| Course ID: | Course Title: | Winter 2019 | |
|---|---|---|---|
| **BIO 310** | **Quantitative Methods for the Biological SciencesI** | **Prerequisite:** | **Math 30** |
| | | **Credits:** | **3** |

| Class Information | | Instructor Information | | Important Dates | |
|---|---|---|---|---|---|
| **Days:** | Wed/Fri | **Instructor:** | Joh Wiest | **First day of classes:** | Thu, January 3 |
| **Time:** | 11:15 a.m. – 12:30 p.m. | **Email:** | jwiest@ambrose.edu | **Last day to add/drop, or change to audit:** | Sun, January 13 |
| **Room:** | A2131 | **Phone:** | (403) 410-6915 | **Last day to request revised exam:** | Mon, March 11 |
| **Tutorial:** | Mon, 1:00 pm-2:15 pm,  L2100 | **Office:** | L2115 | **Last day to withdraw from course:** | Fri, March 22 |
| **Final Exam:** | Mon., Apr. 8, 1:00PM, A2133 | **Office Hours:** | Tue/Thur: 9:30-12:00 | **Last day to apply for coursework extension:** | Fri, March 29 |
| | | | | **Last day of classes:** | Fri, April 5 |

**Course Description**

This course is designed to give students a basic understanding of descriptive and inferential statistics. Emphasis is placed on practical application and students will learn to analyze and interpret basic statistical research. They will also learn to use computer software to analyze data. Lecture and laboratory components. Topics include collection and presentation of data, descriptive statistics, introduction to probability theory, estimation, hypothesis testing, correlation, and linear regression.

**Expected Learning Outcomes**

- Demonstrate an understanding of what "statistics" is
- Analyze the advantages and drawbacks of different methods of viewing and describing data
- Choose the appropriate statistical technique based on a given situation
- Understand how probability, probability distributions, and hypothesis testing are used in statistics
- Interpret the results of statistical analyses, draw conclusions, and describe solutions

**Course Outline**

**Part 1: Descriptive Statistics**
- Data in all its forms
    - Key terminology, Definitions of Statistics
    - Levels of Measurement
    - Data, sampling, and variation
    - Frequency and Frequency Tables
- Graphical Techniques
    - Stem-and-Leaf Graphs, Line Graphs, Bar Graphs
    - Histograms, Frequency Polygons
    - Box Plots
- Numerical Methods
    - Describing Central Tendency
    - Measures of Variation
    - Percentiles, Quartiles, and Whiskers Displays

**Part 2: Probability & Probability Distributions**
- The Concept of Probability
    - Sample Spaces and Events

    - Some Elementary Probability Rules
    - Conditional probability and Independence
- Discrete Random Variables
    - Two Types of Random Variables
    - Discrete Probability Distributions
    - Binomial Distributions
    - Poisson Distributions
- Continuous Probability Distributions

    - The Uniform Distribution
    - The Normal Probability Distribution
- Sampling & Sampling Distributions
    - Random Sampling
    - The Sampling Distribution of the Sample Mean
    - The Central Limit Theorem
    - The Sampling Distribution of the Sample Proportion
    - Surveys and Errors in Survey Sampling

**Part 3: Confidence Intervals & Hypothesis Testing**
- Confidence Intervals
    - z-Based Confidence Intervals
    - t- Based Confidence Intervals
    - Sample Size Determination
    - Confidence Intervals for a Population Proportion
- Hypothesis Testing
    - The Null and Alternative Hypotheses
    - Errors in Hypothesis Testing
    - z-Test about a Population Mean
    - t- Test about a Population Mean
    - z-Test about a Population Proportion

**Part 4: Statistical Inferences Methods**
- Statistical Inferences Based on Two Samples
  - Comparing Two Population Means
  - Paired Difference Experiments
  - Comparing Two Population Proportions
  - The F-Distribution and One-way Independent ANOVA
- Chi-Square Tests
  - Chi-Square Distribution
  - Chi-Square Goodness-of-Fit Tests
  - A Chi-Square Test of Independence
- Correlation and Regression
  - Correlation Coefficients
  - Significance testing for a correlation coefficient
  - The Regression equasion

## Textbook and Software

*Introductory Statistics*, Illowsky & Dean, https://openstax.org/details/introductory-statistics

## Additional Requirements

All students should have a hand-held, non-programmable calculator capable of performing statistical functions (i.e. able to input a data set and compute mean, standard deviation, etc.). Calculators on smartphones or tablets will not be allowed during tests.

## Course Requirements and Evaluation:

Course grading and evaluation will be conducted according to the following:

| | |
|---|---|
| **Assignments** | 40% |
| **Midterm Exam** | 30% |
| **Final Exam** | 30% |

Note: During the exams, students will be allowed a page of handwritten, self-created notes. This formula sheet should contain any formulas the student feels they will need during the exams, as well as any comments they feel may assist them. Again, this sheet should be created by the students themselves to assist them both in studying and learning materials, and to assist them during the exams.

To pass the course, students must achieve an overall grade of at least 50%.

## Submission of Assignments:

Assignments will be posted to the course Moodle Page and be due on dates that will be determined as the semester progresses. These assignments should be completed as much as possible on the pages of the assignment, answered clearly, by hand, showing work and explaining thinking as clearly as possible. Assignments should be submitted on paper, and should be stapled together before being handed in.

## Class Participation and Attendance:

Students are expected to attend all lectures and labs to ensure success on exams, and quizzes.  Students not attending lectures may find themselves missing information not covered in the textbook.  Any student who is absent for an exam or misses an assignment due date should speak to the professor and, where possible, provide a doctor's note.

**Grade Summary:**

The available letters for course grades are as follows:

| % Grade | Letter Grade | Description |
|---------|--------------|-------------|
| 95% to 100% | A+ | |
| 90% to 94% | A | Excellent |
| 85% to 89% | A- | |
| 80% to 84% | B+ | |
| 76% to 79% | B | Good |
| 72% to 75% | B- | |
| 68% to 71% | C+ | |
| 64% to 67% | C | Satisfactory |
| 60% to 63% | C- | |
| 55% to 59% | D+ | |
| 50% to 54% | D | Minimal Pass |
| 0%  to 49% | F | Failure |

Because of the nature of the Alpha 4.00 system, there can be no uniform College-wide conversion scale. The relationship between raw scores (e.g. percentages) and the resultant letter grade will depend on the nature of the course and the instructor's assessment of the level of each class, compared to similar classes taught previously.

Please note that final grades will be available on student registration system. Printed grade sheets are not mailed out.

# Ambrose University Academic Policies:

## Communication
All students have received an Ambrose e-mail account upon registration. It is the student's responsibility to check this account regularly as the Ambrose email system will be the professor's instrument for notifying students of important matters (cancelled class sessions, extensions, requested appointments, etc.) between class sessions. If students do not wish to use their Ambrose accounts, they will need to forward all messages from the Ambrose account to another personal account.

## Registration
During the **Registration Revision Period** students may enter a course without permission, change the designation of any class from credit to audit and /or voluntary withdraw from a course without financial or academic penalty or record. Courses should be added or dropped on the student portal by the deadline date; please consult the List of Important Dates. After that date, the original status remains and the student is responsible for related fees.

Students intending to withdraw from a course after the Registration Revision Period must apply to the Office of the Registrar by submitting a "Request to Withdraw from a Course" form or by sending an email to the Registrar's Office by the **Withdrawal Deadline;** please consult the List of Important Dates on the my.ambrose.edu website. Students will not receive a tuition refund for courses from which they withdraw after the Registration Revision period. A grade of "W" will appear on their transcript.

Students wishing to withdraw from a course, but who fail to do so by the applicable date, will receive the grade earned in accordance with the course syllabus. A student obliged to withdraw from a course after the Withdrawal Deadline because of health or other reasons may apply to the Registrar for special consideration.

## Exam Scheduling
Students, who find a conflict in their exam schedule must submit a Revised Examination Request form to the Registrar's Office by the deadline date; please consult the List of Important Dates. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; 2) the student has three final exams within three consecutive exam time blocks; 3) the scheduled final exam slot conflicts with an exam at another institution; 4) extenuating circumstances. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

## Electronic Etiquette
Students are expected to treat their instructor, guest speakers, and fellow students with respect. It is disruptive to the learning goals of a course or seminar and disrespectful to fellow students and the instructor to use electronics for purposes unrelated to the course during a class session. Turn off all cell phones and other electronic devices during class. Laptops should be used for class-related purposes only. Do not use iPods, MP3 players, or headphones. Do not text, read, or send personal emails, go on Facebook or other social networks, search the internet, or play computer games during class. Some professors will not allow the use of any electronic devises in class. The professor has the right to disallow students to use a laptop in future lectures and/or to ask students to withdraw from the session if they do not comply with this policy. Repeat offenders will be directed to the Dean. If you are expecting communication due to an emergency, please speak with the professor before the class begins.

## Academic Policies
It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. Personal information (information about an individual that may be used to identify that individual) may be required as part of taking this class. Any information collected will only be used and disclosed for the purpose for which the collection was intended. For further information contact the Privacy Compliance Officer at privacy@ambrose.edu.

## Extensions
Although extensions to coursework in the semester are at the discretion of the instructor, students may not turn in coursework for evaluation after the last day of the scheduled final examination period unless they have received permission for a course Extension from the Registrar's Office. Requests for course extensions or alternative examination time must be submitted to the Registrar's Office by the deadline date; please consult the List of Important Dates. Course extensions are only granted for serious issues that arise "due to circumstances beyond the student's control."

## Appeal of Grade
An appeal for change of grade on any course work must be made to the course instructor within one week of receiving notification of the grade. An appeal for change of final grade must be submitted to the Registrar's Office in writing and providing the basis for appeal within 30 days of receiving notification of the final grade, providing the basis for appeal. A review fee of $50.00 must accompany the appeal. If the appeal is sustained, the fee will be refunded.

## Academic Integrity
We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. Academic dishonesty is taken seriously at Ambrose University as it undermines our academic standards and affects the integrity of each member of our learning community. Any attempt to obtain credit for academic work through fraudulent, deceptive, or dishonest means is academic dishonesty. Plagiarism involves presenting someone else's ideas, words, or work as one's own. Plagiarism is fraud and theft, but plagiarism can also occur by accident when a student fails or forgets to acknowledge to another person's ideas or words. Plagiarism and cheating can result in a failing grade for an assignment, for the course, or immediate dismissal from the university college. Students are expected to be familiar with the policies in the current Academic Calendar that deal with plagiarism, cheating, and the penalties and procedures for dealing with these matters. All cases of academic dishonesty are reported to the Academic Dean and become part of the student's permanent record.

**Note**: Students are advised to retain this syllabus for their records.