BIOL 7050: "Experimental Design and Biological Data Analysis", Fall 2021

Dr. Brad Bergstrom   8-9:15 am TR, 1202 BSC
bergstrm@valdosta.edu   Offc Hrs M 2-4:30 pm, T 9:30 am-12 noon; other
                                                                                    times by appt.

1107 BSC, 333-5770

Required Text: **Whitlock, M.W., and D. Schluter. 2015. The analysis of biological data. 2nd ed. W. H. Freeman, New York.** (*I chose this text for its readability, comprehensiveness, and links to numerous resources that you may use for years to come; I expect you will purchase and keep this book as an important reference in your career.) Bring your book to class!

Overview: the format will be a combination of lecture, hands-on data collection and analysis (with graded write-ups), regular homework assignments (due every Thursday), a few quizzes, and some discussion of papers. There will also be a component of individualized design of an experimental protocol, whether that represents your actual Masters research or other proposed project. An initial prospectus (due Week 3) will be returned with comments from me plus a "blind" reviewer (one of your classmates), for you to consider.

I expect you to READ the assigned chapters and "Interleaf"s preceding them (first, skim in advance, whenever possible), because I won't always lecture on them. To learn the content, perform a variety of Practice Problems at the end of each chapter (check answers in back of text); I will assign a few Assignment Problems from each chapter.

Quizzes will focus on definitions of terms as outlined in yellow throughout text (and in some cases other sources made available to you[1]).

Tentative Schedule by Week (Chapter to read and associated homework problems due every Friday):

1   Introduction to sampling and statistics (1, plus "Study Design Concepts" pdf on Blazeview)
2   Displaying Data, Describing Data (2, 3)
3   Uncertainty in Estimation (4); Probability (5: read and learn terms only). Questionnaire due.
4   Hypothesis Testing (6). Lab analysis 1 due.
5   Designing Experiments (14). QUIZ 1: Chapts 1-6.
6   Designing Experiments (14 + assigned readings discussion[1])
7   Analyzing Proportions (7)
8   Fitting probability models to frequency data (8). Lab analysis 2 due.
9   The Normal Distribution (10)
10   Inference for a Normal Population (11). QUIZ 2: Chapts 7,8,10,14
11   Comparing Two Means and Deviations from Normality (12, 13)
12   Comparing Means from More Than Two Groups (ANOVA) (15)
13   Correlation (16). Lab analysis 3 due.
14   Regression (17)
15   Multiple Explanatory Variables (18). QUIZ 3: Chapts. 11-17

*Final Experimental Design Protocol due Wed., Dec. 8

[1]You will find several resources for this course on Blazeview.

We will have the Biology Computer lab reserved for Thursdays and will meet there on some weeks but in the classroom other Thursdays (I'll inform you that Tues which it will be). If you have your own laptop, with Microsoft Excel installed, you may use it (but everything you need is on the computer lab computers, and you will not be able to download Minitab onto your laptop).

Notes on Final Experimental Design Protocol: this will be, essentially, an Introduction and Methods (with partial Literature Cited) of a scientific paper, with emphasis on: 1) justifying your specific hypotheses in the context of your species/system, with preliminary literature review, and 2) specifying the precise methods and all details for sampling, including manipulating explanatory variable(s), measuring effect on response variables, and specific statistical tests needed. Give details of replicates, sample size (do calculations of *n* needed for particular power and precision desired), temporal, ecological, spatial scope of study, grain of sampling units, etc. Also specify types of graphs that will be used to display data. Unlike the Methods section of an actually published paper (which is written in past tense), you may write this in future tense, because it is a proposal for what you *will* do.

Points and Grading:

Initial Questionnaire	30
Collegial Review	15
15 Homeworks @ 10 pts	150
3 Quizzes @ 25	75
Lab analyses	30
Class Discussion	10
Final Design Protocol	50
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TOTAL	360

Lowest A/B/C = 320/285/250

Links and other resources:

Textbook Website: http://whitlockschluter.zoology.ubc.ca/

Calculate sample sizes for Power and Precision in Experimental Design:
http://www.divms.uiowa.edu/~rlenth/Power/

Random number generators: several smart phone Apps, inlcuding "Random Pro"
(But, also download the "Analysis ToolPak" Add-in to your copy of Excel, then activate it in the Analysis group on the Data tab).

Statement on COVID-19 Protocols

VSU, the CDC, and I strongly encourage students to be vaccinated against COVID-19, and that process is both easy and free. It can be done at the Student Health Center—call them at 333-5886 for an appointment. VSU strongly advises that students who are not yet fully vaccinated will wear a fitted facial covering of nose and mouth at all times indoors; **even those who have been fully vaccinated are now advised to wear masks when unable to safely distance indoors because of the highly contagious delta variant, which even vaccinated individuals can acquire and transmit** (NOTE: neck gators are not effective and therefore will not meet this requirement; masks with exhaust valves also are not effective, as they vent particles into the air). Remember, it is the right thing for all of us to do to be mutually respectful of each other's health and well-being. If you should develop symptoms or come in close contact with someone who has tested positive or has COVID symptoms, contact the Student Health Center (229-333-5886) and/or make an appointment with the Lowndes County Public Health Service COVID testing center by calling 844-955-1499, and do not come to class until you receive a negative test and your symptoms clear (or 10 days after symptoms start if you do not get a test). This is a face-to-face course and you are expected to be in class (lecture and lab); any special accommodations will require documentation (including from Student Affairs). VSU's Coronavirus FAQ page is https://www.valdosta.edu/health-advisory/faq.php. For whatever reason you might miss class, you must inform the instructor ASAP you will be (or have been) absent and receive instructions for making up work.

Statement on Attendance, Decorum, and Academic Honesty

Attendance: Absence from class, or showing up late, or leaving early, may cost you points on your final grade, after the first offense. I reserve the right to penalize the grades of students who are habitually absent from or habitually late to class, or who are habitually disruptive in lecture. (See above section about health-related excused absences.)

Disruptive Behavior: a) absolutely no cell phone use in lecture or lab (except that which is part of the lab—e.g., using the camera app); b) no talking or voluntary outbursts in lecture… Note: a sneeze is involuntary; the reflexive "bless-you" is voluntary and therefore controllable; just repress that urge, please!

Academic Dishonesty: cheating of any kind on an assignment or exam, or committing plagiarism on a written paper, will not be tolerated and will result in failure on the assignment, and possibly in the course, plus other penalties as may be allowed by VSU policy (consult the VSU Student Handbook[2]).