

BTRY 6020: Statistical Methods II

Instructor: Nayel Bettache (nbb45)

TA's: Daniel Coulson (dac382) and Tathagata Sadhukhan (ts767)

Credits and Credit Hour Options: 4.0-credits, Letter Grade

Site: <https://nayelbettache.github.io/STSCI6020.html>

Course schedule: There are 28 total lectures and each TA will hold 14 labs.

Session	Time	Location	Instructor
Lecture	Mon/Wed 10:10 - 11:25 AM	Malott Hall 253	Bettache
Lab	Mon 2:55-4:10	Mann Library B30A	Coulson
Lab	Tu 1:25-2:40	Mann Library B30A	Sadhukhan
Office Hours	Mon 11:30-12:30	Mathematics Library 420D	Bettache
Office Hours	Tues 1:30-2:30	Surge B 159	Sadhukhan
Office Hours	Thur 10:30-11:30	Surge B 159	Coulson

Course Description Continuation of BTRY 6010. By the end of the course, student should be able to not just apply statistical methods, but also statistical reasoning to their research questions of interest. Topics include an introduction

- Linear models: linear regression with one independent variable, multiple linear regression, interpretation, causal effects, etc
- Uncertainty and testing in linear models: testing, confidence intervals, prediction intervals, model diagnostics, etc
- More complex regression models: interaction effects, categorical data, additive models, etc
- Generalized linear models: logistic regression, Poisson regression, etc
- Variable selection: Forward/Backward Selection, AIC, BIC, etc
- Modern regression procedures: Lasso, Ridge regression, etc
- Multiple testing: Bonferonni, Family wise error rates, False discovery rate, etc
- Basics of Causal Inference
- Statistical computing with R

Course Objectives: This course will aim to provide a foundation for applying statistical methods to your research interests. Upon completion of this course, you will be able to:

1. Fit a regression to data using statistical software
2. Assess the feasibility of regression assumptions for your data
3. Evaluate which regression methods are appropriate for your specific analysis
4. Explain and interpret the regression results to collaborators

Prerequisites: BTRY 6010 or similar

Textbook: Applied Linear Regression, 4th Edition by Sanford Weisberg. A digital version available for free from the Cornell Library website. Access to the textbook will be helpful, but is not required.

Assignments: The course will be divided into a set of modules (roughly 1-2 weeks each). At the end of each module, there will be an assessment in the form of a set of exercises. You may discuss the assessments with other students, but the final product which you turn in must be completed on your own. *Modules assessments will be due a week after they are released (with exceptions for university holidays).* At the end of the semester, there will be a final exam.

Grading: The module assessment will account for 80% of the final grade and the final exam will account for 20% of the grade. The lowest module assessment grade will be dropped, and the 80% depending on module assessments will be based on the score of the remaining module assessments. This course uses a letter grading system, which is the official grading system at Cornell University. Information can be found at https://courses.cornell.edu/content.php?catoid=31&navoid=7933#Grading_System. Typically, 50% of the students in this course receive a grade of A- or higher.

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>. by a student in this course for academic credit will be the student's own work. You are encouraged to work together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an email attachment file, a diskette, or a hard copy.

Students with Disabilities: Your access in this course is important to me. Please request your accommodation letter early in the semester, or as soon as you become registered with SDS, so that we have adequate time to arrange your approved academic accommodations. Once SDS approves your accommodation letter, it will be emailed to both you and me. Please follow up with me to discuss the necessary logistics of your accommodations.

If you are approved for exam accommodations, please consult with me at least two weeks before the scheduled exam date to confirm the testing arrangements. If you experience any access barriers in this course, such as with printed content, graphics, online materials, or any communication barriers; reach out to me or SDS right away. If you need an immediate accommodation, please speak with me after class or send an email message to me and SDS at sds_cu@cornell.edu. If you have, or think you may have a disability, please contact Student Disability Services for a confidential discussion: sds_cu@cornell.edu, 607-254-4545, sds.cornell.edu.

Mental Health and Well-being: Your health and wellbeing are important to me. 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 Cornell Health for support.