

ISyE 4031 Regression and Forecasting

Fall 2026, Syllabus

Course Information

- **Instructor:** Sen Na (senna@gatech.edu)
- **Course Prefix and Number:** ISYE 4031 M11
- **Term:** Fall 2026

Course Description

An introduction to regression analysis and statistical forecasting. Topics include simple and multiple linear regression, least squares estimation, inference and confidence intervals, residual analysis and model diagnostics, outliers and influential observations, variable selection and model building, polynomial and indicator variable regression, logistic regression, and time series forecasting methods including exponential smoothing and ARIMA models. Emphasis is placed on both the theoretical foundations and practical application using statistical software.

Course Learning Outcomes

By the end of this course, students will be able to:

1. Formulate, estimate, and interpret simple and multiple linear regression models.
2. Assess model adequacy using residual analysis, influence diagnostics, and goodness-of-fit measures.
3. Apply variable selection and model-building strategies to real data.
4. Extend regression to handle categorical predictors, polynomial terms, and binary response variables.
5. Implement time series forecasting methods, including exponential smoothing and ARIMA models.
6. Use statistical software (R) to analyze data sets and communicate results clearly.

Required Course Materials

[1] Faraway, J. (2025). **Linear Models with R** (3rd ed.) CRC Press. <https://julianfaraway.github.io/faraway/LMR/>.

[2] Weisberg, S. (2014). **Applied Linear Regression** (4th ed.) Hoboken, NJ: Wiley. <https://www.stat.purdue.edu/~qfsong/teaching/525/book/Weisberg-Applied-Linear-Regression-Wiley.pdf>.

[3] Kutner, M. H., Nachtsheim, C. J., Neter, J., & Li, W. (2005). **Applied Linear Statistical Models** (5th ed.) McGraw-Hill/Irwin. https://users.stat.ufl.edu/~winner/sta4211/ALSM_5Ed_Kutner.pdf.

Software: R (freely available at <https://cran.r-project.org>) and RStudio (<https://posit.co/download/rstudio-desktop/>). All homework and data analysis will be completed in R.

Grading Policy

Grades will be based on the following components:

Component	Weight
Homework (approximately 8–10 assignments)	40%
Midterm Exam	25%
Final Exam	30%
Participation / In-class activities	5%

Letter grades are assigned according to the following scale:

Grade	Score
A	≥ 90
B	80–89
C	70–79
D	60–69
F	< 60

Homework. Assignments will involve both analytical problems and data analysis in R. Late homework will not be accepted without a documented, legitimate excuse. The two lowest homework scores will be dropped.

Exams. The midterm and final exams are closed-book. You may bring one double-sided, handwritten formula sheet to each exam. No electronic devices are permitted. The final exam is cumulative. Exam dates will be announced at least two weeks in advance on Canvas.

Attendance Policy

Regular attendance is expected. Students are responsible for all material presented in lecture, including announcements made in class. If you must miss a class, please notify the instructor in advance when possible. Lecture notes will be posted on Canvas, but attending class is the best way to keep up with the material. Repeated absences may negatively affect your participation grade.

Academic and Research Honesty/Integrity Statement

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review the [Student Code of Conduct](#) and the [Academic Honor Code](#), especially [Appendix A: Graduate Addendum to the Academic Honor Code](#).

Students are expected to perform research in an ethical and responsible manner. All Doctoral and Master's Thesis students are required to take the [Responsible Conduct of Research training](#), and it is expected that students abide by the principles taught in that training while performing research for this thesis course.

Allegations of scientific or scholarly misconduct are handled in accordance with the procedures outlined by the [Policy for Responding to Allegations of Scientific or Other Scholarly Misconduct](#).

Core IMPACTS

Not applicable.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the [Office of Disability Services](#) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Expectations of Advisors and Advisees

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Expectations of Advisors and Advisees](#) articulates some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.