BIOMETRY

Instructor: Professor Mark Butler
Office/Phone/Email: MGB Room 302K / 683-3609 / mbutler@odu.edu
Office Hrs: By appointment; this is so we can meet when it is most convenient for us both and so that we can meet for as long as necessary. Email me to set up an appointment.
Text: *Biostatistical Analysis*, 4th or 5th Edition, J.H. Zar (recommended; not required)
SPSS Base User's Guide, SPSS Inc. (you may want this as a supplement)
Class Hrs & Room: Tuesday and Thursday, 5:10 PM – 6:25 PM; room 352 Mills Godwin Bldg.
Course Materials: Various course handouts and materials will be made available to you on Dropbox (*https://www.dropbox.com/*) where you can set up your own free account.

Course Objectives

At the conclusion of this course students will understand the essential components of experimental design and will be familiar with basic statistical techniques commonly employed in the biological sciences. Students will recognize the assumptions and data requirements for these statistics, and will learn how to analyze and interpret biological data with these techniques. If nothing else, I hope that you will come to appreciate that: "*... the main function of that section of statistics that deals with tests of significance is to prevent people from making fools of themselves ... by claiming that their favorite theory is substantiated by observations that do nothing of the sort." Colquhoun, Lectures on Biostatistics*

Computer Use

We will be using a windows-based statistical program called SPSS to analyze data. SPSS is a widely used and powerful statistical analysis system. It is relatively simple and offers a lot of on-line help and tutorials, but like any program it takes some getting used to. The SPSS User's Guide manual may be useful to you (though not required) and is available at the ODU bookstore, Monarch Tech Store, and online. There are lots of online help and tutorials as well, however, I will email to you "how to" handouts for each analyses we do that are sufficient for class use.

You must have a LAN Account for our SPSS instruction sessions and to use SPSS on university computers. Obtain a LAN Account ASAP if you do not have one. Students can obtain a LAN account by activating their MIDAS account (Monarch Identification and Authorization System) at the ODU Midas website: *https://midas.odu.edu*

We will meet a few times during the semester (see schedule) after class (7-9PM) in a computer-equipped classroom (BAL 1013A) for hands-on instruction on the use of the SPSS program. Please plan your schedule accordingly so you can attend these important extra sessions.

Access to SPSS:

(1) SPSS is available in the University's Computer rooms if you have a ODU Local Area Network (LAN) account. Check the ODU website for computer room locations and hours of operation (http://occs.odu.edu/labs/locations/).
(2) You can also access SPSS on your own computer via the ODU Cloud; instructions for doing so are on the Biometry Class Dropbox website.
(3) A SPSS site license is free for installation on university computers. If you would like SPSS loaded on your own computer, you can purchase a "SPSS Grad Pak" for about $100 (1 yr subscription) from the Monarch Tech Store. I will send around a form to sign up for this during our first class.

Grading

I follow the University's grading scale; "+" and "-" grades will be assigned. Your final grade will be calculated as follows:

Homework	45% (3 @ 15% each)
Independent Project	15%
Midterm Exam	20%
Final Exam	20%

A Note on Original Work: Students in this course may assist each other in using the SPSS program, but may not help one another on the homework problems! Determination of the appropriate statistical procedures as well as data interpretation, writeup, and discussion must be each student's own original work! I will deal with infractions of these rules in accordance with university policy.

Description of Assignments and Exams

Homework: You will have three homework assignments. For each, you will ascertain the appropriate analysis, analyze the data, and interpret the results. Homework will be due 1-2 weeks after the assignment is given; tentative assignment and due dates are in the schedule below. The structure of the homework reports should follow that shown in the example homework answer that I will email to you.

You must email your completed homework assignments to me at: mbutler@odu.edu

Practice Homework Questions: I will place practice questions and answers in the homework format on the Biometry class Dropbox website:

Late homework: 10% will be deducted from your homework grade for each day late.

Exams: The midterm exam will be open-book and open notes; it will be given **during class on Thursday, March 21st.** The final exam will be a comprehensive, take-home test similar to the homeworks; you must email your completed final exam to me by **5PM on Thursday, May 2nd**. The exams will not be returned to you, but you will have the opportunity to review them and discuss your grade with me if you wish.

Independent Project: You will employ what you learn about experimental design and statistical analyses to design, execute, analyze, and interpret the results of a small experiment that you devise. This must be completed on your own and need not be a biological study. You'll have about two weeks to complete this assignment, which includes both a short paper describing the study and results and an informal oral presentation to the class. I will give you detailed instructions later. **Presentations will be given on Tuesday, April 30th; you must email me your written reports that day as well.**

Reading Assignments: On the Biometry class Dropbox website you will also find a few scientific papers (pdf files) on experimental design issues that I encourage you to read.

Classroom Requirements of the Department of Biological Sciences:

1. There is to be no consumption of food or drink in the lecture or computer rooms. If you require food or drink for medical reasons, please move to the hallway or lobby.
2. If you are in conflict with a faculty or staff member, your first point of contact is the Biology chairman, Dr. Wayne Hynes. The chairman's office is located in room 110 of MGB.
3. Inform the instructor of any medical conditions or needs you may have.
4. Turn off all electronic devices (e.g., cell phones) during class.
5. Read the document "Safety in the Biology Teaching/Research Labs", located in each laboratory.

Refer any questions concerning these requirements to the Department Chair, Room 110 MGB.

Course Outline & Tentative Schedule

Wk	Dates	Lecture Topics & Assignments	Chapters In Zar
1	1/15 & 1/17	Types of data & studies, data mgmt, & descriptive statistics	1 – 4
2	1/22 & 1/24	T-tests: 1-sample t-test, Paired t-test, 2-sample t-test **Computer Instruction: 7–9 PM in BAL 1013A on 1/22 & 1/24** Homework #1 assigned	8 & 9
3	1/29 & 1/31	Hypothesis testing approaches	13
4	2/5 & 2/7	Evaluating parametric assumptions & data transformations **Homework #1 due on 2/7**	10
5	2/12 & 2/14	1-Factor ANOVA & Multiple comparison tests	
6	2/19 & 2/21	Randomized-Block & Repeated Measures ANOVA **Homework #2 assigned**	
7	2/26 & 2/28	Experimental Design	12, 14
8	3/5 & 3/7	Experimental Design Homework #2 due on 2/28	12, 14
9	3/12 & 3/14	**No Class - Spring Break**	
10	3/19 & 3/21	**No Class Tuesday 3/19** (study for exam) **MIDTERM EXAM Thursday 3/21**	
11	3/26 & 3/28	2-factor ANOVA Multifactorial ANOVA	14, 15
12	4/2 & 4/4	Split-plot ANOVA Independent Project Planning	15
13	4/9 & 4/11	Nested ANOVA Homework #3 assigned	16 – 18
14	4/16 & 4/18	Correlation & Regression	12, 17
15	4/23 & 4/25	Categorical Analysis Take-home final exam assigned **Homework #3 due on 4/25**	21 – 22
16	4/30	**Independent Project In-class Presentations** (5 mins/student) **Independent Project Report Due**	
	5/2	**Exam week: Take-home FINAL EXAM DUE BY 5PM**	