

Biology 7050

“Experimental design and Data Analysis in the Biological Sciences”

Professor: Corey Devin Anderson, Ph.D. (Evolution, Ecology, and Population Biology)

Preferred salutation: “Dr. Anderson”

Course Format:

Traditional Face-to-Face (F2F): Face-to-face classes generally have the following:

- a scheduled meeting place and
- a scheduled time and day(s) of the week.

This course also has some “hybrid” elements.

Lecture location: BSC 1202

Days and time: Tues/Thurs, 8:00 to 9:15 AM.

Final exam:

Tuesday 04 May: 8:00 to 10 AM.

Office: Virtual (MS Teams)

Office Hours: Tuesday 9:30 AM to 11:30 AM or by appointment

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Catalog description:

Prerequisites: MATH 2620 or comparable course and admission into the graduate program or permission of the instructor. Application of statistical methods to the study of biological problems, with an emphasis on the interaction between the choice of statistical methods and experimental design.

Required text:

Books

Required text:

- 1) The analysis of Biological Data by Whitlock and Schluter (3rd edition); the publisher is W.H. Freeman (Macmillan Learning).

This is an excellent introductory textbook, and most of the lecture material will follow the topics in the book. I have chosen this book because it is easy to read (relative to most statistics texts), it has lots of practice problems, and it does an excellent job at explaining some of the more challenging concepts.

Course overview:

This is a mixed lecture/seminar course. As currently offered, there is some overlap between this course and BIOL 3000/5000 (Biostatistics). The main difference is that lectures will be recorded and students are expected to view the lectures and read the respective chapters (or other assigned readings) before class. Students are also expected to do go over the assigned R PowerPoints before class. The class period will then be used more for recitation, review, and discussion of topics. There will also be assessments and coding exercises during class time.

Topic	Textbook chapter(s)
Sampling and variables	1
Visualizing data	2
Distributions and summary statistics	3-4
Binomial distribution	7
Probability models for frequency data	7-9
The normal distribution	10-11
Comparing means and variances	12
Handling violations of distribution assumptions	13
Designing experiments	14
ANOVA	15
Correlation	16
Regression	17-18
Computer intensive methods	19
Likelihood	20

Grades

I will use a point system in this course to gauge relative performance. Remember that you must earn at least a “B” in a graduate course to retain good standing. Attendance, preparedness for class, and participation in class discussions will be used to make decision about students who are borderline between grades.

Exams (/ 300 points): There will be two exams (one midterm, one final), each worth 150 points. Each exam will have a lecture and R portion (the R portion will be “take-home”).

Problem sets (/240 points):

There will be ~ four problem sets. The problem sets are all R-based. Each is worth a maximum of 60 points.

Final thesis project (/100 points):

You will write the draft Methods section of your MS thesis and use R to analyze a subset of your thesis data and/or do a power analysis using simulated data (including relevant figures).

Pop quizzes (/50 – 100 points):

There will often be pop quizzes (5-10 @ 10 points/quize) to gauge your progress with R.

Lap top computers

Please bring a laptop computer (with the most recent version of R) to each class, along with the textbook.

Attendance policy (COVID-19 edition)

This is a face-to-face course, with some hybrid elements. Enrollment is sufficiently low this semester that attendance is very important. For students who are forced into quarantine due to COVID-19 (and have followed the appropriate procedures) they may attend the lecture or in-class labs via Collaborate Ultra.

Just because lectures may occasionally be broadcast, this does not mean that it is a substitute for coming to class. I will only broadcast and/or record lectures when there is a student in quarantine with an official clearance from student affairs. I will use live lecture attendance as an additional factor to consider for students with borderline grades.

Do not be excessively and consistently late for lecture.

Students with disabilities

Students requiring classroom or testing accommodations because of documented disabilities should discuss their needs with the instructor at the beginning of the semester. Students not registered must contact the Access Office, Farber Hall, Phone; 245-2498. Website: <http://www.valdosta.edu/access/> For some students, the presence of a medical condition places them at high risk for COVID-19. These students can use the online form to submit documentation of the condition to the Access Office to ensure confidentiality.

<https://www.valdosta.edu/student/disability/forms/request-for-covid19-course-modification.php>

The Access Office will then contact the advisor and department to indicate the receipt of documentation that supports the request for course substitutions or appropriate alternative assignments and virtual access to lectures.

Spring 2021 (addendum): VSU COVID-19 policies:

VSU cares about student success both on and offline, and a variety of resources are available to help students both academically and personally during the Fall 2020 semester. One of the best resources is VSU's Coronavirus FAQ page located at <https://www.valdosta.edu/health-advisory/faq.php>. Information is available there about a variety of topics in VSU's return-to-campus plan.

A website devoted to the health and wellness of VSU students can be seen at <https://www.valdosta.edu/administration/finance-admin/campus-wellness/student-resources.php>.

You can find information, including how you can access the Brightspace Pulse app that will allow you to view BlazeVIEW on your smartphone at <https://www.d2l.com/products/pulse/>. In BlazeVIEW, all VSU students have a course with guides for how to use tools in BlazeVIEW; search for "VSU BlazeVIEW Student Tutorial 2020."

Face coverings:

In response to the best available science and current guidance from the Centers for Disease Control and Prevention and the Georgia Department of Public Health, **every student must wear a face covering that covers their nose and mouth at all times while in any campus building, including in this classroom.** This requirement is intended to protect the health and safety of all VSU students, the instructor, and the entire university community. Anyone attending class without a face covering will be asked to put one on or leave. Students should also be sure they maintain a distance of at least six feet away from their fellow students and instructor and are seated in a seat that is designated to ensure that distance. Students who refuse to wear face coverings appropriately or adhere to other stated requirements may face disciplinary action for Code of Conduct violations.

During field trips (which are outdoors) students are required to wear face covering when close proximity to other students. You may remove your face covering in the field given you are more than six feet away from another student or instructor (but you must be ready to put it back on when in the presence of others).