Course Title: Introduction to Statistics  Instructor: “[Instructor Name]”
Credit Hours: 3  Office: “[Office Location]”
Course Number: MATH 2600-00x  Hours: “[Office Hours]”
Location and Time “[Location and Time]”  email: “[e-mail address]”

TEXT AND MATERIALS
- (Required) *Intro Stats, Fourth Edition* by Richard D. De Veaux, Paul F. Velleman, and David E. Bock
- Go to the following link for step by step directions in how to enroll in the PearsonMyLab course: [http://pearsonmylabandmastering.com/students/](http://pearsonmylabandmastering.com/students/). This guide also includes directions to setting up a temporary account if you do not have immediate funds to purchase the code. When you are able to purchase the access code and would like to make your account permanent that link above will give you the directions so all the work you did will not be lost. Registering onto this website requires that you know the following:
  - (1) courseID:
  - (2) University’s zip code: 43606

COURSE/CATALOG DESCRIPTION
An introduction to descriptive and inferential statistical methods including point and interval estimation, hypothesis testing and regression.

COURSE OVERVIEW
People around the world have one thing in common- they all want to figure out what’s go on. You’d think that amount of information available to everyone today this would be an easy task, but actually, as the amount of information grows, so does our need to understand what it can tell us. Statistics is the study of DATA that provide information about something. This course is to help you make sense of the concepts and methods of Statistics and to turn it into a powerful, effective approach to understanding the world.

PREREQUISITES
The prerequisite for this course is Intermediate Algebra. You can demonstrate that you have met this prerequisite in one of 3 ways.

1. ACT math score of 20 or higher
2. Sufficient score on the Math Placement Exam
3. Passing Math 1200

ATTENDANCE
Attendance will be kept track of for the instructor’s records only. However, it is the responsibility of the student to attend every class in order to receive the latest notes, homework assignments, handouts, and announcements.

GRADING POLICIES
Student work will be assessed as follows. Specific guidelines, grading criteria, and a timeframe for grades and feedback will be provided as each assignment is announced:

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<thead>
<tr>
<th>Assignments</th>
<th>% of Final Grade</th>
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Students are expected to complete and submit all assignments by the due date listed in the Course Schedule. Late assignments and make-up tests will not be permitted unless arrangements are discussed and approved well before the required due date. Ask questions as soon as possible by email or by phone if you do not understand an assignment.

The grading scale for this course is as follows:

<table>
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<tr>
<th>Percentage Range</th>
<th>Grade</th>
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<td>93% - 100%</td>
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ASSIGNMENTS
Online homework will be assigned and submitted via www.PearsonMyLab.com. Each assignment will have a due date, but this due date is “artificial.” This means homework should be completed by that date to stay on par with the class schedule; however, if the online homework is not finished by the deadline, students will still have the opportunity to complete all online HW assignments until the start of the final exam with NO PENALTY. Furthermore, students are given unlimited attempts for homework problems. In other words, students have the ability of earning 100% on all online HW assignments, so take advantage of this. There will be 2-3 other homework assignments that will be submitted in class that will require you to use StatCrunch. These assignments will count toward your HW grade.

QUIZZES
There are two type of quiz. One is in-class quizzes and the other one is online quizzes. In-class quizzes will not be announced, at any time during any lecture, so you are encouraged to attend class on a regular basis. On-line quiz will be assigned and submitted via PearsonMyLab Course. Each quiz will have a due date. You will take the quiz two attempts until the due date. The material on the quizzes will be very similar to the online homework problems and examples in the lecture notes. In the calculation of the final grade, the lowest two scores will be dropped.

Class Activity (extra credits)
There will various in-class exercises during lecture, and points will be given for participation, so you are encouraged to attend class on a regular basis. These points will be used to make up your quiz scores at the end of the semester.

WRITTEN EXAMS
Each of these three exams will be proctored on-campus at the dates and times below. The classroom for each exam is: TBA. The exam is comprehensive.
- Midterm #1 [weight: 20%]: TBA Week 5 or 6
- Midterm #2 [weight: 20%]: TBA Week 9 or 10
- FINAL EXAM [weight: 30%]: DATE/TIME
EXTRA CREDIT POLICY
Extra credit will NOT be given on an individual basis. If there is an extra credit opportunity it will be open to the entire class and it will not be substantial enough to bump up a letter grade.

CLASSROOM RULES AND ETIQUETTE
- Cell phones and earphones need to be turned off and out of sight.
- Laptops need to be put away.
- Cell phones, laptops or any devices capable of connecting to the outside world may not be used as calculators on exams.
- Do not leave the classroom until the class has ended. If one student gets up and leaves five minutes before the class is over, others will follow. If there is some unusual circumstance that requires you to leave early, you speak to me about it at the beginning of class.

MISSED EXAM POLICY
If a student knows he/she will be missing an exam then he/she must contact the instructor in a timely fashion before the exam and provide valid documentation to support his/her absence. Whether an absence is “excused” or not is determined by the instructor using the University’s missed class policy. Once the student’s excused absence is verified, then the exam missed must be made up within one week after the class has taken that exam. The instructor will send a verification email to your UT email account elaborating when your exam will be at the testing center and for how long. If the student does not make up the exam during that time period then the grade for that item will become a zero.
- If a student does not contact the instructor after a week has passed on the missed exam, then that grade turns into a zero. No extensions!
- If the student misses a non-exam day (just lecture), it is his/her responsibility to cover all the missed material. The instructor will NOT make her notes available to students looking to fill in missed notes.
- Reference: [http://www.utoledo.edu/facsenate/missed_class_policy.html](http://www.utoledo.edu/facsenate/missed_class_policy.html)

EXAMS WILL NOT BE GIVEN EARLY (i.e. before the rest of the class takes it).

STUDENT DISABILITY SERVICES
The University will make reasonable academic accommodations for students with documented disabilities. Students should contact the Student Disability Services (Rocket Hall 1820; 419.530.4981; studentdisabilitysvs@utoledo.edu) as soon as possible for more information and/or to initiate the process for accessing academic accommodations. For the full policy see: [http://www.utoledo.edu/offices/student-disability-services/sam/index.html](http://www.utoledo.edu/offices/student-disability-services/sam/index.html)

ACADEMIC DISHONESTY POLICY:
Academic dishonesty is taken very seriously and will be dealt with according to University policy. Any act of academic dishonesty will result in a grade of zero (0) for that item upon the first occurrence. If there is a second occurrence, an automatic overall course grade of “F” will be given. This policy holds for quizzes and exams. Penalties will be applied to all parties involved. Reference: [http://www.utoledo.edu/policies/academic/undergraduate](http://www.utoledo.edu/policies/academic/undergraduate)

INCOMPLETE GRADE
An incomplete grade is given only in EXTRAORDINARY circumstances that do not allow the student to complete the course work (i.e. being hospitalized for several weeks or amnesia). And if this is the case it is the responsibility of the student to notify the instructor and show documentation. Refer to the link for more information on an incomplete and the grading policy in general: Reference: [http://www.utoledo.edu/policies/academic/undergraduate](http://www.utoledo.edu/policies/academic/undergraduate).
STUDENT PRIVACY
Federal law and university policy prohibits instructors from discussing a student's grades or class performance with anyone outside of university faculty/staff without the student's written and signed consent. This includes parents and spouses. For details, see the “Confidentiality of student records (FERPA)” section of the University Policy Page at http://www.utoledo.edu/policies/academic/undergraduate/index.html

MATH RESOURCES
Students needing help understanding the material and homework problems can get help through the following: (1) Instructor. There are many ways to contact your instructor for help such as office hours, email and before/after class. (2) Fellow classmates. Students are encouraged to help each other out with the concepts in this class. (3) MLRC: Math Learning and Resource Center offers free tutoring (both math and statistics) and is located in the basement of the Carlson Library.

IMPORTANT DATES:
Last Day to ADD/DROP classes: Monday, September, 08, 2014
Last Day to WITHDRAW is: Friday, October 31, 2014
**Instructors cannot withdraw students from classes. It is the student’s responsibility to withdraw from the course on or before the deadline listed above. If you fail to do so, then you will receive a letter grade for this class at the end of the semester.

TENTATIVE SCHEDULE
Chapter 1: Stats Starts Here [total: 1.0 hour]
  1.1 What is Statistics? 0.2
  1.2 Data 0.3
  1.3 Variables 0.5

Chapter 2: Displaying and Describing Categorical Data [total: 3.0 hour]
  2.1 Summarizing and Displaying a Single Categorical Variable 1.0
  2.2 Exploring the relationship Between Two Categorical Variable 2.0

Chapter 3: Displaying and Describing Quantitative Data [total: 4.0 hour]
  3.1 Displaying Quantitative Variables 0.5
  3.2 Shape 0.2
  3.3 Center 0.2
  3.4 Spread 0.2
  3.5 Boxplots and 5-number Summaries 0.5
  3.6 The center of Symmetric Distribution: The Mean 0.2
  3.7 The spread of Symmetric Distribution: The Standard Deviation 0.2
  3.8 Summary – What to Tell about A Quantitative Variable 2.0

Chapter 4: Understanding and Comparing Distributions [total: 0.5 hour]
  4.2 Comparing Groups with Boxplots 0.5

Chapter 5: The Standard Deviation as a Ruler and the Normal Model [total: 4.5 hour]
  5.1 Standardizing with z-Scores 0.5
  5.3 Normal Model 2.0
  5.4 Finding Normal Percentile 1.0
  5.5 Normal Probability Plot 0.5
Chapter 6: Scatterplots, Association, and Correlation  [total: 2.0 hour]
6.1 Scatterplots  0.5
6.2 Correlation  1.0
6.3 Warning: Correlation ≠ Causation  0.5

Chapter 7: Linear Regression  [total: 2.0 hour]
7.1 Least Squares: The Line of “Best Fit”  0.3
7.2 The Linear Model  0.2
7.3 Finding the Least Squares Line  0.5
7.5 Examine the Residuals  0.5
7.6 $r^2$: The Variation Accounted For by the Model  0.3
7.7 Regression Assumption and Conditions  0.2

Chapter 8: Regression Wisdom  [total: 1.0 hour]
8.1 Examining Residuals  0.2
8.2 Extrapolation  0.2
8.3 Outliers, Leverage, and Influence  0.2
8.4 Lurking Variables and Causation  0.2
8.5 Working with Summary Values  0.2

Chapter 10: Sample Surveys  [total: 1.5 hour]
10.1 The Three Bid Ideas of Sampling  0.2
10.2 Population and Parameters  0.1
10.3 Simple Random Samples  0.5
10.4 Other Sampling Designs  0.5
10.6 The Valid Survey  0.1
10.7 Common Sampling Mistakes or How to Sample Badly  0.1

Chapter 11: Experiments and Observational Studies  [total: 0.5 hour]
11.1 Observational Studies  0.2
11.2 Randomized Comparative Experiments  0.3

Chapter 12: From Randomness to Probability  [total: 1.0 hour]
12.1 Random Phenomena  0.3
12.2 Modeling Probability  0.2
12.3 Formal Probability  0.5

Chapter 13: Probability Rules!  [total: 2.5 hour]
13.1 The General Addition Rule  1.0
13.2 Conditional Probability and the General Multiplication Rule  1.0
13.3 Independence  0.5

Chapter 15: Sampling Distribution Models  [total: 4.0 hour]
15.1 Sampling Distribution of a Proportion  0.5
15.2 When Does the Normal Model Work?  0.5
15.3 The Sampling distribution of Other Statistics  1.0
15.4 The Central Limit Theorem  1.5

Chapter 16: Confidence Intervals for Proportions  [total: 3.5 hour]
16.1 A confidence Interval  1.0
16.2 Interpreting Confidence Intervals  1.5
16.3 Margin of Error: Certainty vs. Precision  0.5
16.4 Assumptions and Conditions 0.5

Chapter 17: Testing Hypotheses About Proportions [total: 4.5 hour]

17.1 Hypothesis 0.5
17.2 P-values 0.5
17.3 The reasoning of Hypothesis Testing 2.0
17.4 Alternative Alternatives 0.5
17.5 P-values and Decisions: What to Tell About a Hypothesis test 1.0

Chapter 18: Inference About Means [total: 4.5 hour]

18.1 Getting Started: The Central Limit Theorem 0.5
18.2 Gosset’s t 2.0
18.3 Interpreting Confidence Intervals 0.5
18.4 A Hypothesis Test for the Mean 1.0
18.5 Choosing the Sample Size 0.5

Chapter 19: More About Tests and Intervals [total: 3.5 hour]

19.1 Choosing Hypothesis 1.0
19.2 How to Think About P-values 1.0
19.3 Alpha levels 1.0
19.4 Critical Values for Hypothesis Tests 0.3
19.5 Errors 0.2

Total: 43 hours

LEARNING OBJECTIVES
After the completion of this course, students will have developed a statistical literacy in conjunction with each objective below:

PART I: Exploring and Understanding Data

Chapter 1: Stats Starts Here
- Identify population, sample, parameter and statistic in a given situation (Data).
- Identify individuals and variables in a given situation.
- Categorize type of variable. (categorical or Quantitative)

Chapter 2: Displaying and Describing Categorical Data
- Use statistical software to make and interpret a frequency table or a contingency table for a categorical variable.
- Use statistical software to make and interpret a bar chart or a pie chart.
- Report a non-technical summary for a categorical variable through appropriate tables and graphs in a given context.

Chapter 3: Displaying and Describing Quantitative Data
- Describe a quantitative variable with a histogram, a stem-and-leaf plot, a dot plot or a box plot in 4 features: Shape, center, spread and unusual features.
- Summarize the center of a distribution by the mean or median and know when it is best to use.
- Summarize the spread of a distribution by the standard deviation or interquartile range and know when it is best to use.
- Use statistical software to make summary statistics and graphs for a quantitative variable.
- Describe a quantitative variable with a histogram, a stem-and-leaf plot, a dot plot or a box plot in 4 features: Shape, center, spread and unusual features.
- Report a non-technical summarization for a quantitative variable through appropriate numerical measures and graphs in a given context.

Chapter 5: The Standard Deviation as a Ruler and the Normal Model
• Compute and interpret the z-score of an observation.
• Compute a percentile, proportion, percentage or probability of interest by finding area under the standard normal distribution using Z-table (Normal calculation).
• Find a corresponding value given a percentile, proportion or probability (Backward calculation).
• Judge whether a value is extreme given a percentile, proportion or probability (Backward calculation).
• Use statistical software to evaluate the normality of data (the Normal model) by going through a histogram and a normal probability plot.
• Recognize why derived information from a normal calculation can be misleading if the distribution is not Normal.

PART II: Exploring Relationships Between Variables
Chapter 6: Scatterplots, Association, and Correlation
• Describe the relationship between two quantitative variables on scatterplot in 4 features: direction, form, strength and unusual features.
• Identify the explanatory and response variables in a given context.
• Use statistical software to plot bivariate variable, find the correlation; interpret the output.

Chapter 7: Linear Regression
• Use statistical software to fit a linear regression line with residual plots; interpret the output.
• Interpret a regression slope and intercept appropriately in the context.
• Find a predicted value found by substituting the x-value in the regression equation, while being careful of extrapolation.
• Report and interpret r-square, which reports the fraction of the variation of y accounted for by the linear model.

Chapter 8: Regression Wisdom
• Identify unusual and influential points by a scatter plot, residuals and leverage.
• Evaluate the validity of statements with information gleaned from a scatterplot, a residual plot, r-square, and outliers.
• Report a non-technical summarization for the relationship between variables in words and numbers. Be sure to use the names of the variables and their units.

PART III: Gathering Data
Chapter 10: Sample Surveys
• Identify population, sample, parameter and statistic in a given situation.
• Examine a sample of the population by the choice of the sample and the sample size.
• Draw a simple random sample using a table or random digits or a software program.
• Evaluate what sampling technique is used and whether it provides a representative sample that yields valid results.

Chapter 11: Experiments and Observational Studies
• Express the differences among observational studies, experiments and surveys.
• Evaluate the validity of statements about the nature of statistical thinking, including the concepts of causation, sample size, experimentation, and subjectivity.

PART IV: Randomness and Probability
Chapter 12 and 13: Probability
• Explain “the law of large numbers” and that the common understanding of “the Law of Averages” is false.
• Interpret a probability value and understand the possible range of values is from 0 to 1.
• Calculate probability for the “or” compound event using the addition rule.
• Apply the addition rule correctly by identifying whether the events are disjoint or not.
• Calculate probability for the “and” compound event using the multiplication rule.
• Apply the multiplication rule correctly by identifying whether the events are independent or dependent events.
• Calculate conditional probability and the probability of “at least one”.

PART V: From the Data at Hand to the World at Large
Chapter 15: Sampling Distribution Models:
• State the sampling distributions arise because samples vary.
• Distinguish the difference between the population distribution and the sampling distribution.
• Construct a histogram showing a sampling distribution of a statistic (mean or proportion) by proportions (or means) of a class project.
• Interpret the mean of a sampling distribution of a statistic (mean or proportion)
• Interpret the standard deviation of a sampling distribution of a statistic (mean or proportion)
• Describe the shape of a sampling distribution depending on the size of the sample.
• State the Central Limit Theorem (CLT) tells the sampling distribution of the sample means (or proportion) follows a normal if sufficiently large sample size and sample randomly selected, regardless of the population distribution.
• Determine whether the sampling distribution of a mean is approximately normal by the random sampling, sample size or the population distribution.

Chapter 16: Confidence Intervals for Proportions
• Identify the population proportion in a given situation.
• Explain the difference between point estimates and confidence intervals for estimating a population parameter.
• Compute a critical value given the level of confidence using z-table.
• Construct a z-based confidence interval for population proportion.
• Explain in context a confidence interval by clearly stating the confidence level.
• Determine the appropriate sample size for estimating a proportion given a specific margin of error and confidence level.
• Evaluate the validity of a confidence interval with the random sampling and the normality of sampling distribution.
• Use statistical software to construct a confidence interval; interpret the output.

Chapter 17: Testing Hypotheses About Proportions
• Formulate a null and alternative hypothesis in symbols and words for problems involving the population proportion.
• Explain the process underlying hypothesis z-test.
• Interpret a p-value in the context for a given set of hypotheses.
• Evaluate the validity of a hypothesis z-test with the random sampling and the normality of sampling distribution of a mean.
• Make a nontechnical conclusion with respect to the claim in alternative hypothesis in the context.
• Use statistical software to perform a z-based confidence interval and tests for one proportion; interpret the results.

Chapter 18 and 19: Inferences About Means
• Identify the population mean and standard deviation in a given situation.
• Compute a critical value given the level of confidence using t-table.
• Construct a t-based confidence interval for population mean when sigma is unknown.
• Explain in context a confidence interval by clearly stating the confidence level.
• Determine the appropriate sample size for estimating a mean given a specific margin of error and confidence level.
• Formulate a null and alternative hypothesis in symbols and words for problems involving the population mean.
• Explain the process underlying hypothesis t-test.
• Interpret a p-value in the context for a given set of hypotheses.
• Make a nontechnical conclusion with respect to the claim in alternative hypothesis in the context.
• Evaluate the validity of a t-based confidence interval and hypothesis t-test with the random sampling and the normality of sampling distribution of a mean.
• Compare statistical and practical significance.
• Use Statistical Software to perform a t-based hypothesis test on one mean and interpret the results.