ANS 6905 Applied Statistics for Animal Sciences

Fall 2021 - August 24 to December 14

Class Number: 20841

Section: 0225

1. **Course Description**: The course is designed for graduate students in animal or veterinary sciences with some knowledge of statistics. The focus will be on basic concepts of linear models, experimental design, and data analyses. The goal is for students to be able to plan and interpret the most typical experimental designs and perform the most common analyses of data including interpretation of software outputs. The software SAS STAT will be used as platforms for data analyses.

2. **Course units**: This is a 4-credit course that includes lectures and labs.

3. **Pre-requisites**: No pre-requisite course required.

4. **Course location**: Animal Sciences (Building 459), Room 102. Students away from campus will be able to attend the course via Zoom (https://ufl.zoom.us/j/6490656162). All lectures will be recorded and posted in the website of the course in the UF E-Learning site for anyone to review the course materials.

5. **Instructors:** José Eduardo P. Santos (jepsantos@ufl.edu).

6. **Teaching assistants:** TBD.

7. **Office hours:** Contact me by email to set up time as needed. Do not hesitate to contact me by email or before or after lectures.

8. **General scope:** Experimental design and proper data analyses are critical processes for scientific research. The planning and performing research studies have statistical implications that influence how results are interpreted. The fundamentals of regression models, experimental design, and data analysis will be taught through a combination of lectures, exercises, and case studies for use with computer programing and final data interpretation. Common examples from animal science studies will be used to illustrate course principles.

9. **Course Objectives**: At the end of this course, students will be acquainted with the basic principles of linear models, experimental design, and data analysis and they will be familiar with the most common statistical methods used in experiments in the animal sciences. At completion of this course, students should be able to:

- Proper use of regression models

- Select the most appropriate experimental design for a particular experiment or study

- Properly identify the experimental unit and fixed and random effects on a statistical model

- Select the most appropriate method of analysis of data

- Prepare the data for analyses and identify potential mistakes with the data

- Determine the most appropriate model that fits the data

- Interpret the results of the data analyses

10. **Meeting times:** Fall, Tuesdays and Thursdays, periods 7 and 8 (1:55 PM – 3:50 PM EST).

11. **Material and Supply Fees**: No fee.

12. **Textbooks and Software Required**: Although no textbook is required, the students are highly encouraged to read different books. Below is a list of suggested books. In addition, lecture notes will be provided through e-learning.

- Biostatistics for Animal Science (M Kaps and WR Lamberson)
- Design and Analysis of Experiments (DC Montgomery)
- Logistic Regression Using SAS: Theory and Application, 2nd Edition (Paul Allison)
- SAS for Mixed Models, Introduction and Basic Concepts (Walter W. Stroup et al.)
- Introduction to Linear Regression Analysis (DC Montgomery, EA Peck, GG Vining)

The SAS STAT Software (http://www.sas.com/en_us/software/sas9.html) will be used during laboratory exercises. As a University of Florida graduate student, you should be able to have access to SAS through the SAS UFApps for Students.

11. **Attendance and Expectations**: Requirements for class attendance, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.
All students are expected to attend class. Cell phones should be turned off in class. Reading of newspapers, working on assignments for other classes, or other activities that are not part of the class are not allowed during class time.

12. **Grading**: Grades will be based on exams (mid-term and final exams, 60% of the grade), weekly quizzes (20% of the grade), assignments including take-home exercises (15% of the grade), and class participation (5%). The grading scale is shown below, and it agrees with the UF grading policies. Contact me ahead of time if for any reason you are unable to take the exams on the scheduled dates.

Remember, participation in class is part of the grading system.

1 point corresponds to 1%.

Exams and points

	Percentage of final grade	Due Date/Date of Exam
1st Exam	30.0%	October 5
2nd Exam	30.0%	December 14
Quizzes	20.0%	Entire semester
Take home exercises	20.0%	Entire semester
Class participation	5.0%	Entire semester
Total	100%	

Grading scale (% total points)

A = 93-100	A- = 88-92.9	B+ = 85 to 87.9	B = 81-84.9	B- = 78-80.9	C+ = 75-77.9
C = 71-74.9	C- =68-70.9	D+ = 65-67.9	D = 61-64.9	D- = 58-60.9	E < 58

For more information on UF grades and grading policies, please visit:
https://catalog.ufl.edu/graduate/regulations/#text

13. **Class policies:** Students will be expected to work on their own during the labs although discussions on how to approach problems are encouraged. Exercise assignments will be provided for each topic and will be used for grading the course. No cell phone use during class or exams.

14. **Class recording:** All lectures will be recorded in Zoom and students will be able to access the recordings that will be posted after class.

15. **Online course evaluation process:** Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

16. **Honesty Policy**: As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the*

University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

17. **Accommodation for Students with Disabilities:** The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/ .

18. **Software use:** All faculty, staff and students at the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

19. **Campus helping resources**: Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575
www.counseling.ufl.edu/cwc/
- Counseling Services

- Groups and Workshops
- Outreach and Consultation
- Self-Help Library
- Wellness Coaching

Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/
For emergencies, contact the University Police Department: 392-1111 or 9-1-1.
Campus helping resources: Students experiencing crises or personal problems that interfere

20. **Course content:**

   o Simple Linear Regression

   o Multiple Linear Regression

   o Checking Model Assumptions

   o Model Variable Selection

   o Generalized Linear Models

   o Observational Studies

   o Experimental Design: Basic Concepts

   o Completely Randomized Design

   o Randomized Design with Factorial Arrangement of Treatments

   o Randomized Complete Block Design

   o Split-Plot Design

   o Latin Square Design

   o Mixed Effect Models

   o Special Topics

21. **Course schedule:** Details of the UF calendar for the Fall of 2021 is available at
https://catalog.ufl.edu/UGRD/dates-deadlines/pdfs/calendar2122.pdf

Week	Date	Week Day	Topic
1	08/24/21	TUE	Simple Linear Regression
1	08/26/21	THUR	Multiple Linear Regression I
2	08/31/21	TUE	Multiple Linear Regression II
2	09/02/21	THUR	*Lab 1 - Linear Regression*
3	09/07/21	TUE	Checking Model Assumption I
3	09/09/21	THUR	Checking Model Assumption II
4	09/14/21	TUE	*Lab 2 - Checking Model Assumption*
4	09/16/21	THUR	Model Variable Selection
5	09/21/21	TUE	*Lab 3 - Model Variable Selection*
5	09/23/21	THUR	Generalized Linear Model I
6	09/28/21	TUE	Generalized Linear Model II
6	09/30/21	THUR	*Lab 4 - Generalized Linear Model*
7	10/05/21	TUE	**Exam I**
7	10/07/21	THUR	Introduction to Time to Event Analysis
8	10/12/21	TUE	Observational Studies I
8	10/14/21	THUR	Observational Studies II
9	10/19/21	TUE	*Lab 5 - Observational Studies*
9	10/21/21	THUR	Experimental design - Basic Concepts
10	10/26/21	TUE	*Lab 6 - Blocking, Covariate and Sample Size Calculation*
10	10/28/21	THUR	Completely Randomized Design
11	11/02/21	TUE	Randomized Design with Factorial Arrangement of Treatments
11	11/04/21	THUR	*Lab 7 - Factorial Arrangement of Treatments*
12	11/09/21	TUE	Randomized Complete Block Design
12	11/11/21	THUR	*Holiday - No Class*
13	11/16/21	TUE	Latin Square Design
13	11/18/21	THUR	*Lab 8 - Randomized Block and Latin Square Design*
14	11/23/21	TUE	Mixed Effects Model I
14	11/25/21	THUR	*Holiday - No Class*
15	11/30/21	TUE	Mixed Effects Model II
15	12/02/21	THUR	*Lab 9 - Mixed Effects Models*
16	12/07/21	TUE	Review
16	12/09/21	THUR	*No classes - reading day*
17	12/14/21	TUE	Exam II