QUANTITATIVE ECOLOGY (WIS 4601C - Spring 2026) -3 credits-

Instructor:
Dr. Travis M. Thomas (travis.thomas@ufl.edu)
Student Hours: Wednesdays 12:55-2:15 PM or by appointment
Office Location: TBA (XX; https://campusmap.ufl.edu/#/index/0116)

Teaching Assistant:
Monica Lasky (PhD candidate; WEC)
Email: Lasky.monica@ufl.edu
Office Hours: by appointment (zoom)

Dr. Thomas' Teaching Philosophy:
Overall, my objectives as an instructor are to: (1) inspire some enthusiasm for data and analytical methods, (2) facilitate the knowledge of applied statistical methods, and (3) encourage the life-long pursuit of evidence-based science. I achieve my teaching objectives by using a variety of pedagogy techniques that consist of short lectures, discussions, and hands-on exercises. One challenge that I've encountered teaching this course is that many students are blindsided by mathematical jargon, equations, and notations, which look more complex than they really are. I like to emphasize a broad understanding of basic concepts rather than forced memorization of definitions, etc. I adopt a relaxed environment, where students feel free to ask questions and think independently about these topics. It is essential that students obtain a basic understanding of applied statistical techniques, which will benefit their careers in ecology and natural resource sciences, especially as technology and computational techniques rapidly advance over time.

Lectures: Lecture will be in-person on Mondays and Wednesdays at 11:45 AM - 12:35 PM.
Labs: Required**.** Labs will meet in-person on Fridays at 11:45 AM - 1:40 PM) in MCCB 3086.
Course Website: via eLearning (elearning.ufl.edu)

Prerequisite: STA 2023 and WIS 3401.

Course description:
Many ecological, management, and conservation needs for wildlife populations are related to assessing questions associated to "how many, how much, where, and when". This course is designed to provide students with the motivation and understanding to assess these questions that are commonly encountered by natural resource professionals. Upon completing this course, students will understand three major types of probability, utilize major distribution types, build linear models, and interpret their output.

Course Objectives: At the completion of this course, students will be able to:
(1) Recognize, compare, and contrast concepts and vocabulary related to analyses in wildlife ecology and conservation (week 2–week 14).
(2) Describe classical and conditional probability (week 3-6; lab 3-4).
(3) Construct a hypothesis and use model-based inference (week 6–8)
(4) Parameterize models using data and characterize uncertainty (week 6-9).

(5) Compare and interpret model output (week 6–9).
(6) Understand wildlife parameter estimation (week 10–12).
(7) Report / summarize information (week 8-14).

Required Text: None; course materials will be available electronically via eLearning.

GRADING

Grading will be based on:

Weekly quizzes (10): based on weekly lectures, readings, and labs. These are short (3-6 question quizzes) on-paper, multiple choice style quizzes that will be given in-class or possibly on Canvas (11-1 quizzes, 10 points each) –100 pts total.

Exams (2): Basically, larger versions of the quizzes that cover the two broad sections of the course: 1) probability theory and distributions, and 2) linear models and parameter estimation (2 evaluations, 50 points each) –100 pts total.

Weekly labs (10): Based on the lab worksheet questions and participation –100 pts total.

Group project: This is a fun exercise where you will be randomly assigned to a group of 4 and work together to utilize a learned skill to estimate a given dataset (dealer's choice)–50 pts total.

Final exam: This is TBD. Typically, this is optional (used to replace lowest grade if needed), but it is considered TBD as of now.

Random attendance (5): This a 1/0 based on your presence/absence in lecture (5 random dates checked @ 5 points each) – 25 pts.

Class total = 375 points.

Final course grades will be assigned based on the following percentages:

Percent of total points	Letter Grade
93.0 - 100.0	A
90.0 - 92.9	A-
87.0 - 89.9	B+
83.0 - 86.9	B
80.0 - 82.9	B-
77.0 - 79.9	C+
73.0 - 76.9	C
70.0 - 72.9	C-
67.0 - 69.9	D+
63.0 - 66.9	D
60.0 - 62.9	D-
< 60.0	F

*Please see the official UF grading policy here.

NOTE: If you are taking this course for Honors credit your grade will be based on the following:

All of the above plus an individual project:

Individual project: This is an exercise that will test your ability to apply techniques learned in this course. Students will work independently on a dataset and apply appropriate statistical analysis, interpret results, and summarize findings. –**100 pts**

Honors credit:
Final course grades based on the following percentages:

Percent of total points	Letter Grade
93.0 - 100.0	A
90.0 - 92.9	A-
87.0 - 89.9	B+
83.0 - 86.9	B
80.0 - 82.9	B-
77.0 - 79.9	C+
73.0 - 76.9	C
70.0 - 72.9	C-
67.0 - 69.9	D+
63.0 - 66.9	D
60.0 - 62.9	D-
< 60.0	F

*Please see the official UF grading policy here.

Required Software:

For this course, we will use RStudio via Posit cloud. All code and analyses will use program ***R***, which is a free, "open source" programing software. Overall, program ***R*** is based on the *S* computer language, and it is an integrated suite of software facilities for data manipulation, calculation and graphical display. In fact, Program ***R*** can utilize 100's of "packages", which can be used for specific analyses and tasks. Also, we will use **RStudio**, an integrated development environment (IDE) for ***R***, that is super user friendly and has a customizable workbench with all the tools required to work in ***R*** (console, source, plots, workspace, help, history, etc.). To make things easier (e.g., I can review your code, etc.) we will use **RStudio Cloud** for your lab assignments and group projects. Basically, this is a cloud-based version of **RStudio** that will already be loaded on the UF lab computers. Please note that these are ***free*** programs, so if you want to try using ***R/RStudio*** at home for practice, please feel free to do so. For more info on Program ***R*** please click **here,** and for info/instruction on **RStudio** click **here.**

A few references:

Via our CANVAS page we will provide links to copies of book chapters, monographs, and peer-reviewed literature. For review of basic statistical concepts, we recommend http://www.khanacademy.org/, http://onlinestatbook.com/ from Rice University, a great book and website is https://moderndive.com/, and https://www.youtube.com/user/zedstatistics.

There are TONS of R resources on the web: http://www.r-project.org/
https://r4ds.had.co.nz/

Tentative Course Outline:
**The weekly coverage might change as it depends on the progress of the class.*

Week 1 (Jan 12 – Jan 16)	**M:** Introductions / syllabus / expectations **W:** NO LECTURE!! **Readings:** Read about your classmates **Lab 1:** A brief Introduction to ***R*** **Assignment:** Discussion -> Class Introductions
Week 2 (Jan 19 – Jan 23)	M: NO LECTURE (MLK day) W: Probability **Readings:** *Ecological Detective* **Ch 1** by Hilborn and Mangel **Lab 2:** Basic R & plotting **Assignment:** Quiz 1
Week 3 (Jan 26 – Jan 30)	**M:** Probability- classical **W:** Probability- classical **Readings:** TBD **Lab 3:** Database management **Assignment:** Quiz 2
Week 4 (Feb 2 – Feb 6)	**M:** Probability- conditional **W:** Probability- conditional **Readings:** Bolker 2002 Ch 4 **Lab 4:** Distributions **Assignment:** Quiz 3
Week 5 (Feb 9 – Feb 13)	**M:** Probability distributions 1 **W:** Probability distributions 2 **Readings:** Quinn and Keough p. 32-44; 173-187 **Lab 5:** Extra distributions **Assignment:** Quiz 4
Week 6 (Feb 16 – Feb 20)	**M:** Probability & likelihood **W:** Parametric models **Readings:** Quinn and Keough p. 78-90 **Lab 6:** Exam 1 / Basic parametric models **Assignment:** Exam 1 (in lab)
Week 7 (Feb 23 – Feb 27)	**M:** Linear regression **W:** Linear regression **Readings:** Nichols et al. 2019 **Lab 6:** linear models **Assignment:** *Quiz 5*
Week 8 (Mar 2 – Mar 6)	**M:** Linear regression **W:** Linear regression **Lab 7:** GLMs **Assignment:** *Quiz 6*

Week 9 (Mar 9 – Mar 13)	**M:** Imperfect detection & uncertainty **W:** Transects and 'distance' sampling **Readings:** **Lab:** LTDS -distance models- **Assignment:** *Quiz 7*
Week 10 (Mar 16 – Mar 20) (spring break)	**M: OFF** **W: OFF** **Readings: OFF**
Week 11 (Mar 23 – Mar 27)	**M:** Capture-recapture models **W**: Closed populations **Readings:** Cooch & White Ch-5 (5.1- 5.2) **Lab 9:** Closed abundance models **Assignment:** *Quiz 8*
Week 12 (Mar 30 – Apr 3)	**M:** Open populations **W**: Open population models **Readings:** Nichols et al. (2019/2020) ←will be on quiz **Lab 10:** Open CJS models **Assignment:** *Quiz 9*
Week 13 (Apr 6 – Apr 10)	**M:** Occupancy 1 **W**: Occupancy 2 **Readings:** TBD **Lab 11:** Occupancy **Assignment:** Quiz 10
Week 14 (Apr 13 – Apr 17)	**M:** Exam 2 (lecture) / Inverse probability (Bayesian) **W**: Bayesian models **Readings:** Hooten & Hobbs 2025 **Lab:** TBD **Assignment:** *Quiz 11*
Week 15 (Apr 20 – Apr 24)	**M:** Putting it all together **W**: Guest lecture -surprise- **Lab:** Lab R proficiency / Final TBA **Assignment:** *Group projects are **due** Apr 22 at **11:59**PM*
Final Exam (TBD)	TBD

Class attendance and demeanor policy: All students are expected to attend most lectures and every lab session. Students are responsible for the materials and information presented. Students who miss class for a UF approved reason will be able to make-up exams and quizzes from that day. Unexcused late assignments will have 10% deduction in point total for that assignment each day late. Late assignments will not be accepted beyond 3 days post-due date. A professional attitude is expected in all lectures and labs. Please do not disturb fellow students by talking during class. Also, please minimize electronic distractions by silencing cell phones and eliminating electronic distractions during class and lab. While we will actively use computer resources in lab, it is strongly recommended that students focus on course material. Make-up exams or assignments will not be given for

unexcused absences. An acceptable excuse (meeting guidelines from the UF handbook) must be submitted to be eligible for a make-up exam.

Rights of students with special needs: The University of Florida meets all federal and state laws regarding discrimination including the American Disabilities Act (ADA Law). Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, http://www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Student evaluations: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations athttps://evaluations.ufl.edu.Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/ .

Academic honesty: As a result of completing the registration form at the University of Florida, every student has signed the following statement: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submit-ted for credit by students at the University of Florida, the following pledge is either re-quired or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.”

UF counseling services: The University of Florida provides excellent resources on campus for students having personal problems or seeking additional career and academic assistance to help them realize their full potential. The University cares about you and your well-being. These resources include:

(a) U Matter, We care:If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
(b) Counseling and Wellness Center: https://counseling.ufl.edu/ , 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
(c) Sexual Assault Recovery Services (SARS) Student Health Care Center, 392-1161.
(d) University Police Department, 392-1111 (or 9-1-1 for emergencies). http://www.police.ufl.edu/

Academic Resources:

(a) E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu . https://lss.at.ufl.edu/help.shtml.
(b) Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu/
(c) Library Support, http://cms.uflib.ufl.edu/ask . Various ways to receive assistance with respect to using the UF libraries or finding resources.
(d) Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/
(e) Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/
(f) Student Complaints On-Campus: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/
(g) On-Line Students Complaints: http://distance.ufl.edu/student-complaint-process/

Software use: All faculty, staff and students at the University are required 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.

On using LLM artificial intelligence (e.g., ChatGPT, etc): I'd like to clarify how you can and cannot utilize artificial intelligence / generative AI in my class. Here are the guidelines that I *expect* you to follow:

1. ***Permitted***:
   Studying**:** You're welcome to use or try to use AI for studying purposes. AI could possibly offer some insight or provide additional explanations and/or practice problems. However…
   Verification Reminder: While AI is a powerful tool, it is important to verify the information independently. Generative AI is not infallible often out of contect, so it can and will produce errors. Always cross-check facts and interpretations with proven sources.
2. ***Restricted****:*
   Assignments: You cannot use AI for answering questions related to this course during any assignment or the group project. Instead, try to engage with the material and your peer students.
   All quiz and exam questions: Similarly, using AI for quiz/exam questions is not permitted. Critical thinking and your own knowledge are crucial during assessments. Also, it would be considered cheating, so it would be best to avoid using AI on any graded coursework.