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

Preferred salutation: “Dr. Anderson”

Days and time: Mon/Wed, 2:00 to 2:50 PM.

Days and time: Mon/Wed, 3 to 4:50 PM.

Tuesday 05 Dec: 2:45 to 4:45 PM.

: Thursday 3:30 to 5 PM.
E-mail: coreanderson@valdosta.edu

The lectures provide a survey of key concepts, topics, and tests in biostatistics; the labs are intended to reinforce the lecture material, as well as to provide basic training in statistical programming with R.

Education outcomes for BS Degree in Biology: (Develop and test hypotheses, collect and analyze data, and present conclusions in both written and oral formats used in peer-reviewed journal and scientific meetings).

VSU General Education Outcomes: (Students will use computer and information technology when appropriate); (Students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices); (Students will demonstrate the ability to analyze, to evaluate, and to make inferences from oral, written, and visual material).

If you need extra help or clarification, please use email and/or take advantage of office hours. I am also usually available after lecture if you have questions. Appointments and drop-ins are permitted, but cannot always be accommodated.

.

Course overview

This is an upper division course on the statistical analysis of biological data ("biostatistics"). The current catalog description needs revision; in my opinion, the last sentence reads more like somebody's personal course syllabus. Specific requirements for my version of this class may not match those in the current course description; they are outlined in subsequent sections.

The catalog lists Biol 1107, Biol 1108, Math 1113, and Math 2620 as prerequisites. I interpret this to mean that the course is upper division, that you have some basic math skills (precalculus or otherwise), and some sort of background in statistics. That said, I recognize that most students (even the graduate students) taking this course likely have a very rough understanding of statistics (and probably a fear of mathematics in general), even if they have had Math 1113 and Math 2620. By virtue of the course topic (biostatistics) you should expect this course to be quantitative, but I do not consider the math I this course to be advanced (so don't psyche yourself out!).

Statistics have become an essential tool in the biological sciences (including biomedical research), yet most biology students are relatively poorly trained in statistics, partly because biology undergraduate curriculum is dominated by special topics courses required for medical and dental school, rather than courses that are needed to become a competent science student. That said, even graduate school entrance exams (such of the MCAT) have put renewed emphasis on quantitative reasoning; note that the passage questions in the new MCAT are adapted from scientific journal articles and reflect the increasing importance of research in medicine. This is because medical practitioners need to be able to interpret the results of medical tests, and *good* practitioners should also be able to vet primary literature and/or publish their own cases or studies.

More generally, it is important to consider that scientific facts are ultimately derived, not from text books, but from the empirical scientific literature, published primarily in scientific journals. Not all studies require fancy quantitative methods, but whenever somebody is trying to test something based on a sample from a larger population, inferential statistics are likely to be involved…and it is critical to understand how the data were analyzed.

Because the large number of tests available, and the complex mathematical and computational theory underlying some tests, statistics can be a humbling domain for a biologist; the learning curve is seemingly exponential and constantly expanding; it is impossible to know everything. However, a better understanding of commonly encountered lingo, concepts, and tests is an important starting point. If you want to be a good analyst, you probably need to understand some of theory underlying the different tests (so that you apply them correctly), but the most basic goal should be to know what test to apply based on the nature of your question and the type of data that you have.

A good biostatistics course should probably be two semesters; in the first semester you would cover basic concepts and tests, and in the second semester you would examine special topics in biostatistics that you are likely to encounter (e.g., multivariate statistics, morphometrics, circular statistics, spatial statistics, meta-analysis, etc.). Since Biology 3000 is limited to one semester

I use a rank-based (or "stack rank") grading system; this means that you will be evaluated based on how well you perform (in terms of your point total) relative to other students in the class.

When possible, I like to use natural breaks in the point distribution to determine letter grades. For example, if there is a substantial point differential separating the top five students in the class from the remaining students, these top students would typically receive an "A". Conversely, natural breaks at the bottom of the distribution determine those students that do not pass (i.e., D/F). In the case that discrete natural breaks in the distribution do not exist, I will use quartiles of the distribution to assist in parsing the distribution.

There are approximately 800 points that can be earned in this course:

- 300 points from unit exams.
- 300 points from problem sets.
- 150 points of the final lab practicum.
- 50 points for lecture attendance (10 random surveys worth 5 points each).

There will be three unit exams (mainly multiple choice format, with some written answers), each worth 100 points.

Lab exercises are mainly intended to reinforce course concepts through the application of statistical programming (with R). Proficiency with lab exercises will be gauged via five problem sets (worth 60 points each) and the final lab practicum

Note that problems sets and attendance alone comprise ~ 44% of your final grade. This means that a strong performance on problem sets and showing upon.