

# **COURSE OUTLINE**

## **MATH 138**

### **Statistics**

4 Semester Hours

## **HOWARD COMMUNITY COLLEGE**

### **Description**

In this course, students will develop the skills necessary to examine basic statistical terminology; develop pictorial and analytical distributions; and use statistics tables, a calculator, and a computer to calculate measures of central location and measures of variation. The student will additionally examine the normal distribution, correlation, and regression analysis, sampling, testing hypotheses, the chi square test, and probability related to statistics. Classes will require use of a statistical computational package such as Minitab. Prerequisite: MATH 070 (4 hours weekly)

### **Overall Course Objectives**

Upon completion of this course, the student will be able to:

1. Use statistical tables, calculator and computer to solve certain problems.
2. Calculate measures of central locations and measures of variation.
3. Present data in a readable form gathered on a survey.
4. Solve probability problems and make decisions based on given probabilities.
5. Present various types of distributions and calculate their mean and standard deviation.
6. Calculate a correlation and state its meaning.
7. Calculate a regression equation.
8. Test hypotheses.
9. Find appropriate samples.
10. Use the chi square test.
11. Use a statistical computational package.

### **Major Topics**

#### **Introduction**

Population vs. Sample

Data and Data Summarization

Statistical Inference

#### **Descriptive Statistics**

Data Scales of Measurement

Summarizing Qualitative, Quantitative and Bivariate Data

Measures of Location and Dispersion

Chebyshev's Theorem and the Empirical Rule

Measures of Location and Dispersion for Grouped Data

Box Plots, histograms and other graphs

#### **Introduction to Counting Techniques, Combinations, Permutations, and Probability**

Experiments, Events and their Probabilities

Union and Intersection of Events, Addition Rule, Mutually Exclusive Events

Conditional Probability, Independent Events, Multiplication Rule

#### **Random Variables**

Discrete Random Variables, Expected Value and Variance

Binomial Probability Distribution

**Continuous Probability Distributions**

Uniform, Normal and Standard Normal Distributions

Computing Probabilities for any Normal Distribution

Normal Approximation to the Binomial Distribution

**Sampling and Sampling Distributions**

Simple Random Sampling, Cluster Sampling, Stratified Random Sampling,

Systematic, and Convenience Sampling

Sampling Distribution of  $\bar{x}$  and Finding Probabilities

The Central Limit Theorem

**Inference About a Population Mean**

Point and Interval Estimates

Hypothesis Testing

Inferences Using Small Samples

**Inferences About a Population Proportion**

Sampling Distribution of  $\hat{p}$

Interval Estimates

Hypothesis Testing

**Inferences Involving Two Populations**

Interval Estimates and Hypothesis Testing with Means and Proportions

**Inference About Population Variances**

Chi-Squared Distribution

Goodness-of-Fit

Test of Independence

**Course Requirements**

Grading procedures will be determined by the individual faculty member but will include the following:

Several unit exams and several projects using computer software, and required certificates using a software package students can load on their home machines.

Comprehensive departmental final

A graphing calculator such as the TI83+ is required.

**Other Course Information**

This course may be used as a Mathematics core course or as a Mathematics elective. Check your transfer institution to guarantee transferability.