Instructor:  Marzia A Cremona  
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Office Hours:  Mo 3:15pm-4:15pm, Fr 9:00am-10:00am, or by appointment.

TA:  Bingyuan Liu  
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Office Hours:  Tu 12:30pm-1:30pm, Th 10:30am-11:30am, or by appointment.

Class schedule:  Mo Fr 4:40pm - 5:30pm  Chemistry Building 102  
We 4:40pm - 5:30pm  Boucke Building 111 (Lab)

Attendance and participation: You are expected to attend both lectures and lab sessions on a regular basis, and to actively participate in them. You are also strongly encouraged to make use of instructor’s and TA’s office hours throughout the semester.

Prerequisite: STAT 200 or higher. You must be familiar with introductory statistics (data description, estimation and inference) and you are invited to review the material in https://onlinecourses.science.psu.edu/stat200.


Website: Lecture outlines, lab materials and assignments will be provided through Canvas. You are expected to check regularly for updates.

Computing/Lab: The statistics software used for lab sessions and homework assignments is R. R is free, it is available in all Penn State Computer Laboratories, and it can be downloaded from https://www.r-project.org/. You are also recommended to use the interface RStudio, that can be freely downloaded from https://www.rstudio.com/ (in order to use RStudio, you need first to install R).
Course topics:
- Estimation of simple and multiple linear regression models
- Inference
- Prediction
- Diagnostics
- Model selection
- Logistic and Poisson regression (if time permits)

Learning objectives: This course introduces the common statistical tools employed for linear regression, focusing on data analysis and applications. At the end of the course, you will be able to:
- Estimate and interpret a linear regression model
- Compute confidence intervals and perform hypothesis tests on the model parameter(s)
- Predict a new response, taking into account the uncertainty of the prediction
- Check model assumptions, detect potential problems and fix them
- Evaluate models and choose between them

Assessments:
Labs (5%, two missing reports allowed): During each computer lab session, you will be given instructions to perform specific tasks and data analyses in R. You are required to prepare a short report with relevant output, your comments, and answers to the questions you are instructed to address. This does not need to be exhaustive or polished, but should contain enough to show that you completed all tasks and analyses. At the end of each lab session, you need to submit the report (pdf, doc or docx) through Canvas. Two missing reports will be allowed in the final grade calculation.

Quizzes (15%): Short quizzes will be assigned every Friday (starting in the second week) and will be due the following Wednesday by the end of the day. These will be delivered online through Canvas. You will only have one attempt, but no time limit.

Homework (15%, lowest score dropped): There will be 5-6 homework assignments, posted on Friday and due the following Friday by the end of the day on Canvas. Homework will include both theoretical questions and data analyses to be performed with R. Late submissions will not be accepted, except under exceptional circumstances and with reduced grading. The lowest score will be dropped.

Mid-Term Exams (35%): There will be 2 mid-term exams, given in class during the semester (50 minutes). They will be closed-book and will not require the use of statistical software. You may bring only a calculator, plain scratch paper and pen. Dates of the exams will be announced in class. Make up tests will be arranged only under exceptional circumstances, and should be agreed upon with the instructor at least one week prior to the test date.

Final Project (30%): Instead of a final exam, this class will have a final group project. Each group will select a dataset, formulate a problem, use the tools learned during the course to analyze the data and draw conclusions. A final report summarizing the analysis will need to be submitted through Canvas by Monday, December 11. More details about the project will follow.

Collaborations: You are strongly encouraged to discuss lectures, labs and homework with one another. However, you should always submit separate and individually written homework assignments and computer lab reports.
Grading:

- Labs (5%)
- Quizzes (15%)
- Homework (15%)
- Mid-Term Exams (35%)
- Final Project (30%)

Grades will be assigned using a standard breakdown: A (93-100); A- (90-92); B+ (87-89); B (83-86); B- (80-82); C+ (77-79); C (70-76); D (60-69); F (0-59).

Academic Integrity: All Penn State policies regarding ethics and honorable behavior apply to this course. Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. All University policies regarding academic integrity apply to this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Any instances of academic dishonesty WILL be pursued under the University and Eberly College of Science regulations concerning academic integrity.

ECOS Code of Mutual Respect and Cooperation: The Eberly College of Science Code of Mutual Respect and Cooperation embodies the values that we hope our faculty, staff, and students possess and will endorse to make The Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.

Disability Services: Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site. In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please provide the letter and discuss any adjustments with me as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.

Counseling and Psychological Services: Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients’ cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Educational Equity Concerns: Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias webpage.