Biometrics and Experimental Design
BIO 6301

Lecture: MW 5:00-6:15 (CAV 031)

Instructor Information
Dr. Nicholas J. Negovetich
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Phone: x6646
email: nicholas.negovetich@angelo.edu
Office Hours: M-F 9:00-11:00am; Other times by appointment

Course Description
An examination of statistical methods used in biological research. Emphasis will be on the application of statistical procedures and the design of experiments. This course will include an overview of more complex statistical procedures including multivariate methods, randomization tests, and resampling techniques.

Learning Outcomes
1. Gain a basic understanding of the subject (e.g., factual knowledge, principles, theories)
   – You will be able to choose and perform the statistical tests in R
   – You will be able to assess the validity of assumptions of parametric tests in R
2. Learning appropriate methods for collecting, analyzing, and interpreting numerical information
   – You will be able to choose and perform the appropriate statistical test
   – You will be able to assess the validity of assumptions of parametric tests
   – You will be able to interpret the results of statistical tests
3. Learning to apply course material (to improve thinking, problem solving, and decisions)
   – You will be able to interpret the results of statistical tests

Text
This class does not require a textbook. There is an abundance of information on the internet that explains how to perform and interpret statistical tests. If additional reference material is required for this course, then that material will be posted on blackboard.

Course Format
This course will be a combined lecture and lab course. I will introduce various tests when lecturing, then allow you to perform the tests on the computer. You will learn how to perform all tests in R using R Studio.

Attendance
Attendance is expected for this course. You are responsible for all material presented during class and in the reading assignments. Instructor notes will NOT be provided.

Homework and Assignments
Homework for the lecture will be assigned after the various statistical tests have been introduced and examples given. While not difficult, the student is expected to complete the homework and submit it to the instructor on the due date prior to the start of class. The focus of the homework assignments is to give the student practice in performing data analysis outside of lecture. Homework will be graded on a 2 point scale: 2 = >75% correct, 1 = <75% correct and/or partially completed to satisfaction, 0 = incomplete and/or demonstrated lack of effort. You are responsible for checking your answers against the posted key.
Quizzes and Exams
The lecture will consist of three exams, and a comprehensive final exam. The exams are the principle methods through which the learning outcomes will be assessed. The exams will be a mixture of questions that test theoretical/factual knowledge (closed-book) and assess your ability to perform/interpret the various statistical tests (open-book).

Make-up Exams and Lab Exercises
I understand that special circumstances beyond one's control can result in the inability to attend class when an exam is given. For these circumstances, a make-up exam may be scheduled provided that I was notified prior to the day of the exam.

Point Breakdown
Final grades will be assigned as follows: A=100-90%, B=89-80%, C=79-70%, F=69% or lower. Standard rounding methods will be used (round up for 0.5 or higher). The percentage breakdown for each portion of the course is listed in the table below:

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>5%</td>
</tr>
<tr>
<td>Exams (3 at 25% each)</td>
<td>75%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

Academic Dishonesty
Angelo State University expects its students to maintain complete honesty and integrity in their academic pursuits. Students are responsible for understanding the Academic Honor Code, which is contained in the Angelo State University Student Handbook and the Angelo State University Catalog. Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. The College of Science and Engineering adheres to the university’s Statement of Academic Integrity.

Special Accommodations
Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. If any member of the class feels that they have a disability and needs special accommodations, then please contact an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the Student Disability Services website. Remember, it is your responsibility to initiate such a request by contacting an employee of the Office of Student Affairs.

Religious Holy Days
A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.

Title IX
The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX.
Compliance. 
Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.
Director of Title IX Compliance/Title IX Coordinator
Mayer Administration Building, Room 210
325-486-6357
michelle.boone@angelo.edu

You may also file a report online 24/7 at http://www.angelo.edu/incident-form. If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345. For more information about Title IX in general you may visit https://www.angelo.edu/title-ix.

Technology in the Classroom
I strongly encourage all with laptops to bring them to class for use during the course. This will ensure that all R packages will be available if and when you analyze your own data. **Cell phone usage is prohibited** (bring a scientific calculator if you need to use a calculator). Being told to put your cell phone away will result in a 2-percentage point deduction in your final course grade.

COVID-19 Addendum
This semester’s class will not follow previous offerings of the course. Due to requirements stipulated by the administration, I am required to record and post lectures. The lectures will be live streamed to YouTube (URL of the Course Playlist will be posted on Blackboard). I know it’s easy to watch the lectures at home, but I encourage everyone to attend class so that you can participate fully by asking questions about any concepts that may be difficult to comprehend. Class attendance is also extremely important and will help you become more familiar with doing statistics in R.

As a member of the Texas Tech University System, Angelo State University has adopted the mandatory [Facial Covering Policy](https://www.angelo.edu/title-ix) to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are required to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability. For the safety of everyone, any student not appropriately wearing a mask/facial covering will be asked to leave the classroom immediately. The student will be responsible to make up any missed class content or work. Continued non-compliance with the Texas Tech University System Policy may result in disciplinary action through the Office of Student Conduct.
### Class Schedule

This schedule is **VERY** tentative and subject to change.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Misc</th>
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| 1/25/2021| Introduction  
Review of R and Descriptive Stats |                       |
| 2/01/2021| Review of ANOVA and related tests  
Two- and Three-way ANOVA |                       |
| 2/08/2021| Two- and Three-way ANOVA  
Correlation Review |                       |
| 2/15/2021| Correlation Review  
ANCOVA and Regression |                       |
| 2/22/2021| ANCOVA and Regression | Exam #1               |
| 3/01/2021| Regression |                       |
| 3/08/2021| Categorical Variables: GOF Review  
Tests of Independence |                       |
| 3/15/2021| Categorical Variables: Posthoc Tests |                       |
| 3/22/2021| Categorical Variables: Posthoc Tests |                       |
| 3/29/2021| GLM: Logistic Regression | Exam #2               |
| 4/05/2021| GLM: Logistic Regression |                       |
| 4/12/2021| Model II ANOVA  
Generalized Mixed Effects Models |                       |
| 4/19/2021| Generalized Mixed Effects Models |                       |
| 4/26/2021| Generalized Mixed Effects Models | Exam #3               |
| 5/03/2021| Review of Methods | Last Day to Drop 4/30 |
| 5/10/2021| Final Exam Week |                       |

*Final Exam: Wednesday May 12, 6:00-8:00pm, CAV 031*

* Due to the nature of this course, the theoretical portion (closed book) of the final exam will be given on during the schedule time for the final exam. The application portion (open book) will be unlocked on the Friday before Finals Week and will be due by 6pm on the day of our closed-book final exam.