

CHAMBERSBURG AREA SCHOOL DISTRICT  
COURSE OF PLANNED INSTRUCTION

SCHOOL Senior High DEPARTMENT Mathematics DATE October 2004

COURSE TITLE Probability & Statistics GRADE 11, 12 COURSE LENGTH ½ year

LESSON FREQUENCY (PER WEEK) 5 TIME 43 MIN COURSE REVISED October 2004

COURSE CREDIT ½ credit COURSE REQUIRED \_\_\_\_\_ ELECTED X .

I. MAJOR COURSE OBJECTIVES AND STUDENT PERFORMANCE INDICATORS

All Students Will:

A. Understand the fundamental basis of statistics.

1. Identify variables, populations, and samples.
2. Compare descriptive and inferential statistics.
3. Explain random samples and simulate a random process.

Standards: 2.6.11.A, E

Anchor: M11.E.1.1

4. Describe and identify components of simulations, observational studies, and experiments.

Standards: 2.6.11.A, G

B. Choose and apply appropriate methods for organizing data.

1. Determine types of graphs appropriate for specific data.

Standards: 2.6.11.A, B

Anchor: M11.E.1.1

2. Construct bar graphs, Pareto charts, circle graphs, time plots, histograms, relative-frequency histograms, and stem-and-leaf displays.

Standards: 2.6.11.A, B

Anchor: M11.E.1.1

3. Interpret information displayed in graphs.

Standards: 2.6.11.A, B

Anchor: M11.E.1.1

4. Recognize basic distribution shapes.

Standards: 2.6.11.I

C. Understand averages and variations.

1. Calculate and interpret measures of center and spread.

Standards: 2.6.11.A

Anchor: M11.E.2.1

2. Compute the coefficient of variation and explain its significance.

Standards: 2.6.11.A

3. Apply Chebyshev's theorem to raw data.

Standards: 2.6.11.A

4. Interpret percentile scores.

5. Draw and interpret box-and-whisker plots.

Standards: 2.6.11.B

Anchor: M11.E.1.1

D. Relate data, functions, and models.

1. Create and interpret scatter diagrams.

Standards: M11.E.4.2

Anchor: 2.6.11.C, D

2. Estimate lines of best fit and correlation coefficients.

Standards: M11.E.4.2

Anchors: 2.6.11.C, D

3. Identify explanatory and response variables.

Standards: 2.6.11.F

4. Find and graph the least-squares line.

Standards: 2.6.11.C

5. Define, compute and interpret correlation coefficients.

Standards: 2.6.11.F

E. Understand the elementary probability theory.

1. Explain and apply basic rules of probability.

Standards: 2.7.11.B

Anchors: M11.E.3.1

2. Explain the relationship between statistics and probability.

Standards: 2.5.11.B, 2.7.11.C

3. Compute probabilities of compound, independent, and mutually exclusive events.

Standards: 2.7.11.E

Anchors: M11.E.3.1

4. Organize outcomes using tree diagrams.

Standards: 2.6.11.B

5. Compute number of outcomes using permutations and combinations.

Standards: 2.7.11.E

Anchors: M11.E.3.2

6. Relate probabilities to everyday life.

Standards: M11.E.3.1

Anchors: 2.7.11.A, E

F. Apply the Binomial Probability Distribution

1. Distinguish between types of random variables.

2. Graph probability distributions.

Standards: 2.6.11.B

3. Compute standard deviation.

Standards: 2.6.11.B

4. Define the features of a binomial experiment.

Standards: 2.6.11.A, G

5. Use binomial probability in real-world applications.

Standards: 2.6.11.A

Anchors: M11.E.1.1

6. Make histograms for binomial distribution.

Standards: 2.6.11.A

Anchors: M11.E.1.1

G. Use and understand normal distributions.

1. Graph a normal curve and summarize important properties.

Standards: 2.6.11.I

2. Use the empirical rule to solve real-world problems.

Standards: 2.6.11.I

3. Construct and interpret control charts.

4. Perform conversions involving z scores and standard deviation.

Standards: 2.6.11.B

5. Graph and find areas under the normal distribution curve.

Standards: 2.6.11.I, 2.11.11.F

6. Find and interpret inverse normal distribution.

Standards: 2.6.11.I

7. Make connections between normal distribution and binomial distribution.

Standards: 2.5.11.B, C

H. Explore sampling distributions

1. Define commonly used terms for sampling distributions.

2. Construct a relative frequency distribution for raw data and make comparisons to a theoretical sampling distribution.

Standards: 2.6.11.B, E

3. Use standard deviation to construct sampling distributions.

Standards: 2.6.11.A, B

4. Learn the statement and meaning of the central learning theorem, and apply it to a data set.

Standards: 2.6.11.A, B

I. Use estimation on standard deviation and binomial distribution probability.

1. Explain confidence and freedom levels, error of estimate, and critical value.

Standards: 2.6.11.G

2. Compute and interpret confidence intervals for standard deviation for large and small populations.

Standards: 2.6.11.E, G, H

3. Estimate the probability of success in binomial distribution.

Standards: 2.6.11.D

Anchor: M11.E.4.1

4. Interpret poll results and margin of error.

Standards: 2.6.11.A, D, G

Anchors: M11.E.4.1

5. Compute the sample size to be used for estimating a mean standard deviation and a proportion probability of success.

Standards: 2.6.11.E

J. Gain a basic understanding of hypothesis testing.

1. Identify the null and alternate hypotheses in a statistical set.

Standards: 2.6.11.G

2. Recognize types of errors, level of significance, and power of a test.

Standards: 2.6.11.G

3. Use the hypotheses to identify an appropriate critical region.

Standards: 2.6.11.G

4. Compute critical values and regions for sample sets of standard deviation.

Standards: 2.6.11.B

5. Compute the sample test statistic.

Standards: 2.6.11.B

6. Understand the concept of statistical significance.

Standards: 2.6.11.G

7. Identify the meaning of and compute  $P$  values for sample sets.

Standards: 2.6.11.B

8. Draw test conclusions based on the  $P$  value and level of significance.

Standards: 2.6.11.D

9. Identify the components and critical values for testing a proportion.

Standards: 2.6.11.G

## II. CONTENT OUTLINE AND TIME ALLOCATION

- A. Understand the fundamental basis of statistics.
- B. Choose and apply appropriate methods for organizing data.
- C. Understand averages and variations.
- D. Relate data, functions, and models.
- E. Understand the elementary probability theory.
- F. Apply the Binomial Probability Distribution
- G. Use and understand normal distributions.
- H. Explore sampling distributions
- I. Use estimation on standard deviation and binomial distribution probability.
- J. Gain a basic understanding of hypothesis testing.

### III. TEXTS, MATERIALS, AND MAJOR RESOURCES

Understanding Basic Statistics: Evanston, Illinois: McDougal Littell, 2004.

### IV. PROCEDURES FOR ASSESSMENT OF PA ACADEMIC STANDARDS

Teacher designed quizzes and tests and/or standard text tests  
Midterm and cumulative exams as designated by District policy  
Teacher observation  
Class participation, group discussions, and teacher conference  
Teacher, peer, self-assessment of performance  
Special reports and research  
Student presentations  
Opportunity for alternative assessment as deemed appropriate by the teacher

### V. SPECIAL CONDITIONS OR PREREQUISITES

### VI. COURSE EVALUATION PROCEDURE

All planned courses will be monitored by the department chair and building administrators and revised according to the District's revision cycle.

### VII. ACCOMMODATIONS

The needs of students in the learning support and gifted programs are met through a variety of adaptations, modifications or enrichments to the planned course. If a student has an IEP or a GIEP (Gifted individual Education Plan), specific strategies and accommodations for that student will be identified in his or her individualized educational plan under the section called specially designed instruction. The learning support and gifted teachers are available to provide classroom teachers with any kind of assistance in providing accommodations.