Huntingdon College
W. James Samford, Jr. School of Business and Professional Studies

COURSE NUMBER: BUS329
COURSE NAME: Foundations of Quantitative Methods
Fall 2015, Session II – Fairhope
Wednesday, 10/ 7, 14, 21, 28, 11/ 4 from 5:30 p.m. - 9:30 p.m.

INSTRUCTOR’S NAME: Dr. Charles Lake

CONTACT INFORMATION: charles.lake@hawks.huntingdon.edu

COURSE DESCRIPTION: Descriptive Statistics; probability and probability distribution; statistical inferences and hypothesis testing; simple regression analysis. Also, the course will cover various statistical applications in quality control, marketing, finance, economics, and other areas of business.

PREREQUISITE: None

TEXT REQUIRED:
A First Course in Statistics, McClave & Sincich (Pearson) (see Huntingdon College booklist for edition and ISBN)

COURSE LEARNING OUTCOMES:

1. Present data in tables and charts.
2. Summarize and describe numerical data.
3. Recognize the appropriate application of statistical methods and the correct interpretation of data and studies.
4. Calculate confidence interval estimations
5. Utilize linear regression

Week 1: Methods for Describing Data and Probability

This portion of the module is an introduction to describing data sets, probability theory and discrete and continuous random variables. Upon completion students will be able to utilize native Excel and/or the MegaStat Excel add-in to:

1. Describe categorical data with frequency distribution tables, bar charts, and pie charts.
2. Describe quantitative data with frequency distribution tables, dot plots, and histograms.
3. Generate and interpret measures of central tendency and dispersion for quantitative variables.
4. Describe quantitative data with a five-number summary and related box-whisker plot.
5. Describe linear relationships between two variables with a scatter-plot
6. Explain how to assign probabilities.

Week 2: Random Variables and Probability Distributions

This portion of the module is an introduction to the two types of random variables and probability distributions. Upon completion students will be able to:

1. Distinguish between the two types of random variables.
2. Compute the expected value & variance of discrete random variables.
3. Describe the Binomial.
4. Calculate probabilities for Binomial random variables using tables or an Excel function.
5. Describe the Normal random variable.
6. Calculate probabilities for Normal random variables using tables or an Excel function.
7. Calculate the value of a Normal random variable given an associated probability.

Week 3: Statistical Inference; Confidence Intervals & Hypothesis Testing

This portion of the module is an introduction to statistical inference: confidence intervals and hypothesis testing. Upon completion students will be able to:

1. Compute a confidence interval for a population mean assuming the population standard deviation is unknown.
2. Interpret the meaning of a confidence interval using managerial language.
3. Formulate the null and alternative hypotheses used in hypothesis testing for a population mean.
4. Identify Type I and Type II errors.
5. Conduct one-tailed and two-tailed hypothesis tests for a population mean, assuming unknown sigma and using t-tables.
6. Obtain and interpret the observed significance level (p-value) for a one-tailed or two-tailed statistical test.
7. Conduct hypothesis tests for the difference between two population means.

Week 4: Linear Regression

This portion of the module is an introduction to linear regression. Upon completion students will be able to:

1. Obtain the equation for the least-squares regression line through a set of data points using native Excel
2. Interpret, within a business context, the meanings of slope and intercept of a least squares regression line.
3. Obtain a confidence interval for the linear regression slope and interpret the meaning of the interval.
4. Obtain the coefficient of correlation and the coefficient of determination for linearly related bivariate data and interpret the coefficients within a business context.
5. Use the least-squares regression line for estimation and prediction.

**Week 5: Final Exam Project**

In this portion of the module students are expected to be able to conduct data analysis using the appropriate tool with the aid of Excel. Upon completion students will be able to:

1. Select the correct numerical and graphical method for summarizing variables depending on the data type.
2. Utilize the appropriate probability distribution to compute probabilities within a business context.
3. Conduct the appropriate inference procedure (estimation or hypothesis test) to answer pertinent questions within a business context.
4. Generate linear regressions and interpret the computer output involving slope, intercept, prediction/confidence intervals, and measures of fit in order to answer questions appropriately within a business context.

**Grading Elements**

<table>
<thead>
<tr>
<th>Grading Elements</th>
<th>Percentage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Assignments and Homework</td>
<td>40%</td>
</tr>
<tr>
<td>Final project</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

**GRADE POINT EQUIVALENTS** - Describe the point range for each letter grade.

- A = 90 – 100
- B = 80 – 89
- C = 70 – 79
- D = 60 – 69
- F = 0 – 59

**ATTENDANCE POLICY:**

**Absences and Tardiness** – All students are required to attend the first session. Those who do not attend the first session will be automatically dropped from the course. Students with more than one absence will receive an "F" for the course. Since this class meets only five times, missing a single class meeting is equivalent to missing three weeks of a regular term. If you cannot attend a class you must let the instructor know via email as soon as possible. In case of absences you are responsible for obtaining all handouts and assignments. Tardiness may result in a deduction in your class participation grade. Excessive tardiness may count as an absence.

**Participation** – Participation is not the same as attendance. Participation requires students to come to class prepared to actively participate, which makes the classroom
experience more meaningful. However, participation is not just speaking out in class. The contributions made by the student should be related to the course content and meaningful to the class discussion.

**Late Assignments** – *No shows* fail the assignment. It is expected that the students fulfill their assignments on the date they are scheduled to do so. Students with illness or other problems that prevent them from attending class on the day a presentation or written assignment (including a test and/or exam) is due must contact their instructors PRIOR to the deadline via Huntingdon College email with supporting documentation to request an extension or a make-up. In most cases, missed assignments are logistically difficult to make-up while maintaining the integrity of the module. In rare cases, approval to make-up an assignment may be granted at the discretion of the faculty member based on the seriousness of the circumstance and on the supporting evidence provided by the student. Contacting a fellow class member does not substitute for contacting the instructor.

**Accommodation of Special Needs** - Huntingdon College makes every reasonable accommodation for disabilities that have been processed and approved through our Disability Services Committee in accord with the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. In order to request disability-related services at Huntingdon College, students must self-identify to the Disabilities Intake Coordinator, Camilla Irvin, and provide appropriate and up-to-date documentation to verify their disability or special needs. After the accommodations have been approved by the Disability Services Committee, the 504 Coordinator, Dr. Lisa Olenik, will notify your professor(s) of the committee’s decision. If you have any questions regarding reasonable accommodation or need to request disability-related services, please contact Disability Services at (334) 833-4577 or e-mail at disabilityservices@huntingdon.edu.

**Academic Honesty** – Plagiarism is literary theft. Failure to cite the author of any language or of any ideas *which are not your own creation* is plagiarism. This includes any text you might paraphrase, as well. Anyone is capable of searching the Internet or any printed media; your research paper is intended to broaden your knowledge, stimulate your creativity, and make you think, analyze, and learn. It is not consistent with the College Honor Code, nor with scholarly expectations to submit work which is not the product of your own thinking and research. Severe penalties will result upon the submission of any work found to be plagiarized, including potential failure of the entire course. It is easy and simple to properly cite all sources used in your paper. Take no risks – cite your sources.

**Huntingdon College Library**: As an EB student you have access to the full-range of electronic resources provided by the Library of Huntingdon College. Your first step upon enrollment at Huntingdon should be to register for a library account. You can do this by going to the Library’s web site at [http://library.huntingdon.edu/](http://library.huntingdon.edu/) and under “EB Services” complete the “Library Card Application” form and submit it. You will receive shortly your personal library account information, which will then allow you to access a variety of resources including databases. Should you ever have a problem accessing the Library’ electronic resources, please contact the Library (specifically, Systems Librarian Brenda
Among the Library’s electronic resources, you will find a number of databases specific to the area of business administration and its allied fields of study (e.g. databases within /EbscoHost/, /Gale/, and /ProQuest/, as well as /Oxford Journals/). You will also find databases that support your core courses in such fields as English, history, communications, the arts, and the sciences. You may be familiar with the AVL (the /Alabama Virtual Library/) and have your own AVL card. As a student at Huntingdon College, you no longer need to maintain your own AVL card, if you access the AVL through our web site. Simply click on “Campus & Library” rather than “Home Access” within the AVL. A few other mentions: /Countess/ is the name of the Library’s online catalogue and among its holdings you will find electronic books. If you want to know what full-text electronic journals are available to you through the Library’s databases, you can use the /Serials Solutions/ link on our web site. You can limit your search by discipline (such as “Business & Economic”). If you use Google for any of your research, we greatly encourage you to use /Google Scholar/ and /Google Books/. These features of Google will direct you to resources appropriate for academic research.*

**COURSE ASSIGNMENTS** Homework is due at the beginning of class.

**Week 1:**
Read sections 1.1-1.5, 2.1-2.8,
Homework: 2.5, 2.11, 2.12, 2.27, 2.30, 2.44, 2.58, 2.76, 2.94, 2.111, 2.134

**Week 2:**
Read sections 3.1- 3.6, 4.1- 4.5
Homework Exercises: 3.10, 3.14, 3.43, 3.67, 3.76, 4.3, 4.19, 4.21, 4.23, 4.50, 4.52, 4.71, 4.79, 4.82

**Week 3:**
Read sections 5.1-5.5, 6.1 -6.5, 7.1-7.2
Homework Exercises: 5.9, 5.15, 5.33, 5.51, 5.73, 6.16, 6.27, 6.43, 6.61, 7.6

**Week 4:**
Read sections 9.1 – 9.6

**Week 5:**
Reading: review all relevant chapter assigned sections in preparation for the final examination. The final examination has two components: the final exam project (30%) and a multiple choice test (30%). The project involves a complete Excel simple regression analysis on an assigned text data set from Chapter 9 (see attached example below). The multiple choice test includes questions from each chapter covered in this course. Most of the questions require you to use the correct formula(s) to determine the correct choice for a given multiple choice question.
Management of a commercial real estate company wants to use a simple regression model to explain assessed value of commercial real estate property (Y) as a linear function of the property's floor space (X in ft²). In order to do so, they collect the following sample data. They have hired you as a management consultant to correctly analyze the sample data (file: Assessed: Text page 483) given below.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commercial Property</td>
<td>X = Floor Space in square feet</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1280</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1620</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>1820</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>2070</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>2930</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>2990</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>3570</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>3660</td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>4720</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>4790</td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>4880</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>5000</td>
</tr>
<tr>
<td>15</td>
<td>13</td>
<td>5650</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
<td>5720</td>
</tr>
<tr>
<td>17</td>
<td>15</td>
<td>5940</td>
</tr>
<tr>
<td>18</td>
<td>fcst 16</td>
<td>7000</td>
</tr>
<tr>
<td>19</td>
<td>fcst 17</td>
<td>5001</td>
</tr>
</tbody>
</table>

1. In Excel, obtain the correct simple regression solution for this data (use α=.05).
2. What is the correct simple regression equation in this case? Define the model parameters (intercept and slope) in this case.
3. Are the interval estimates of predicted property assessed value useful in this model (you are required to answer by correctly comparing commercial property 12 (A14) to commercial property 17 (A19))?
4. Is there any model shortcoming that is unique to either or both of the forecasted (fcst 16 & 17) assessed commercial property values? Explain in specific terms.
5. Referring to your Excel scatter plot with a fitted trend line, your Excel residual plot, the Excel normal probability plot, and the Excel standardized residuals for this model, are there any model shortcomings clearly apparent in this case (do the residuals appear to be a set of random numbers and approximately normally distributed and why must they exhibit these properties)? Explain in specific terms.
6. Explain in specific statistical terms why commercial property 8 (A10) has the least wide (most precise) prediction interval among the sampled properties.