

**ILLINOIS EASTERN COMMUNITY COLLEGES**  
**DUAL CREDIT COURSE SYLLABUS**  
**Flora High School**

**College:** Frontier Community College

**Term:** Fall

**Year:** 2019

**IECC Course Number:** MTH 1131

**Section:**

**Title:** Introduction to Statistics

**High School Course Number:** 2011.01, 2011.02, 2011.03

**Credit:** 3

**High School Course Name:** Statistics

**Instructor Information:**

**Name:** Rachel Webb

**Office location and phone number:** Flora High School

**Office hours:** N/A

**Class Meeting Times, Days, Locations:** MTWRF 8:58 - 9:43, 9:47 - 10:32, 1:39 - 2:24, Room 7C Flora High School

**Course Catalog Description / Prerequisites:** Focuses on mathematical reasoning and the solving of real-life problems, rather than on routine skills and appreciation. Descriptive methods (frequency distributions, graphing and measures of location and variation), basic probability theory (sample spaces, counting, factorials, combinations, permutations, and probability laws), probability distributions (normal distributions and normal curve, binomial distribution, and random samples and sampling techniques), statistical inference (estimation, hypothesis testing, t-test, and chi-square test, and errors), and correlation and regression. PREREQUISITE: PRE 0420 Intermediate Algebra with a grade of C or better, or REM 0422 Math Literacy, or two years of college preparatory algebra with a grade of C or better, or sufficient score on the placement test, or consent of instructor. Lecture.

**Required Textbooks, Reference, and Other Materials: Recommended Textbooks and Reference Materials:**

ELEMENTARY STATISTICS, Weiss, current edition, ISBN: 9780321691231 (FCC)

**Attendance Requirements:** Attendance Regular class attendance is necessary if a student is to receive maximum benefits from work. Regular attendance is the responsibility of the student. All absences and arrangements for make-up work are arranged directly with the instructor, who is responsible for determining whether the absence is excused. When the quality of work has been affected by absences or tardiness, the instructor may recommend that the student be dropped from the course. The student will be notified of the administrative withdrawal. Make up work for illness and other absences may be accepted at the discretion of the instructor

**Methods of Instruction:** Lecture/discussion with the primary emphasis on problem solving/group work (at the discretion of individual instructor).

**Methods of Student Evaluation and Grading Scale:** Methods of Student Evaluation:

The primary means of evaluating students will be their performance on tests and quizzes. Projects and papers may also be used as determined by individual instructor. Student effort as demonstrated on assignments, participation in class, and attendance also may be considered.

A semester hour is the unit used to measure credit. One semester credit hour is awarded for the successful completion of one hour per semester of lecture activity or two hours per week per semester of lab activity. While credit is awarded to recognize that the student has accomplished all course requirements, the following grades and symbols are awarded to reflect the quality of that performance.

cc: College and Student

## Flora Grading Scale

| Grade | Range  |
|-------|--------|
| A     | 95-100 |
| A-    | 94     |
| B+    | 93     |
| B     | 87-92  |
| B-    | 86     |
| C+    | 85     |
| C     | 78-84  |
| C-    | 77     |
| D+    | 76     |
| D     | 70-75  |
| D-    | 69     |
| F     | 0-68   |

### **Student Learning Outcomes:**

#### **Successful completers will:**

#### **1. Organization, Presentation and Description of Quantitative Data**

A. organize and graph quantitative data.

B. apply the definitions, properties, and functions of the following descriptive statistics and calculate their values from small data sets: means, medians, variances, standard deviations, correlation coefficients.

#### **2. Probability and Probability Distributions**

A. recognize certain data sets as being the result of random experiments, determine the relative frequency of certain events related to these experiments and use probability language to express those determinations.

B. express and provide examples of the interpretation of the probability of an event as the limit of the relative frequency of that event in repeated experiments, express and provide examples of alternative interpretations of probability.

C. determine probabilities of events through the application of the standard ideas in elementary probability (e.g. the "addition rule," the "multiplication rule," counting techniques, independence of events, conditional probability,...).

D. given a random experiment with a random variable defined on its sample space, construct the probability function of the random variable and determine probabilities of events described in terms of random variables.

E. give examples of continuous random variables, their probability density functions, the determination of probabilities of events described in terms of random variables, and, for certain simple distributions (e.g. the normal distribution), find probabilities of events, given the mean and standard deviation of the random variable.

F. establish the parameters and properties of a sampling distribution comprised of both sample means and sample proportions.

### 3. Sampling and Statistical Inference

- A. state the Central Limit Theorem as it applies to sample means and state the properties of the distribution of the sample proportions.
- B. list properties of estimators of population proportions and means and find corresponding estimates from sample data.
- C. list properties of interval estimates of means and proportions, standard deviation and variance and construct confidence intervals from sample data.
- D. state appropriate hypotheses and alternatives concerning population means and proportions, standard deviation and variances and test these using sample data.

### 4. Communicate statistical concepts in writing.

### 5. Utilize statistical technology.

**Detailed Course Outline:** (Note: *The instructor reserves the right to modify the detailed course outline when necessary.*)

Topical Outline:

|   |   |
|---|---|
| I. The Nature of Probability and Statistics; Frequency Distributions and Graphs | 6 |
| Introduction and Basic Terminology  |   |
| Descriptive and Inferential Statistics  |   |
| Variables and Types of Data   |   |
| Organizing Data   |   |
| Histograms  |   |
| Frequency Polygons, Ogives, and Other Types of Graphs                           |   |
| Graphing Calculator and/or Computer Applications.                               |   |
| II. Data Description  | 6 |
| Measures of Central Tendency  |   |
| Measures of Variation   |   |
| Measures of Position  |   |
| Graphing Calculator and/or Computer Applications                                |   |
| III. Probability  | 6 |
| Sample Spaces and Probability Rules   |   |
| Addition and Multiplication Rules for Probability                               |   |
| Complementary Events  |   |
| Conditional Probability and Independence  |   |
| Counting Methods, Combinations, Permutations, Factorials                        |   |
| Graphing Calculator and/or Computer Applications                                |   |
| IV. Probability Distributions   | 5 |
| Probability Distributions   |   |
| Mean, Variance, and Expectation   |   |
| The Binomial Distribution   |   |
| Graphing Calculator and/or Computer Applications                                |   |
| V. The Normal Distribution  | 7 |
| Properties of the Normal Distribution   |   |

The Standard Normal Distribution  
The Central Limit Theorem  
The Normal Approximation to the Binomial Distribution  
Graphing Calculator and/or Computer Applications

|  |   |
|--|---|
| VI. Linear Regression and Correlation                            | 3 |
| Linear Regression with One Independent Variable                  |   |
| Scatter Plots  |   |
| The Regression Equation  |   |
| The Coefficient of Determination and Standard Error of Estimate  |   |
| Graphing Calculator and/or Computer Applications                 |   |
| VII. Estimation and Sample Size                                  | 6 |
| Introduction to Estimation                                       |   |
| Point Estimate, Interval Estimate, and Confidence Interval       |   |
| Estimates and Samples Sizes for Means                            |   |
| Estimates and Sample Sizes for Proportions                       |   |
| The Chi-Square Distribution and estimates for variance/Std. Dev. |   |
| Graphing Calculator and/or Computer Applications                 |   |
| VIII. Hypothesis Testing   | 6 |
| Steps in Hypothesis Testing                                      |   |
| The z-test   |   |
| The t-test   |   |
| Test for proportions   |   |
| Test for Variance and Standard Deviation                         |   |
| Additional Topics Regarding Hypothesis Testing (optional)        |   |
| Graphing Calculator and/or Computer Applications                 |   |

Total Contact Hours: 45