

PRINCIPLES OF BIOMETRY

Biology 4620, 5620 FALL 2018

334 Life Sciences 11:30–12:20 PM M, W, F

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Office Hours: 12:30–1:30 PM W

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Tentative Lecture Schedule

WEEK	TOPICS (H: Homework Assignment)	CHAPTER*
1	Scientific Epistemology; Populations and Samples (H)	Handout
2	LABOR DAY (M, 3 September) Measurement Levels; Frequency Distributions (H)	1
3	Measures of Central Tendency and Variability (H)	
4	Counting Techniques and Probability (H)	2
5	Probability Distributions and Random Samples (H)	3, 4
6	Scientific Epistemology and Hypothesis Tests; One-Sample Hypotheses	5
7	Review; EXAM I: PART A (W, 4 October), PART B (F, 6 October)	
8	Statistical Error and Power (H)	6
9	Paired Sample Hypotheses; Two-Sample Hypotheses (H)	7
10	Non-Parametric Statistical Tests (H) Goodness of Fit Tests (Graduate Students)	6, 7 11
11	Comparisons of Population Means from k -Samples: Analysis of Variance	8
	VETERAN'S DAY (M, 12 November)	
12	EXAM II: PART A (W, 14 November), PART B (F, 16 November)	
13	Factorial Design: Two-Way Analysis of Variance THANKSGIVING BREAK (22-24 November)	9
14	Two-Way Analysis of Variance (<i>continued</i>); Linear Regression and Correlation (H)	9, 10
15	Common Problems with Biological Data: Transformation; Principles of Experimental Design; Review (H)	A.1, A.2, Handout
16	FINAL EXAM (F, 14 December 11:30-2:00 PM)	

*REQUIRED TEXTBOOK AND COMPUTER SOFTWARE

Text.—Glover, T. and K. Mitchell. 2016. *An Introduction to Biostatistics*. Third Edition. Waveland Press.

Computer Software.—We will use JMP 13 statistical software in this course (compatible with PC and Apple computers). A student license for JMP can be downloaded at:

<http://www.onthehub.com/jmp/>

Graduate students will learn to use basic functions in R.

COURSE OBJECTIVES AND LEARNING OUTCOMES

This course is intended to provide you with a foundation in scientific epistemology and an introduction to elementary statistical techniques commonly used by biologists. The course will prepare you to learn more sophisticated statistical procedures and you are encouraged to continue your studies through the advanced course offered by the Department of Biological Sciences (graduate students) or through courses offered by the Department of Mathematics and Statistics.

HOMEWORK ASSIGNMENTS

Undergraduate Students

There are 10 homework assignments, which will be distributed (or posted) on Fridays (indicated by an **H** on the schedule) or on the last day that classes meet in a week if a Friday is a scheduled holiday. The assignments are due at the start of class the Friday after they are distributed. There are ten assignments, each worth 20 points. Late assignments will not be accepted unless prior arrangements are made with me and *no make-up assignments will be allowed*.

Graduate Students

The rules for undergraduates apply, but assignments will generally include more problems and each assignment will be worth 25 points. The assignments may involve the use of R. In addition, graduate students will conduct an independent study of the goodness of fit statistics (described in Chapter 11). These procedures will be covered on the final, for a total of 35 points. Details will be discussed in class.

IN-CLASS ASSIGNMENTS

Five in-class assignments will be given periodically. Each assignment is worth 10 points must be completed in class. Problems will illustrate principles discussed in the lecture and will generally involve working in small groups. *You may not earn in-class assignment points for any class that you do not attend.*

EXAMINATIONS

There will be two in-class examinations—excluding the final—as indicated on the schedule, each of which consists of two parts. Each examination is worth 100 points. A make-up test will be given only under extreme circumstances, which include a medical emergency or the death of someone in your family. You must be prepared to document your emergency and you must make every effort to contact me *before* a test is scheduled. *You may lose your privilege to take a make-up examination if you fail to contact me in a timely manner.* The final examination will include a take-home section (75 points for undergraduates, 100 points for graduate students) and an in-class section (25 points for undergraduates, 35 points for graduates) that will given at the university-scheduled time (**Friday, December 14, 11:30–2:00 PM**). The final examination will not be strictly cumulative, but you will need to apply many of the concepts and techniques used repeatedly over the course of the semester.

Examinations will consist of multiple choice, short answer and essay questions. Emphasis will be placed on knowledge of basic concepts and vocabulary, critical thinking and the application of statistical techniques to biological data. *The take-home section of the final examination will be distributed in class (Friday, December 8) and is due when you arrive to take the in-class portion of the examination (Friday, December 15).*

GRADES

Your lowest score on the 10 homework assignments and the lowest score of your five in-class assignments will be dropped to compute your total score for the course. Thus, undergraduates can earn a maximum of 520 points and graduate students can earn up to 600 points in the class.

Grade*	Undergraduates	Graduate Students
A	468-520	540-600
B	416-467	480-539
C	364-415	420-479
D	312-363	360-419
F	0-311	0-359

* Listed point ranges for grades are based on percentages, where $90 \leq A \leq 100$, $80 \leq B < 90$, $70 \leq C < 80$, $60 \leq D < 70$ and $0 \leq F < 60$. The lower boundary for grades *may* be reduced slightly based on the overall performance of students in the class, but *any adjustments will be minor and you should use the 90, 80, 70, 60 percentage scheme to monitor your progress.*

STRATEGIES FOR SUCCESS

To do well in this course you should:

Attend every class

Take detailed notes, particularly on material that you do not understand

Participate in class discussions

Review my posted handouts and your notes regularly and come to class prepared with questions

Contact me promptly to discuss any problems that affect your performance in class

ACADEMIC HONESTY

The *Academic Honesty Policy* requires that students do not cheat, fabricate, plagiarize or facilitate academic dishonesty. A violation of the policy may result in failure of this course and could lead to expulsion from the University. *All incidences of academic dishonesty will be reported.* For details related to this policy, you should visit:

<http://www.bgsu.edu/student-handbook/code-of-conduct/code-of-academic-conduct.html>

All assignments and examinations must be completed independently, without the help of your classmates or others, unless you are informed otherwise.