Biological Statistics II

BTRY3020/STSCI3200 & BTRY5020/STSCI5201

Statistics & Data Science

Spring 2024 - Catalog Number: 1058

Instructor

NAME	OFFICE	OFFICE HOURS
Jeremy Entner	168 Surge B	T 1:00-3:00pm (In Person)

Course Email Address:

- **biostats@cornell.edu**
- All email for the course should be sent to the email address listed above.
- Email Addresses for Teaching Assistants can be found on Canvas

Office Hours

Office hours should remain fixed week to week. However, you should check Canvas ahead of time, just in case there is an unexpected cancellation or adjustment.

Teaching Assistant information and office hours can be found on Canvas.

Any student can attend any office hours. Office hours are meant to provide assistance. Students are expected to come with questions seeking clarifications. Students should not expect a TA or the instructor to review each answer a student has made at an assignment to determine its correctness before the assignment is submitted.If a student is unsure of an answer, they should provide their reasoning for the work they have done so far, and an explanation of where they are unsure.Additionally, they should be able to show where they looked in the notes to produce their reasoning.

Office hours are not time for the TA or Instructor to reteach lectures from scratch.

Course Description

Applies linear statistical methods to quantitative problems addressed in biological and environmental research. Methods include linear regression, inference, model assumption evaluation, the likelihood approach, matrix formulation, generalized linear models, single-factor and multifactor analysis of variance (ANOVA), and a brief foray into nonlinear modeling. Carries out applied analysis in a statistical computing environment.

Credits

- 4.0 - credits, Letter Grade or Satisfactory/Unsatisfactory

Course Objectives

After the Biological Statistics II course students will be able to:

- design a statistical experiment using randomization techniques.
- analyze multivariate linear and nonlinear data that include quantitative and qualitative variables.
- apply generalized linear model to appropriately collected data.
- formulate and evaluate parametric and nonparametric methods for determining model uncertainty.
- employ matrix methods to effectively design and implement linear models.
- assess the quality of a statistical analysis.

Prerequisites/Co-requisites

- Prerequisite: BTRY 3010 or equivalent

Time & Location

The course meets weekly at the times listed below. There will be 28 meetings of the lecture. There will be 14 meetings per section.

Students should check Student Center for the specific section number, location, and time that they are enrolled in. Your Teaching Assistant's name will not appear in Student Center. If there is a discrepancy between this listing and Student Center, the information in Student Center should be deemed correct.

Lecture	Warren Hall 175	TR 10:10am - 11:25am	Dr. Entner
LAB 401	Mann Library B30B	F 12:20pm - 1:10pm	TA - See Canvas
LAB 402	Mann Library B30A	R 1:25pm - 2:15pm	TA - See Canvas
LAB 403	Mann Library B30A	F 10:10am - 11:00am	TA - See Canvas
LAB 404	Mann Library B30B	F 11:15am - 12:05pm	TA - See Canvas

Optional Reference Books

1. Applied Linear Statistical Models, 5th edition, by Michael H. Kutner et al, 2004, McGraw-Hill Irwin publications. ISBN: 0-07-238688-6. THIS BOOK IS OUT OF PRINT.
2. An R companion to Applied Regression, 2nd edition, by John Fox, 2011, Sage Publications,

Assignments

- Course Surveys
- Up to Two Weekly After-Lecture quizzes
- Weekly discussion Assignment
- Two Evening Preliminary Exams
- One Final Exam

Method of Grading Student Achievement

Basis of Grade Determination:

Weight	Assessment
1%	Course Surveys
29%	Discussion Homework (Equally Weighted)
20%	Lecture Quizzes (Equally Weighted)
30%	Prelim Exams (Equally Weighted)
20%	Final Exam

Assignments within each category are equally weighted.

Grading Scale:

Grade	Low	High
A+	99.80	1000
A	93.33	99.80
A-	90.00	93.33
B+	86.66	90.00
B	83.33	86.66
B-	80.00	83.33
C+	76.66	80.00
C	73.33	76.66
C-	70.00	73.33
D+	66.66	70.00
D	63.33	66.66
D-	60.00	63.36
F	0.00	60.00

Each grade range includes the score on the left, and excludes the score on the right. For example, a 90.0 is an A-, and not a B+. An 89.99 is a B+, not an A-.

Students taking the class for an S/U grade must have a score of 70 or greater to be given a grade of S.

Software

R-Studio and R will be used as the statistical computing tool for this class. A background in programming with R and using R Studio is assumed. Anyone coming into this course without such background (BTRY3010) should consider themselves warned, especially if you have no coding experience.

The discussion component of the course is designed to illustrate concepts introduced in lecture. The discussion is not an introduction to programming in R and R-Studio.

R-Studio can be downloaded free of charge from r-project.org and rstudio.com. You should have latest version of *R* and *RStudio*.

If installing these on your personal computer is problematic, you have two alternatives:

1. Use discussion computers on campus that have R-Studio and R installed.
2. Get an online account through Posit.cloud to use RStudio.

Websites

There are two relevant websites for the course.

- Canvas will be used for recording grades, posting course materials, and quizzes.
- Gradescope will be used for assignment submissions.

Course Surveys

Periodically, surveys and questionnaires will be posted to Canvas. These are used mainly as information gathering tools for the exams. These are graded based on **useful** completion. Submitting these surveys with answers that do not answer the questions will be considered non-useful answers. Only the single lowest survey score will be used when computing your final grade.

Exams

Two **Evening** Preliminary Exams will be given. The Date, Time, and Location information is published online at **https://registrar.cornell.edu/exams/spring-prelim-schedule**.

One Final Exam will be given. The Date, Time, and Location information will be posted at **https://registrar.cornell.edu/**

Complete Exam Rules are posted in the Course Information Module under the heading **Exam Rules**.

> The graduate version of the Preliminary Exams and Final Exam will contain questions that are modified from the questions on the undergraduate exams and/or questions cover content not included in the undergraduate exam. Such questions are meant to demonstrate a higher level of understanding than the typical undergraduate student.

Weekly Discussion Meeting

Discussions meet once a week. Computers are available for you to use during the discussion. However, if you desire, may use your personal computer to complete the discussion. You will need to install both *R* (https://www.r-project.org) and *RStudio* (https://www.rstudio.com) on your computer. While completing the discussion, you may confer with your neighbors and the TA, but the work you submit must be your own.

You are expected to attend the section you are registered for. A set of documents will be posted on Canvas that will be used in discussion.

During the discussion, the TA will work through an example or demonstrate a concept using R. Subsequent to that, you will have time to work on the Homework Assignment that accompanies the discussion. You are not expected to complete the discussion/Homework during the discussion period. You have 1 week to complete the discussion/Homework.

The discussion/Homework will need to be submitted to either Gradescope, Canvas, or both, depending upon the given instructions. **THE DUE DATE AND TIME WILL BE POSTED ON GRADESCOPE** If there is a discrepancy between a due date and time posted on GRADESCOPE and on CANVAS, the due date and time on GRADESCOPE should be considered the correct due date and time.

discussion/Homework submissions should be based on information, commands, functions, and procedures that have been demonstrated in discussion or Lectures. If you are uncertain whether something is allowable for a submission check the course notes and discussion handouts that were available before the discussion was presented. If the information you are looking for is not available there, it is not allowable for a submission.

If you know a method (usually a function) in R for completing a problem which was not shown in class/discussion, you should

- use the method shown in class/discussion;
- show the instructor the alternate method;
- use the method shown in class/discussion. (No credit will be given otherwise.)

Some discussion periods may be used to give exam questions that would require the use of R on a computer.

> The discussion/Homework will have parts of questions that are marked for **Graduate Students**. These parts are required for graduates students. These parts are not required for undergraduates students.

discussion assignments will not be accepted late for any reason. You should not email the instructor or teaching assistants a late submission. It will not be accepted.

discussion submissions to GRADESCOPE should:

- be the product of KNITTING an RMD file to MICROSOFT WORD and saving that result as a PDF.
- have problems matched/assigned to relevant pages. (Points will be deducted for each occurrence.)
- not have different problems sharing the same page(s). Each problem should be on its own page. In the event that a problem requires more than one page, none of its results should appear with the results from a different problem. (Points will be deducted for each occurrence.)

Lecture Quizzes

Each lecture will be accompanied by a quiz posted to Canvas. Each Quiz will be due within one week of posting it. In the event that you are unable to complete the lecture quiz on time, each lecture quiz has an automatic extension of one week. There is no penalty for completing the lecture quiz during the extension period (although Canvas will mark all your submissions as late). Lecture quizzes occurring near breaks in the semester will be adjusted accordingly. Quizzes during the last week of class will only be extended until the last day of class. No extra extensions will be granted. You have unlimited attempts at each lecture quiz.

Lecture Quiz questions are drawn from a homework bank at random. Each attempt at a Lecture Quiz will likely include some questions from previous attempts and new questions. The highest homework score will be the score that is kept. Thus, if you ace a lecture quiz, and want to see other types of questions, it does not hurt your grade to attempt the lecture quiz again.

Late Assignments, Make-Up Policy & Extensions

No late assignments will be accepted. Do not email an assignment to the instructor or TA after it is due. It will no be accepted. If an assignment is due at 11:00pm on a particular day, do not wait until 10:58PM to submit the assignment.

Extensions will only be given for a valid Student Disability Services (Student Disability Services) or Varsity Athletics (VA) accommodation that allows for extensions. The letter needs to be received by the instructor before the extension can be asked for. The extension (based on an Student Disability Services or VA accommodation) will only be granted when asked for in a **timely manner**. The instructor determines the length of the extension.

No make-ups discussion sections will be allowed, unless allowed for by a Student Disability Services or VA accommodation.

At least one discussion activity score will be dropped. This is to accommodate events that may cause you to miss your discussion. This could include, but is not limited to:

- taking a field trip in another class,
- attending a sporting event,
- registering for the course late
- sleeping in
- broken car
- family emergency

Dropped Grades

1. The lowest score in each of these grading categories will be dropped.
    - Discussion Homework
    - Lecture Quizzes
2. All except the lowest Course Surveys score will be dropped. If there are 10 surveys, and you complete 9, you will receive a zero for this portion of your grade.
3. No exams will be dropped.
    - Make-up exams will only be given to students with a valid Student Disability Services, Varsity Athletics, or Military Service accommodation that allows for a make-up. Such exams must be made up within 1 day of the posted exam date. Allowable make-up exams will not be given after the exam results have been posted.
    - If ONE preliminary exam is missed (and can't be made-up because of a Student Disability Services, Varsity Athletics, or Military Service accommodation), the missed preliminary exam score will be replaced at the end of the semester with the score the student receives on the final exam. This will be done on a percentage basis. Thus, if a student received an 80% score on the final exam, they would be awarded 80% of the possible points on the missed exam. (In the unlikely event that adjustments are made or extra credit is given to the final exam scores, the percentage will be taken from the unadjusted final exam score.)
    - If two preliminary exams are missed, one of the exams will have its grade replaced as described above. The other will be given a zero score.
    - If you attend an exam period, you will not be eligible for these missed exam policies.
    - Until the final exam is taken, any missed preliminary exams will have their scores recorded as a zero. Only after the final exam is taken will a replacement be made as described above.

Varsity Athletes

Varsity athletes should forward their official schedule of events and associated athletic leaves of absences to the instructor as soon as they receive it from the athletics department.

Additionally, Varsity Athletes should notify the instructor three days prior to missing a discussion section for an event listed on the official schedule of events and associated athletic leaves of absences.

Further, Varsity Athletes should notify the instructor no less than one week and no more than two weeks prior to missing a scheduled exam.

Regrades

Regrades are intended to correct serious errors in grading, not to dispute judgment calls made by graders. Graders do sometimes take off a little too much, but they just as often give a little too much. **Consistency in grading is the goal.** If you decide that a serious mistake was made in grading your assignment, then we would be happy to fix it. Asking for a regrade depends on where an assignment is submitted.

Gradescope Submissions

If you believe there is an error in grading an assignment that was submitted in Gradescope, use Gradescope to submit a regrade request. This will notify the TA that graded that particular submission. They will review your submission. Emailing a TA or the Instructor regarding a regrade request for an assignment submitted through Gradescope. will result in a reply directing you to use the regrade options within Gradescope.

Non-Gradescope Submissions

If you believe there is an error in grading an assignment that was NOT submitted through Gradescope, contact a TA or the instructor. Copy and paste the entire question into an email, and send it to the instructor, or a TA, for review. If needed, the question will be corrected. If it will increase your overall quiz score, your the grade will be changed.

Deadlines for Regrades

GradeScope Submissions: The deadline for making regrade request for an assignment submitted through GradeScope is seven days after the original grade was released on GRADESCOPE.

- Appeals made after that will be denied without consideration of their merits.
- You should regularly check GRADESCOPE for posted grades.

Canvas Submissions: The deadline for making regrade request for an assignment submitted through Canvas is seven days after the due date of the assignment.

- Canvas Submissions are generally quizzes.
- It is generally quicker to retake the quiz.
- If you have made multiple attempts on a quiz, and have regrade request on a submission that will not raise the overall quiz score, the
- Appeals made after that will be denied without consideration of their merits.

Exams: Exam Packets and Exam Bubble Sheets are scanned and loaded into GRADESCOPE. The deadline for making a regrade request is seven days after the release of both items on GRADESCOPE.

- Appeals made after that will be denied without consideration of their merits.
- Regrade Requests should be made through GradeScope
- Regrade Requests should be made on the Bubble Sheet and not on the Exam Packet.
- You should regularly check GRADESCOPE for posted grades.

Warning

Resist the temptation to use regrades as a means to fish for a better grade. Any regrade requests that we perceive to be specious will inspire increased rigor in rechecking your **entire** submission, and that often leads to a grade reduction. Consistency in grading is the goal.

You should feel free to ask them for **clarifications** or for advice on how to improve your work. But the grade on your solution and/or changes to your grade are "out of bounds" for discussion.

Some Examples of "out of bounds" remarks:

> "I don't thing this question should be worth _____ points"
>
> "The deduction taken for this questions is too large"

If during the course of your discussion the TA thinks there might be a mistake, they will volunteer to have the response reviewed outside your meeting. Keep in mind, the TA you contacted may not be the individual that graded the assignment. They will need to contact the actual grader, a PhD TA, or the Instructor. If a mistake is found, we will change your grade **up or down** accordingly.

Electronic Devices

You may use your electronic devices during class provided they are not disturbing/distracting the class or the instructor. If you are disturbing/distracting the class, you will be informed and asked to stop. At which point, you should stop.

Browsing non-class related websites during class is considered distracting/disturbing and should not be done.

Recordings

Recording any portion of the course in any manner without the permission of the instructor is forbidden. Providing or selling course materials to future students taking this course is forbidden. Obtaining course materials from students that are not currently enrolled in the course is forbidden. Obtaining or sharing exams from this course is forbidden.

Academic Integrity

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity: http://cuinfo.cornell.edu/aic.cfm. Under the provisions of the Code, anyone who gives or receives unauthorized assistance in the preparation of work at home or during tests in class will be subject to disciplinary action. A student's name on any piece of work is our assurance that they have neither given nor received any unauthorized help in its preparation. Students may assist each other on assignments by answering questions and explaining various concepts. However, one student should not allow another student to copy their work directly. All University policies with respect to cheating will be enforced. A student who is found to have cheated on an exam, or any other graded assignment, will receive an "F" in the course.

Artificial Intelligence

The use of artificial intelligence is forbidden in this class. It should not be used to generate solutions for any work in this course. It should not be used to generate suggestions for solutions. Usage of Artificial intelligence will be considered an academic integrity violation.

Student Disability Accommodations

Students with Disabilities: Your access in this course is very important to me. In order to have adequate time to arrange your approved accommodation(s), you must request your SDS accommodation letter no later than the add/drop deadline for the semester.

- Students currently registered with SDS: Once you request your accommodation letter and it is approved by SDS, it will be emailed to both you and me. Processing time can be up to 48-hours.
- Students not registered with SDS: The registration process for new accommodations can take up to three weeks. Once you are approved by SDS for accommodations, you will be able to request your accommodation letter for this course.
- If you are approved for accommodations later in the semester: you must request your accommodation letter as soon as possible.

Students with Exam Accommodations:

In addition to requesting your accommodation letters, this course will be participating in the Alternative Testing Program (ATP). All exams will be centrally managed and supported by the ATP Testing Coordinator in the Office of Student Disability Services and accessible in your SDS student portal. ATP support includes:

Scheduling of accommodated exams:

Daytime exams: Students are expected to start their accommodated exam at the same time as the general exam administered during class time. Students with extended time accommodations who have an academic conflict (i.e. a course immediately following this class) may select to take their accommodated exam at 8 a.m. and/or 5 p.m. on the same day as the general exam. More information is available here at sds.cornell.edu/atp

Evening prelims: Evening prelim exams will begin promptly at 6:30 p.m.

Notification of accommodated exam logistics

1. All exam logistics are managed by the ATP and will ONLY be communicated to you via email from sds-testing@cornell.edu and accessible in your SDS student portal. Please do not contact me with questions about exam logistics, as I will not be able to answer them.
2. 10-days prior to the exam date: ATP will automatically send an email with the exam date, time, location.
3. 48-hours prior to the exam date: ATP will send a reminder email about the exam.
4. Coordination of make-up exams (i.e., for students who have been granted prior permission by me to take the exam on a day other than the scheduled date of the main exam) will be handled by the instructor. The ATP will not be involved in the logistics for any make-up exams. If you miss your scheduled accommodated exam, you should notify the instructor, not the ATP.

For students with other academic accommodations (not testing-related), please follow up with the instructor to discuss the necessary logistics of your accommodation(s).

Mental Health and Well-being

Your health and wellbeing are important to the instructor. There are services and resources at Cornell designed specifically to bolster undergraduate, graduate, and professional student mental health and well-being. Remember, your mental health and emotional well-being are just as important as your physical health. If you or a friend are struggling emotionally or feeling stressed, fatigued, or burned out, there is a continuum of campus resources available to you: https://mentalhealth.cornell.edu/get-support/support-students. Help is also available any time day or night through Cornell's 24/7 phone consultation (607-255-5155). You can also reach out to me, your college student services office, your resident advisor, or Cornel Health for support.

Changes to the Syllabus

The Instructor reserves the right to alter this syllabus, if the Instructor decides it to be for the benefit of most of the class. The Instructor will make you aware of this either either in writing (electronic or otherwise), or verbally (during lecture). Failure to read communication regarding the course, or being absent from lecture when something is changed, does not excuse a student from having a policy applied to them.