

East Penn School District
Secondary Curriculum

A Planned Course Statement
for

Intro to Probability and Statistics

Course # 318

Grade(s) 11-12

Department: Mathematics

Length of Period (mins.) 42 Total Clock Hours: 126

Periods per Cycle: 6 Length of Course (yrs.) 0.5

Type of Offering: required ✓ elective

Credit: 0.5

Adopted: 6/28/10

Developed by:

Jason Geist

Description of Course 318:

Course Title: Introduction to Probability and Statistics

Description

This course is designed to introduce students to the application of probability and statistics. Topics such as descriptive statistics, discrete probability, normal probability distributions, confidence intervals and hypothesis testing will be covered.

Goals:

- To apply probability and statistical theory to real-life applications so students will develop a deeper understanding of analyzing data.

Requirements:

- Must have at least an 80% in Algebra 2 or at least a 80% in Math Analysis.

Text: Elementary Statistics: Exploring the World 4th Edition

Key to Levels of Achievement (Listed with each learning objective)

Awareness (A):	Students are introduced to concepts, forms, and patterns.
Learning (L):	Students are involved in a sequence of steps and practice activities that involved further development and allow evaluation of process.
Understanding (U):	Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level.
Reinforcement (R):	Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication.

Unit	Num	Objective	Level	Content	Evaluation	Standard
Introduction to Statistics	1.1	<ul style="list-style-type: none"> • The student will define basic statistical terminology. • The student will explain the difference between descriptive and inferential statistics. • The student will classify a data set. • The student will identify populations and samples • The student will distinguish between a parameter and a statistic 	A L U	<ul style="list-style-type: none"> • Define data, statistics, population, sample, parameter, statistic, descriptive statistics, and inferential statistics • Identify populations and samples • Compare a parameter and a statistic 	<ul style="list-style-type: none"> • Teacher Observation • Assignments • Quizzes • Tests • Alternative Assessments 	2.6.11.A 2.6.11.C
	1.2	<ul style="list-style-type: none"> • The student will classify data by type and level. • The student will explain the difference between nominal level of measurement and ordinal level of measurement • The student will explain the difference between interval and ratio levels of measurement 	A L U	<ul style="list-style-type: none"> • Define nominal, ordinal, interval, and ratio levels of measurement. • Classify data sets 	<ul style="list-style-type: none"> • Teacher Observation • Assignments • Quizzes • Tests • Alternative Assessments 	2.6.11.C
	1.3	<ul style="list-style-type: none"> • The student will design a statistical study 	A L U R	<ul style="list-style-type: none"> • Define observational study, experiment, treatment, control group, placebo, simulation, survey, confounding variable, placebo effect, blinding, randomization, and replication. • Discuss different sampling techniques • Decide on data collection methods • 	<ul style="list-style-type: none"> • Teacher Observation • Assignments • Quizzes • Tests • Alternative Assessments 	2.6.11.A
	1.3 Activity	<ul style="list-style-type: none"> • The student will explain the uses and abuses involved in statistical research. 	A L U	<ul style="list-style-type: none"> • Discuss uses, abuses, and ethics of statistical research 	<ul style="list-style-type: none"> • Teacher Observation • Assignments • Quizzes • Tests • Alternative Assessments 	Beyond Standards

Unit	Num	Objective	Level	Content	Evaluation	Standard
Descriptive Statistics	2.1	<ul style="list-style-type: none"> The student will construct a frequency distribution from a data set. The student will interpret data from a given frequency distribution 	A L U	<ul style="list-style-type: none"> Define frequency distribution, classes, limits, widths, midpoint, relative frequency, and cumulative frequency. Construct frequency distribution tables and histograms Construct a cumulative frequency graph. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
	2.2	<ul style="list-style-type: none"> The student will graph quantitative, qualitative, and paired data sets 	A L	<ul style="list-style-type: none"> Construct stem and leaf plots, dot plots, pie chart, Pareto chart and a time series chart Interpret a scatter plot 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
	2.3	<ul style="list-style-type: none"> The student will calculate the measures of central tendency of a given data set. The student will identify outliers in a given data set. The student will classify frequency distribution graphs 	A L U	<ul style="list-style-type: none"> Find mean, median, mode, weighted mean, and the mean of a frequency distribution Classify types of frequency distribution graphs 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.6.11.C
	2.4	<ul style="list-style-type: none"> The student will calculate measures of variation from a given data set. The student will interpret standard deviation. 	A L U	<ul style="list-style-type: none"> Find range deviation, population variance, population standard deviation, and sample standard deviation. Interpret standard deviation using the empirical rule and Chebychev's Theorem. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.6.11.C
	2.5	<ul style="list-style-type: none"> The student will calculate measures of position from a given set of data 	A L U	<ul style="list-style-type: none"> Find 1st, 2nd and 3rd quartiles from a data set Find the interquartile range Create a box and whisker plot Find a z-score 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.6.11.C
Probability	3.1	<ul style="list-style-type: none"> The student will understand basic concepts of probability 	A L U	<ul style="list-style-type: none"> Identify sample space of a probability experiment Identify simple events Use the fundamental counting principle to find the number of ways two or more events can occur 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.A

Unit	Num	Objective	Level	Content	Evaluation	Standard
				<ul style="list-style-type: none"> Distinguish between classical, empirical, and subjective probabilities Find the probability of the complement of an event Use tree diagrams to find more probabilities 		
	3.2	<ul style="list-style-type: none"> The student will find the probability of an event given that another event has occurred. 	A L U	<ul style="list-style-type: none"> Conditional probability Distinguish between dependent and independent events Use the multiplication rule to find the probability of two events happening in sequence. Use the multiplication rule to find conditional probabilities 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.A
	3.3	<ul style="list-style-type: none"> The student will calculate probabilities using the addition rule. 	A L U	<ul style="list-style-type: none"> Determine if two events are mutually exclusive Use the addition rule 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.A
	3.4	<ul style="list-style-type: none"> The student will apply counting principles to find probabilities 	A L U R	<ul style="list-style-type: none"> Use permutations to find probability Use combinations to find probability 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.A
Discrete Probability Distributions	4.1	<ul style="list-style-type: none"> The student will construct, graph, and verify probability distributions 	A L U	<ul style="list-style-type: none"> Define random, discrete, continuous variables. Construct and verify a discrete probability distribution. Find the expected value of a discrete random variable. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
	4.2	<ul style="list-style-type: none"> The student will perform a binomial experiment. 	A L U	<ul style="list-style-type: none"> Determine if a probability experiment is a binomial experiment. Find binomial probabilities using the binomial probability formula. Find binomial probabilities using technology, formulas, and a binomial probability table Graph a binomial distribution. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.A

Unit	Num	Objective	Level	Content	Evaluation	Standard
				<ul style="list-style-type: none"> Find the mean, variance, and standard deviation of a binomial probability distribution. 		
	4.3	<ul style="list-style-type: none"> The student will complete a geometric distribution. 	A L U	<ul style="list-style-type: none"> Find probabilities using the geometric distribution. Find probabilities using the Poisson distribution. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.E
Normal Probability Distributions	5.1	<ul style="list-style-type: none"> The student will interpret graphs of normal probability distributions. 	A L U	<ul style="list-style-type: none"> Interpret graphs of normal probability distributions. Find areas under the standard normal curve. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.A
	5.2	<ul style="list-style-type: none"> The student will calculate probabilities for normally distributed variables 	L U	<ul style="list-style-type: none"> Use technology to find the probabilities of normally distributed variables. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.E
	5.3	<ul style="list-style-type: none"> The student will calculate values that correspond to normal distributions. 	A L U	<ul style="list-style-type: none"> Find z-score given the area under the normal curve. Convert a z-score to an x-value Find a data value of normal distribution given the probability 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.E
	5.4	<ul style="list-style-type: none"> The student will calculate sampling distributions and verify their properties. 	A L U	<ul style="list-style-type: none"> Interpret the central Limit Theorem Apply the Central Limit Theorem to find the probability of a sample mean 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	2.7.11.E
	5.5	<ul style="list-style-type: none"> The student will approximate a binomial distribution. 	L U R	<ul style="list-style-type: none"> Find the correction for continuity. Use the normal distribution to approximate binomial probabilities. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
Confidence Intervals	6.1	<ul style="list-style-type: none"> The student will be able to construct confidence intervals. 	A L U	<ul style="list-style-type: none"> Find a point estimate and margin of error. Construct and interpret confidence intervals for population mean. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards

Unit	Num	Objective	Level	Content	Evaluation	Standard
				<ul style="list-style-type: none"> Determine the minimum sample size required when estimating the population parameter. 		
	6.2	<ul style="list-style-type: none"> The student will construct confidence intervals for the mean of a small sample. 	L U	<ul style="list-style-type: none"> Interpret the t-distribution and use the t-distribution table. Construct confidence intervals when $n < 30$. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
	6.3	<ul style="list-style-type: none"> The student will construct confidence intervals for population proportions. 	L U	<ul style="list-style-type: none"> Find a point estimate for the population proportion. Determine the minimum sample size required when estimating a population proportion. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
	6.4	<ul style="list-style-type: none"> The student will construct confidence intervals for variance and standard deviation. 	L U	<ul style="list-style-type: none"> Interpret the chi-square distribution and use a chi-square distribution table. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
Hypothesis Testing (Optional)	7.1	<ul style="list-style-type: none"> The student will understand each step needed to complete a hypothesis test. 	A L	<ul style="list-style-type: none"> Define hypothesis test State a null hypothesis and an alternative hypothesis. Identify type I and type II errors and the level of significance. Know when to use a one-tailed or two-tailed statistical test. Make decisions based on the results of a statistical test. Write a claim for a hypothesis test. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards
	7.2	<ul style="list-style-type: none"> The student will hypothesis test for the mean. 	A L U	<ul style="list-style-type: none"> Find P-values Use P-values for a z-test. Find critical values and rejection regions in a normal distribution. Use rejection regions for a z-test. 	<ul style="list-style-type: none"> Teacher Observation Assignments Quizzes Tests Alternative Assessments 	Beyond Standards