

BioStatistics – Spring 2023

(BioSci 465)

Instructor: Dr. Filipe Alberto
Lapham 575 (south wing)

e-mail: albertof@uwm.edu

Lecture times: Tues, Thurs **2.30-3.45 (PM) in Lapham Hall N103**

Office hours: Please email or talk to me for an appointment, I will find time in that week to talk with you.

Course topics: Introductory statistics with application to biology. Includes descriptive statistics, hypothesis testing, Chi-square tests, t-tests, ANOVA, regression and multiple regression.

Required items: Tophat.com subscription and book

To use the classroom app for answering in-class questions and completing assignments (all through TopHat), you will need an **electronic device**. This includes laptop, smart-phone, tablet or cell phone with text capability.

You can purchase the TopHat subscription and book through the UWM virtual bookstore (uwm.ecampus.com), or through TopHat directly. **I recommend you do it through Tophat directly as you will get access to the book faster.**

The course join code on TopHat is 108475

Required Textbook: The textbook is electronic and is called “**Statistics for Social Science**” by Steve Hayward. This is an electronic book available from TopHat.com. My colleague Peter Dunn, who also teaches this class, and I are editing it and, to reduce confusion, we called it “**Biostatistics – Spring 2023**”. You have ‘lifetime’ access with your purchase.

Required TopHat subscription: To use the textbook and answer homework and other assignments you will also need a TopHat subscription (You can buy the semester or see their web site for other options in case you might use it in other courses).

You will need to register online at <https://tophat.com/> as a student and pay the fees there, if you have not registered for another class at UWM that uses TopHat (e.g., Genetics, or Birds of Wisconsin).

The tophat site has instructions on how to use the system. **You will need to bring to class a mobile device (cell-phone, tablet, or laptop) to be able to answer the in-class questions and assignments on TopHat.** Don't forget to charge your battery. A text message from an older cell phone can also be used to answer the questions (see the TopHat site for details). Use UWM-WiFi to connect your laptop or mobile device when answering TopHat quizzes in class, the UWMPublic connection is known to log out and cause failure to upload your answers. **Download Top Hat before or after, not during, class.**

For extra credit R homework, you will need to install in your laptop R and Rstudio or, alternatively, R and a text editor (see instructions on CANVAS software page), let me know if this is not possible so I can accommodate you. UWM computer labs have also R installed.

Class format

Course material will be delivered via lecture, online textbook and class exercises. Lecture slides will be available on the course CANVAS site (<https://uwm.edu/canvas/home/>). The site will have some of my lecture slides in PDF format.

IMPORTANT: This class requires regular participation. 30% of the grade is based on in-class assignments. You will NOT be successful if you miss classes and try to learn the material simply by reading the lecture slides. DO NOT make this mistake.

Textbook Questions (Learning Check) using TopHat [40% / 30%, U/G] of total grade). Each chapter in the TopHat “textbook” has questions embedded in the chapter; these are the **Learning Check** questions to help make sure you understand the material as you read it. **Note that these are different from the end of chapter questions (aka in-class assignments see below).** You have two attempts to get these questions correct, and the grades are scaled 60% for the correct answer and 40% for participation. You will have **one week** to read each chapter and get points for this ‘quiz’. Note that you will be required to read the chapters being lectured one week before the lecture, including answering to the questions. This will help transform the lecture more from a classic format into a discussion. **The exception will be the first week where you will have to read that week's topic plus those from the second week.** After these deadlines the textbook chapter will change from homework mode to review mode. You will still be able to read the chapters and see questions and correct answers **but you won't be evaluated if you only answer after the deadline.**

In class assignments (“End of chapter” Questions) using TopHat (30% of total grade). Each chapter in the textbook also has some questions at the end. **These “end of chapter questions” are in a different folder than the questions mentioned above.** You have one attempt at these questions, and the grades are scaled 60% for the correct answer and 40% for participation. **I will drop the lowest score for any of these assignments, but I advise against using this as an excuse to not complete all of them. Any additional excused assignments will require documentation. Some assignments may be done as homework, these will be announced ahead of time.** When on homework format the quiz should be completed individually.

Two examinations (30% of total grade) will be administered during the semester. The second exam will be administered on the **last day of class**. Exams will consist of approximately 35-45 questions. The exams will be multiple choice and include definitions, decision-making and problem-solving. There is relatively little number-crunching in the course. Exams will be non-cumulative, but will rely upon understanding material covered earlier in the semester. During exams some computation will be required; however, all necessary formulae and statistical tables will be provided (although you need to know what the symbols in the formulas represent). **Calculators may be used, but other electronic equipment that include calculators may not** (laptops, cell phones, pda’s, etc). All exams will be collected and kept in the instructor’s office. Students may view their own previously completed exams and quizzes in the instructor’s office, but may not keep them.

Graduate students will be required to make a 15 min presentation to the class (10% of total grade) on a topic of interest involving statistical analysis (chosen after consulting the instructor). A couple of questions about grad presentations will appear in the 2nd exam.

Extra credit if you complete computer assignments on R (5% of total grade) that follow the contents of some of the chapters and will help you to run your own statistical analysis. **This homework will be submitted in the form of a script (text file) in CANVAS within the published deadlines.** If interested in taking this extra credit, **you should learn at the beginning of the semester on how to use the R software.** At the beginning of the semester you should install R in your computers, there will be help in CANVAS and you can always contact me for help with R related issues.

NOTE THAT this extra credit component is only worth 5% and might be time-consuming if you are struggling with R analysis or the command line format of the R software. I will be explaining all you need to know to use it. R installation instructions

will be on canvas course pages. If needed, I will be helping people in the first weeks of class with any doubts about installation and basic use of R. Again, if your schedule is full or if you are struggling with the main components of this class, you should perhaps focus on those and not consider pursuing this extra credit.

Extra credit for TopHat in class questions(5%): Up to 5 additional percentage points will be added to the final grade based on TopHat questions given during lectures (there are about 30 of these over the semester). These questions are graded 60% for the correct answer and 40% for participation.

Evaluation: Grades will be based on the **two exams; answers to questions in the textbook, and the in-class “end of chapter” quiz, and presentations (grad only) as follows:**

Grades will be allocated in the following manner:

Undergraduates: Textbook Questions 40%, End of chapter questions / homework 30%, Exams 30%.

extra credit: R homework extra credit (5%), Tophat classroom questions (5%),

Graduate students: Textbook Questions 30%, End of chapter questions / homework 30%, Exams 30%, Presentation 10%.

extra credit: R homework extra credit (5%), Tophat classroom questions (5%)

Attendance and Assignment requirements: Attendance is required at each class unless excused for documented reasons, such as sickness or other serious reasons. Missed assignments will result in a zero for the grade, unless excused. **I will drop the lowest score for the in-class assignments, but I advise against using this as an excuse to not complete all of them. Any additional excused assignments will require documentation of illness or serious reasons.**

Letter grades will be assigned based on the final total points listed below.

A	92 – 100%	C	71 – 75%
A-	89 – 91%	C-	68 – 70%
B+	86 – 88%	D+	65 – 67%
B	82 – 85%	D	61 – 64%
B-	79 – 81%	D-	56 – 60%
C+	76 – 78%	F	0 - 55%

Need for Special Accommodation * Students who require note-taking or test-taking accommodations in order to meet any of the requirements of this course, please contact me as soon as possible to make suitable arrangements.

(DATES AND TOPIC CORRESPONDENCE ARE SUBJECT TO CHANGE)

Week	Dates	Lecture topics	Chapter in TopHat textbook	Lecture
1	24, 26 Jan	Introduction, Types of data and variables, sampling methods, hypotheses & predictions	1, 2	1,2
2	31 Jan, 2 Feb	Descriptive statistics, sampling distributions, confidence intervals	3, 4	3, computer
3	7, 9 Feb	Probability, binomial distribution, hypothesis testing	3,4	4, 5
4	14, 16 Feb	Analysis of frequencies, Chi-square tests: goodness of fit and test of independence	5	6, 7
5	21, 23 Feb	Normal and t distributions, one-sample t-test	6, 7	8, computer
6	28 Feb, 2 Mar	Two-sample tests, non-parametric tests,	7,8	9, computer
7	7, 9 Mar	Experimental design and power analysis	extra	10, computer
8	14, 16 Mar	Review 15 Mar, Exam I (16 Mar)		
9	28, 30 Mar	Intro to ANOVA, types of ANOVA	9	11, computer
10	4, 6 Apr	Planned and unplanned comparisons, two-way ANOVA,	9	12, computer
11	11, 13 Apr	Nested ANOVA, within-subjects ANOVA	extra	13, 14
12	18, 20 Apr	Intro to regression & correlation	10	15, 16
13	25, 27 Apr	Multiple regression, model selection,	extra	17, 18
14	2, 4 May	Graduate student presentations	extra	
15	9, 11 May	Review on 9 May Exam II (11 May)		
		There is NO Final Exam in this course		

Some University Guidelines of Interest

Academic Misconduct

The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. A more detailed description of Student Academic Disciplinary Procedures may be found in Regents Policy Statements, UWS Chapter 14 and UWM Faculty Document #1686.

Complaint Procedures

Students may direct complaints to the head of the academic unit or department in which the complaint occurs. If the complaint allegedly violates a specific university policy, it may be directed to the head of the department or academic unit in which the complaint occurred or to the appropriate university office responsible for enforcing the policy.

Grade Appeal Procedures

A student may appeal a grade on the grounds that it is based on a capricious or arbitrary decision of the course instructor. Such an appeal shall follow the established procedures adopted by the department, college, or school in which the course resides. These procedures are available in writing from the respective department chairperson or the Academic Dean of the College/School.

A more detailed description of the grade Appeal Policy may be found in UWM Selected Academic and Administrative Policies, Policy #S-28 and UWM Faculty Document #1243.

Sexual Harassment

Sexual harassment is reprehensible and will not be tolerated by the University. It subverts the mission of the University and threatens the careers, educational experience, and well being of students, faculty, and staff. The University will not tolerate behavior between or among members of the University community which creates an unacceptable working environment.

Using Canvas

Canvas is pretty intuitive. Log on at (<https://uwm.edu/canvas/home/>). Additional online help is available here <https://uwm.edu/canvas/students/>.