

Prepared July 2007 by James Haver

Textbook: Bock, Velleman, and De Veaux. *Stats: Modeling the World*, second edition, Pearson/Addison Wesley, 2007.

Prerequisites: General Statistics is open to any junior or senior who has successfully completed the IIR or Applied Mathematics course. Students wishing to take the course should have a TI-83 or TI-83plus calculator for use during class and at home.

Technology: In addition to regular use of the TI-83, students will be provided with the ActivStats program for classroom and home use.

Scope: General Statistics is a one-semester high school course that is comparable to statistics courses in colleges and universities. Students that take this course will have the option of receiving college credit for the class through Schenectady Community College. While Statistics is a mathematics course, there is a great deal of emphasis throughout the course on communication and interpretation. Students will be expected to justify their choices mathematically and in written form.

TIME	CONTENT	STUDENT SKILLS
September (1 Day)	<p><u>Introduction to Statistics</u></p> <ul style="list-style-type: none"> • Format of the textbook • Class expectations • Discussion of "What is Statistics?" 	<ul style="list-style-type: none"> • Familiarity with the layout of the textbook. • Understand the importance of reading and writing in the course • Understand the importance of technology in the course • Begin to see the impact of statistics on our modern life
(3 Days)	<p><u>Data</u></p> <ul style="list-style-type: none"> • The importance of understanding data • Categorical vs. quantitative 	<ul style="list-style-type: none"> • Be able to answer the who, what, when, where, why and how of data • Classify a variable as categorical or quantitative • Identify the units of any variable
(7 days)	<p><u>Displaying and Describing Categorical Data</u></p> <p>Frequency tables Bar charts Pie charts The area principle Contingency tables Conditional distributions Segmented Bar Charts Simpson's Paradox</p>	<ul style="list-style-type: none"> • Choose an appropriate display for categorical data • Be able to create an appropriate display for categorical data • Be able to read and interpret displays of conditional distributions of one variable for more than one group • Identify situations showing Simpson's Paradox

TIME	CONTENT	STUDENT SKILLS
(7 days)	<p><u>Displaying Quantitative Data</u></p> <ul style="list-style-type: none"> • Histograms • Stem-and-Leaf graphs • Shape, center, and spread • Outliers • Timeplots 	<ul style="list-style-type: none"> • Be able to identify an appropriate display for quantitative data • Be able to construct a display for quantitative data • Know how to compare the distributions of groups by comparing their shape, center, and spread (Activstats) • Understand the impact of outliers in the data • Use a graphing calculator to construct a basic histogram
October (7 days)	<p><u>Describing Distributions Numerically</u></p> <ul style="list-style-type: none"> • Measures of central tendency • Quartiles and interquartile range • Boxplots • Standard Deviation 	<ul style="list-style-type: none"> • Be able to choose an appropriate measure of central tendency to describe data • Understand the standard deviation tells how the data surrounds the mean • Use a graphing calculator to find a 5-number summary of a variable and create a boxplot • Understand which numerical descriptions resist outliers and which do not • Know how to describe numerical summaries in written form
(9 days)	<p><u>The Standard Deviation as a Ruler and the Normal Model</u></p> <ul style="list-style-type: none"> • Standardizing with z-scores • Shifting Data • Rescaling Data • Parameters of the Normal Model 	<ul style="list-style-type: none"> • Recognize when standardization can be used to compare values • Knowing when the Normal model can be used • Be able to calculate the z-score of a situation • Be able to explain the meaning of a z-score calculation • Be able to use the Normal model to estimate observations falling within certain standard deviations of the mean • Know how to find the percentage of data falling below a given value in a Normal model • Use technology to create a Normal model(Activstats)
(4 days)	<p><u>Scatterplots, Association, and Correlation</u></p> <ul style="list-style-type: none"> • Outliers • Correlation coefficient • Causation 	<ul style="list-style-type: none"> • Recognize patterns in a scatterplot • Know how to describe a given scatterplot in detail • Draw conclusions about the value of the correlation

TIME	CONTENT	STUDENT SKILLS
(5 days)	<ul style="list-style-type: none"> • Association vs. Correlation <p><u>Linear Regression</u></p> <ul style="list-style-type: none"> • Linear Model • Residuals • Best Fit • R-squared 	<p>coefficient be able to defend the strength of the value</p> <ul style="list-style-type: none"> • Be able to distinguish between correlation and causation • Be able to distinguish between correlation and association • Know how to create a scatterplot by hand and with technology(Activstats) <ul style="list-style-type: none"> • Be able to explain independent and dependent variables • Recognize when linear regression can be used to describe a relationship between two variables • Know how to find a regression equation by hand and with technology • Know how to use regression to predict values by hand and with technology • Be able to write an explanation of the relationship between variables in a regression equation using appropriate terms and units • Understand how the regression slope and correlations coefficient are related
November (9 days)	<p><u>More relationships between variables</u></p> <ul style="list-style-type: none"> • Nonlinear relationships • Correlation and regression 	<ul style="list-style-type: none"> • Be able to use logarithmic transformations to linearize exponential data • Understand that the correlation coefficient and the regression line can be very influenced by outliers • Find marginal distributions • Be able to describe a summary or display of a re-expressed variable making clear how it was re-expressed

TIME	CONTENT	STUDENT SKILLS
Dec (18 days)	<p><u>Samples and Experimentation</u></p> <ul style="list-style-type: none"> • Methods of collecting data • Planning and conducting surveys • Random sampling • Stratifying • Designing questionnaires • Planning and conducting experiments 	<ul style="list-style-type: none"> • Be able to identify the population in sampling • Be able to recognize bias • Know how to use a calculator to select a simple random sample • Recognize the difference between an observation study and an experiment • Be able to identify bias • Identify all elements of an experiment • Design a randomized experiment • Explain in writing why a randomized comparative experiment can give good evidence for cause and effect relationships