# COURSE OUTLINE

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT205</td>
<td>Statistics for Social and Health Sciences II</td>
<td>3</td>
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<thead>
<tr>
<th>3/Week</th>
<th>0/Week</th>
<th>0/Week</th>
<th>0/Week</th>
<th>15 Weeks</th>
</tr>
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<tbody>
<tr>
<td>Class or Laboratory</td>
<td>Laboratory, Shop</td>
<td>Work</td>
<td>Semester</td>
<td>Length</td>
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<tr>
<td>Lecture</td>
<td>Work Hours</td>
<td>Studio or Clinic</td>
<td>Experience</td>
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Performance on An Examination/Demonstration

: **Prerequisites:** MAT200 with a minimum C grade or permission of department

**Catalog Description:**

A second semester course in an academic year sequence for social sciences, humanities, nursing, and related fields. Topics include probability, inference for two parameters, inference for regression and correlation, analysis of variance, analysis of categorical data, and nonparametric statistics. [Spring offering]

**Latest Review:** Fall 2014


Calculator: Scientific or graphing calculator required

Revised 2014  **Course Coordinator:** Leslie S. Grunes, 609-570-3865, grunesl@mccc.edu

**Information resources:**

- The library has many books, CDs and videos available.
- The Library Computer Lab has Internet access and MINITAB installed for student use.
- The Learning Center has tutoring and help available to the students.
Course Competencies/Goals Objective:

The student will be able to:

I. Calculate probabilities by applying the various rules
II. Test hypotheses in drawing conclusion about the means or proportions from 2 independent populations, or match pairs
III. Calculate confidence intervals of the means or proportions from 2 independent populations, or match pairs
IV. Do inferences about the to draw conclusions about the population regression line
V. Hypothesis testing from a 2 way table of counts in a contingency table.
VI. Perform Analysis of Variance for a one factor, block and factorial designs
VII. Hypothesis testing using nonparametric techniques

Course-specific General Education Knowledge Goals and Core Skills.

General Education Knowledge Goals

Goal 1. Communication. Students will communicate effectively in both speech and writing.

Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

MCCC Core Skills

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.

Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.

Goal E. Computer Literacy. Students will use computers to access, analyze, or present information, solve problems, and communicate with others.
Units of study in detail.

UNIT I - Probability

1. Sample space and events. (CG 1, GE 2,B)
2. Probability of events (CG 1, GE 2,B)
3. Find probability of (CG 1, GE 2,B)
   P (A or B) (Addition Rule)
   P (not A) (Complement Rule)
   P (B given A) (conditional probability)
4. Independent and dependent events (CG 1, GE 2,B)
5. Multiplication Rule (CG 1, GE 2,B)

UNIT II - Inference

1. The student will know how to test for variances from two independent normal populations using the F-test. (CG II GE 2,4,B,E)
2. The student will test the means of two independent populations using the z-test or t-test depending on the shape of the populations and the size of the samples. (CG II GE 2,4,B,E)
3. The student will find the confidence interval of the difference of two means using either t-statistic or z-statistic. (CG II GE 2,4,B,E)
4. The student will test hypothesis for two proportions sampled from two large independent populations using the z-test. (CG II GE 2,4,B,E)
5. The student will find the confidence interval of difference of two proportions from large independent populations. (CG II GE 2,4,B,E)

UNIT III Inference for Regression and correlation

1. Given a sample with two variables x, y, the student should be able to calculate the correlation coefficient (CG IV GE 2,4,B,E).
2. The student should test the hypothesis \( \rho = 0 \) using the t-test. (CG IV GE 2,4,B,E)
3. The student should calculate the linear regression \( y' = mx + b \) that is, find the calculated values of m and b using the least squares formula. (CG IV GE 2,4,B,E)
4. The student construct the confidence interval of \( y' \) by calculating least squares fit y using the t-statistics. (CG IV GE 2,4,B,E).
5. The student calculates the coefficient of determination $r^2$. (CG IV, GE 2,4,B, 6. The student calculates the linear regression $y$ in terms of two variables $x_1$, $x_2$. (CG IV, GE 2,4,B,E)

UNIT IV Chi-square and Analysis of Variance

Chi-Square

1. The student will use contingency table analysis testing hypotheses on equality of K proportions or the independence of two variables using the $X^2$-statistic. (CG,GE 2,4,B,C)

Analysis of Variance

1. The student will test the equality of K means from samples from K different populations of one factor using Analysis of Variance. (CG VI GE 1,2,3,B,E)

2. The student will test of the equality of means along with its interaction of two factors using the Analysis of Variance. (CG VI GE 1,2,3,A,B,C)

UNIT V - Nonparametric Statistics

1. The student will know the advantages and disadvantages of a nonparametric test (CG VII,GE 1,2,4,A,B,C).

2. The student will know the assumptions needed and the appropriate hypothesis to apply the following tests: (CG vii, GE 2,4,A,B,C)

   A. Sign Test
   B. Wilcoxon Signed-Ranks Test for two Dependent Samples
   C. Wilcoxon Rank-Sum Test for two Independent Samples
   D. Kruskal - Wallis Test
   E. Rank Correlation
   F. Runs Test for Randomness

EVALUATION

An examination after each unit. Computer projects using MINITAB will be incorporated throughout the course.

Academic Integrity Statement:

Mercer County Community College is committed to Academic Integrity – the honest, fair, and continuing pursuit of knowledge, free from fraud or deception. Students should never:

- Knowingly represent the work of others as their own
- Knowingly represent previously completed academic work as current
- Fabricate data to support academic work
- Use or obtain unauthorized assistance in the execution of any academic work
- Give fraudulent assistance to other students
- Unethically use technological means to gain academic advantages
Violators of the above actions will be penalized, and offenders will be reported to the Academic Integrity Committee. Please see the Student Handbook on Academic Integrity for additional details.