NAU NORTHERN ARIZONA UNIVERSITY

**Course Title: ECO 321 Intermediate Business Statistics**
**Term: Summer 2023**
**Instructor: TBA**
**Course Credit: 3**
**Mode of Instruction: Online**

**Course Description:**

This course provides training in quantitative analysis as it applies to business problems. Topics include, but are not limited to, probability, sampling issues, statistical decision making using hypothesis testing, analysis of variance, regression, and nonparametric statistics. After finishing this course, students will learn more modern and sophisticated statistics and machine learning techniques and proper programming languages.

**Course Prerequisites:**

ECO 201 Introduction to Business Statistics

**Learning Outcomes:**

By the end of the course, the student should be able to:

A. Demonstrate understanding of statistical thinking and data analysis techniques for decision-making under uncertainty;

B. Emphasize concepts and results interpretation through different methods of evaluation;

C. Understanding the process associated with statistical decisions, defining and formulating problems, analyzing the data, and using the results in decision making;

D. Get hand-on experiences on data collection and analysis through excel work.

**Course Material:**

Alexander Holmes, Barbara Illowsky and Susan Dean, ***Business Statistic***s, Houston: Rice University, OpenStax, 2017.

**Evaluation:**

- 4 Homework [40%]
- Mid-term Exam [25%]
- Final Exam [35%]

**Description of the Evaluation tasks:**

Assignment/ Essay/ ... : During the term, students will be required to finish several evaluation tasks within due date. All the tasks are linked with specific course topics/outcomes and will adequately assess students' competence and learning outcomes. Students are encouraged to meet with instructor about these tasks at any point.

Mid-term/ Final Exams/ Quiz/... : There may be periodic quizzes given at the beginning of lecture sessions; the feedback from these quizzes will monitor the progress of the learners and help to set learning priorities. There will be mid-term exam/ final exam for the course. They are the basic criteria for the evaluation of students' learning outcomes and final grade.

**Grading Policy:**

Students are supposed to finish each online lecture. Prior to each class, students should finish the required readings. During the class time, students are encouraged to make use of all relevant online course resources and communicate with the instructor. Students' grades are accumulated based on the cumulative evaluations.

Students' letter grade will be assigned according to the following scale:

| | | |
|---|---|---|
| A+ 90-100 | A 85-89 | A- 80-84 |
| B+ 77-79 | B 73-76 | B- 70-72 |
| C+ 67-69 | C 63-66 | C- 60-62 |
| D+ 57-59 | D 53-56 | D- 50-52 |
| F < 50 | | |

**Academic Integrity:**

Students must strictly adhere to the university's academic integrity rule; and all essays, exams and any other form of academic assignments must adhere to these rules. Any form of plagiarism, cheating, or misappropriation of materials will be considered a violation of academic integrity and will be punishable by the university.

**Withdrawal from the Course(s):**

Students will be able to apply for a transfer or withdrawal within 3 days of the starting date of the course. If a withdrawal is applied for within 3 working days, the tuition fee will be fully refunded. After 3 days, the tuition fee will not be refunded. If a withdrawal is applied for in the first two weeks, it will be recorded as W (Withdraw) on the course transcript. After this initial two-week period, the class will be recorded as F (Fail).

**Tentative Schedule:**

| | |
|---|---|
| 1 | Confidence Intervals<br>A Confidence Interval for a Population Standard Deviation, Known or Large Sample Size |
| 2 | A Confidence Interval for a Population Standard Deviation, Unknown or Small Sample Case<br>A Confidence Interval for A Population Proportion |
| 3 | Calculating the Sample Size n: Continuous and Binary Random Variables |

| | |
|---|---|
| 4 | Null and Alternative Hypotheses<br>Outcomes and the Type I and Type II Errors |
| 5 | Distribution Needed for Hypothesis Testing<br>**Homework 1** |
| 6 | Full Hypothesis Test Examples |
| 7 | Comparing Two Independent Population Means |
| 8 | Cohen's Standards for Small, Medium, and Large Effect Sizes<br>Test for Differences in Means<br>Comparing Two Independent Population Proportions |
| 9 | Two Population Means with Know Standard Deviations<br>Matched or Paired Samples |
| 10 | Facts about the Chi-Square Distribution<br>Test of a Single Variance<br>**Homework 2** |
| 11 | Goodness-of-Fit Test |
| 12 | Test of Independence |
| 13 | **Mid-term Exam** |
| 14 | Test for Homogeneity |
| 15 | Comparison of the Chi-Square Tests<br>**Homework 3** |
| 16 | Test of Two Variances<br>One-Way ANOVA |
| 17 | The F Distribution and the F-Ratio<br>Facts about the F Distribution |
| 18 | The Correlation Coefficient r<br>Testing the Significance of the Correlation Coefficient |
| 19 | Linear Equations |
| 20 | The Regression Equation<br>**Homework 4** |
| 21 | Interpretation of Regression Coefficients: Elasticity and Logarithmic Transformation |

| | |
|---|---|
| 22 | Predicting with a Regression Equation<br>Using Microsoft Excel for Regression Analysis |
| 23 | Continuous Random Variables |
| 24 | Linear Regression and Correlation |
| 25 | **Final Exam** |