Syllabus for
MAT 232—Elementary Statistics (Business Emphasis)
3 Credit Hours
Fall 2016

I.   COURSE DESCRIPTION

Designed for students in social and health sciences, and education, and business. Includes both descriptive and inferential methods and treats the fundamental concepts exemplified by frequency distributions, measures of central tendency, and variability; the interpretation of results; hypothesis testing; regression; analysis of variance; and chi-square. (Does not count towards major or minor in mathematics.)
Prerequisites: MAT 105 (with a grade of C or higher), 106, 201, NUR 230, SAT math score of at least 520, or ACT math score of at least 22.
Course fee: $30.

This section is designed for students of business.

II.   COURSE GOALS

The purpose of this course is to enable the student to be able to do the following:
A.   Understand the concept of the whole person—an integrated individual who is intellectually alert and spiritually alive by engaging in a quest for knowledge of his or her relationship to God, other people, and the universe and intelligently fill the many roles encountered in everyday life, such as that of the consumer.

B.   Become statistically literate and make statistical decisions in his or her own field of practice, thus enabling him or her to go into everyone's world with healing for the totality of human need.

C.   Understand the groundwork and basic tools of statistical analysis, which includes proficiency with graphing calculators and computer software, for pursuing research purposes or for more concentrated study in his or her chosen discipline.

III.   STUDENT LEARNING OUTCOMES FOR THIS COURSE

A.   Terminal Objectives
        As a result of successfully completing this course, the student will be able to do the following:
        1.   Summarize raw data using graphical methods.
        2.   Summarize raw data by descriptive statistical methods.
        3.   Quote the Central Limit Theorem.
        4.   Apply rules for determining the probabilities of events.
        5.   Construct and interpret confidence intervals for estimating population values.
        6.   Make predictions.
        7.   Complete a test of hypothesis using appropriate formulas and techniques in the following categories:
                a.   Value of population proportion
                b.   Value of population mean
                c.   Difference between two means

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        d.   Difference between two variances
        e.   Analysis of variance
        f.   Correlation

B.   Unit Objectives
As a result of successfully completing this unit, the student will be able to do the following:

1.   Unit I: The student studies approaches to statistics, random sampling, mode, median, mean, variance, standard deviation, percentiles, percentile ranks, z scores, discrete and continuous variables, histograms, and frequency polygons.
    a.   Give examples of descriptive and inferential statistics.
    b.   Given a data set, represent it using appropriate graphical tools.
    c.   Name and define the measures of central tendency and dispersion.
    d.   Given a data set, compute the mode, median, mean, variance, standard deviation, percentile ranks, and z scores.

2.   Unit II: The student studies the binomial distribution, the normal distribution, sampling distributions of sums and means, the normal approximation to the binomial, and the sampling distribution of proportions.
    a.   Calculate the probabilities of simple and compound events.
    b.   State properties of the binomial and normal distributions.
    c.   Calculate probabilities using the binomial and normal distributions.
    d.   Find areas of sectors under the normal curve.
    e.   Find percentiles and percentile ranks in normal distributions and sampling distributions of means, sums, and proportions.
    f.   State the Central Limit Theorem.
    h.   Compute the probabilities of events occurring in distributions exhibiting normal characteristics.
    i.   Compute the probabilities of events occurring in binomial experiments using a normal approximation.

3.   Unit III: The student studies the hypothesis testing procedure, unbiased point estimation of the population mean, variance, standard deviation, and proportion, and interval estimation.
    a.   Find unbiased point estimates for a population mean, variance, standard, and proportion.
    b.   Find confidence intervals for population means and proportions.
    c.   Calculate the probability of a type-one error occurring for tests involving hypotheses regarding population proportions and means.
    d.   Perform tests of hypotheses involving population proportions.
    e.   Perform tests of hypotheses involving population means when population standard deviation is known (z tests).
    f.   Perform tests of hypotheses involving population means when population standard deviation is unknown (t tests).
    g.   Translate real-world theories into hypotheses and test them by appropriate means.

4.   Unit IV: The student studies analysis of variance, regression analysis, correlation analysis, and the chi square tests for the value of a population standard deviation.
    a.   Perform tests of hypotheses involving the differences among a group of population means (ANOVA).

   b. Draw a scattergram given two scores for each subject in a group and sketch a regression curve.

   c. Develop the equation of the best-fit straight line to a raw score scattergram (prediction formula) and use it to make predictions.

   d. Compute and interpret the correlation coefficient between two variables.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

  A. Required Materials
   1. Textbook
    Sowell and Lackritz, *Selected Chapters from Statistics for Business and Economics.* Boston, MA: Cengage Learning, 2014. ISBN-9781305311268

   2. Other
    A calculator with statistical functions that handle two variables is required. Recommended: TI-84, TI-83 Acceptable: TI-30X IIS,

    Access to Excel is required. University computers provide that access. Students with Mac computers will need to download a program that will allow them to access programs in the University Computer Lab. Directions for the download are in D2L. Alternatively, personnel at the concierge desk in the library will provide assistance, if needed.

  B. Optional Materials
   None

V. POLICIES AND PROCEDURES

  A. University Policies and Procedures
   1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.

   2. Students taking a late exam because of an unauthorized absence are charged a ($15) late exam fee.

   3. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, electronic, video, multimedia, or computer software. Plagiarism and other forms of cheating involve both lying and stealing and are violations of ORU's Honor Code: "I will not cheat or plagiarize; I will do my own academic work and will not inappropriately collaborate with other students on assignments." Plagiarism is usually defined as copying someone else's ideas, words, or sentence structure and submitting them as one's own. Other forms of academic dishonesty include (but are not limited to) the following:

    a. Submitting another's work as one's own or colluding with someone else and submitting that work as though it were his or hers;

    b. Failing to meet group assignment or project requirements while claiming to have done so;

    c. Failing to cite sources used in a paper;

    d. Creating results for experiments, observations, interviews, or projects that were not done;

e. Receiving or giving unauthorized help on assignments.

By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means. Penalties for any of the above infractions may result in disciplinary action including failing the assignment or failing the course or expulsion from the University, as determined by department and University guidelines.

4. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.

5. Students are to be in compliance with University, school, and departmental policies regarding the Whole Person Assessment requirements. Students should consult the Whole Person Assessment handbooks for requirements regarding general education and the students' majors.

a. The penalty for not submitting electronically or for incorrectly submitting an artifact is a zero for that assignment.

b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.

B. Department Policies and Procedures

1. Computer Resources - Each Student who uses the computer is given access to the appropriate computer resources. These limited resources and privileges are given to allow students to perform course assignments. Abuse of these privileges will result in their curtailment. Students should note that the contents of computer directories are subject to review by instructors and the computer administrative staff.

2. Late Exams - Each instructor has his or her own late-exam policy, so an instructor may decide that an exam missed because of an unexcused absence cannot be made up.

3. Unexcused Absences - Any student whose unexcused absences total 33% or more of the total number of class sessions will receive an F for the course grade.

4. Incompletes – As stated in the University catalog, incompletes are granted only for "good cause," such as extended hospitalization, long-term illness, or a death in the family. Students must petition for an incomplete using the form available in the Computing and Mathematics Department. Very few incompletes are granted.

C. Course Policies and Procedures

1. Evaluation Procedures

a. The grade for this course is based on averages earned in the following four categories.

Homework	20%
Tests	45%
Computer Projects	15%
Final Exam	20%

Note: Averages in each category do not contribute equally to the final grade. Categories are weighted.

  b. Minimum grading scale:
    A: 90%
    B: 80%
    C: 70%
    D: 60%
    F: 59% and below

  Up to two opportunities will be available for extra credit. One is for perfect attendance.

  The student who wants to know his or her grade in the course should keep a record at all times of all points earned or consult D2L. All grades will be posted in a secure manner on D2L unless the student sends the professor an email requesting that they not be posted.

2 Homework
  a. Homework assignments are provided to help the student not only understand statistical concepts, but also how to perform statistical analysis. It is extremely difficult to be successful in this course without completing all assigned homework lessons.
  b. All homework assignments are due the class period after the material has been covered in class.
  c. Students should show sufficient work on all homework assignments to justify answers. Doing so will often require a graph or drawing.
  d. Homework must be submitted in the following manner: Fold the paper lengthwise with the fold to the left. Put three pieces of information at the top—your name, class time (9:20 or 10:50), and assignment number.
  e. A WPA artifact is required for this course. One of the computer projects will be used for this artifact. For specific requirements, check the WPA handbook at http://wpahandbook.oru.edu. Artifacts not submitted electronically or incorrectly submitted receive a zero for that assignment. (Submission requirements are for students who have had Whole Person Assessment training.)

3. Class attendance
  Class attendance is essential for success in this course. Attendance will be taken at every session. Excessive absences can adversely affect your final grade. Please do not attend class if you are ill. If the student notifies the professor in advance of the absence, it will not count against the student. However, he or she will still be responsible for handing in all homework and computer assignments. Since attendance is taken at the beginning of each class, it is the responsibility of students who are tardy to notify the professor at the end of class. Failure to do so will result in the student's being counted absent for that day. If you are ill on an exam day, you must present a doctor's excuse.

4. Other Policies and/or Procedures
  a. During exam periods, you must turn off all cell phones and place all materials except those required for the exam on the floor.
  b. Students may bring one page of hand written notes to each exam. The sheet may be written on both sides, but can be no larger than 8" by 5.5."
  c. Students must bring a Scantron Test Sheet (100/W) to each exam.

VI.   COURSE CALENDAR

	TEXT	TOPICS	ASSIGNMENT NUMBER	ASSIGNMENT
1	1.1-1.5	Orientation, Syllabus, Basic Ideas	#1	1.6, 1.9, 1.11, 1.13, 1.16 1.17, 1.18
2	2.1-2.4	Graphing and Grouping Data Discrete Case	#2	2.2 a, 2.3, 2.4, 2.11, 2.12a&b, 2.14, 2.15
3	2.5-2.11	Graphing and Grouping Data Continuous Case	#3	2.24a, 2.25, 2.28a, 2.30 a & b, 2.33
4	3.1-3.3	Measures of Central Tendency and Variability	#4	3.3, 3.4, 3.7, 3.12, 3.15, 3.16. 3.17, 3.23
5	3.4-3.6	Measures of Location	#5	3.31, 3.32, 3.35, 3.37b, 3.38
6	3.7, 3.9	Measures for Individual Terms, Box Plots	#6	3.44, 3.47, 3.48 a & b, 3.57, 3.58
7		Review for Exam I		
8		Exam I	Computer Project #1	
9	4.1-4.4	Introduction to Probability The Addition Rules	#7	4.3, 4.4, 4.6, 4.10, 4.11 4.12, 4.13, 4.14, 4.17, 4.18, 4.19
10	4.5	Conditional Probability	#8	4.24, 4.25, 4.26, 4.28, 4,29
11	4.6	The Multiplication Rules	#9	4.38, 4.42, 4.43, 4.46, 4.47
12	5.1, 5.4, 5.5	The Binomial Distribution	#10	5.10, 5.11, 5.13, 5.15, 5.20
13	5.7-5.8	The Normal Distribution	#11	5.41(a-f), 5.42, 5.43, 5.44, 5.45
14	5.9	Applying the Normal Distribution	#12	5.47, 5.50, 5.51, 5.52, 5.55, 5.57, 5.58
15	6.1	Sampling Distributions of Means	#13	6.5, 6.6, 6.7, 6.9, 6.10

16	6.2, 6.3	Sampling Distributions of Sums	#14	6.21, 6.23, 6.24, 6.25, 6.28
17	6.4.3 (omit Ex 6.9 on page 271)	Normal Approximation to the Binomial Sampling Distributions of Proportions	#15	6.31, 6.34, 6.35, 6.39, 6.41 (Do not check answer key)
18		Review for Exam II		
19		Exam II	Computer Project #2	
20	7.1-7.6	Point and Interval Estimates	#15	7.1, 7.2, 7.3, 7.4, 7.11, 7.12, 7.13, 7.15, 7.19 7.20
21	8.1-8.2 (omit 8.2.2 & 8.2.4)	Hypothesis Testing Errors	#16	8.1, 8.3, 8.4, 8.6, 8.10, 8.12a&b
22	8.3-8.5	Hypothesis Tests for Population Proportions	#17	8.13, 8.17, 8.19, 8.21, 8.23
23	8.6-8.7	Hypothesis Tests for Population Means	#18	8.26, 8.28, 8.29, 8.30, 8.33
24	8.8-8.9	Tests for Difference Between Two Means—Independent and Dependent Samples	#19	8.34, 8.35, 8.42, 8.43
25		Review for Exam III		
26		Exam III		
27	9.1-9.3	The F Distribution Analysis of Variance	#20	9.2, 9.3, 9.5, 9.7, 9.9, 9.11
28	10.1-10.4	Regression	#21	10.2, 10.3 a, c, & d, 10.5, 10.7
29	10.7-10.8	Correlation	#22	10.18d, 10.19 a & b, 10.20, 10.23
30		Review for Final Exam Autograph and Commissioning		

Course Inventory for ORU's Student Learning Outcomes
MAT 232—Elementary Statistics
Fall 2016

This course contributes to the ORU student learning outcomes as indicated below:

Significant Contribution – Addresses the outcome directly and includes targeted assessment.

Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment.

Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment.

No Contribution – Does not address the outcome.

The Student Learning Glossary at http://ir.oru.edu/doc/glossary.pdf defines each outcome and each of the proficiencies/capacities.

OUTCOMES & Proficiencies/Capacities		Significant Contribution	Moderate Contribution	Minimal Contribution	No Contribution
1	**Outcome #1 – Spiritually Alive** Proficiencies/Capacities				
1A	Biblical knowledge				X
1B	Sensitivity to the Holy Spirit				X
1C	Evangelistic capability				X
1D	Ethical behavior	X			
2	**Outcome #2 – Intellectually Alert** Proficiencies/Capacities				
2A	Critical thinking	X			
2B	Information literacy	X			
2C	Global & historical perspectives			X	
2D	Aesthetic appreciation				X
2E	Intellectual creativity		X		
3	**Outcome #3 – Physically Disciplined** Proficiencies/Capacities				
3A	Healthy lifestyle				X
3B	Physically disciplined lifestyle				X
4	**Outcome #4 – Socially Adept** Proficiencies/Capacities				
4A	Communication skills		X		
4B	Interpersonal skills			X	
4C	Appreciation of cultural & linguistic differences				X
4D	Responsible citizenship		X		
4E	Leadership capacity	X			

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