ISYE-4031-ASY/RES/RHK - Regression and Forecasting

Summer 2026, May 18 (Mon) to August 6 (Thu) | Georgia Institute of Technology

Class meetings	Monday and Wednesday, 12:30 PM - 02:40 PM (ET)
Room	Manufacturing Related Disciplines Complex Room 2407
Canvas	https://canvas.gatech.edu/
Course format	RES meets in person. ASY and RHK are online asynchronous sections.
Live/recorded access	The instructor will open a Zoom meeting during the in-person class time and record each class. ASY/RHK students may join live when available or watch the posted recording within one week.

Teaching and Learning Team

Role	Name	Contact	Office / Office Hour
Instructor	Jiecheng Lu	jlu414@gatech.edu	Office: ISYE Main 312; Office hour: TBD
Teaching Assistant	Jingye Xu	jxu673@gatech.edu	Office hour: TBD
Teaching Assistant	Dan She	dshe9@gatech.edu	Office hour: TBD

Communication

Canvas announcements are the authoritative source for course-wide operational updates. When emailing the instructor, begin the email subject line with "ISYE 4031"; otherwise the instructor's email filter may automatically miss the message.

Course Format and Participation

This course serves both in-person and asynchronous online students. RES students should attend the scheduled in-person class unless excused. ASY/RHK students are not required to attend live meetings, but may join the Zoom meeting when their schedule permits.

Class recordings will be posted after the live meeting. Asynchronous students should plan to watch each recording within one week so that homework and project preparation remain aligned with the rest of the course.

Zoom meeting details and recording links will be posted on Canvas. Students should treat Canvas announcements as the authoritative source for operational changes.

First-Week Survey

A first-week survey will collect students' time zones and typical weekday availability. The results will be used to help set office hours and other timing-sensitive course activities.

Complete the survey during the first week of class. The tentative due date is Friday, May 22, 2026 at 11:59 PM ET.

Catalog Description

Regression analysis: multiple linear regression, diagnostics, and variable selection.

Forecasting: exponential smoothing techniques and autoregressive moving average models.

Textbook and References

Primary textbook: Forecasting, Time Series, and Regression by Bowerman, O'Connell, and Koehler, 4th Edition.

Reference: Forecasting: Principles and Practice by Hyndman and Athanasopoulos, https://otexts.com/fpp2/.

Course Objective and Outcomes

The objective of this course is to learn regression, time series, and forecasting models and to apply them to practical problems in science, engineering, and data-driven decision making.

- Formulate real-life problems using regression and forecasting models.
- Collect or identify appropriate data for estimating models.
- Use statistical software to estimate models from real data.
- Interpret fitted models and communicate conclusions clearly.
- Compare modeling approaches for explanation, prediction, and forecasting.

Prerequisites

ISyE 2028 / ISyE 3030 or equivalent preparation in probability, statistics, and basic data analysis.

Software

Course materials will mainly use Python. Students may also use R for homework and project work when appropriate. Homework submissions should present final reasoning and results clearly; code may be included when useful or requested.

Some Python labs and homework templates will be provided through browser-based JupyterLite notebooks hosted on GitHub Pages. These notebooks let students run Python in a web browser without installing a local Python environment. Students may still use local Python, R, or another appropriate workflow if the submitted work satisfies the Canvas assignment instructions.

GitHub Labs and JupyterLite

- Course labs home: https://ljc-fvnr.github.io/isye4031-summer2026-labs/
- GitHub repository: https://github.com/LJC-FVNR/isye4031-summer2026-labs
- Module links will be posted in Canvas. The direct link format is https://ljc-fvnr.github.io/isye4031-summer2026-labs/modules/<module_name>/lab/index.html?path=00_START_HERE.ipynb
- JupyterLite saves work in browser storage; it is not Canvas, GitHub, or OneDrive sync. Download completed notebooks and exported PDFs before switching devices, clearing browser data, or submitting work.

Course Outline

- Part I - Introduction and statistical review: forecasting motivation, basic statistical concepts.
- Part II - Regression: simple linear regression, multiple linear regression, diagnostics, residual analysis, model building, and variable selection.
- Part III - Forecasting: time series regression, exponential smoothing, nonseasonal Box-Jenkins models, and seasonal Box-Jenkins models.
- Project work: define a practical problem, identify data, fit regression/forecasting models, and communicate findings.

Students are responsible for material covered in lectures, recordings, assignments, Canvas posts, and required course materials.

Grading

Course grades are based on homework, a group project, and participation. The group project is the main integrative assessment for the course.

Component	Weight	Notes
Homework	30%	Approximately weekly assignments. Lowest homework score may be dropped.
Group project	65%	Project process/team formation, 2-page proposal, 8-page paper, 1-page

		poster, and 5-10 minute presentation video.
Participation	5%	Includes survey completion, engagement with class/recordings/labs

Suggested group project breakdown:

Project Component	Course Weight	Due Target
Project process/team formation	5%	Friday, June 12, 2026 at 11:59 PM ET
Project Proposal	10%	Wednesday, July 8, 2026 at 11:59 PM ET
Final Project Deliverables - paper	30%	Thursday, August 6, 2026 at 11:00 AM ET
Final Project Deliverables - poster	10%	Thursday, August 6, 2026 at 11:00 AM ET
Final Project Deliverables - video	10%	Thursday, August 6, 2026 at 11:00 AM ET

Homework Policy

- Homework will be posted and submitted through Canvas. Canvas assignment instructions are the controlling submission requirements for each homework.
- The intended homework rhythm is a Sunday 11:59 PM ET deadline, usually about 11-13 calendar days after release.
- Unless otherwise stated, late submissions are not accepted.
- For non-notebook homework, submit one clear PDF file of solutions unless Canvas states otherwise. Do not submit scattered image, spreadsheet, or document files as the main solution.
- For JupyterLite-supported homework, students may complete the work in JupyterLite, local Python, R, another appropriate environment, or by hand. When Canvas asks for a notebook workflow, upload the completed .ipynb and a PDF export/report.
- JupyterLite homework notebooks are editable templates, not permanent cloud storage. Download completed work before submitting.
- If AI tools are used, include an AI Usage Report as an appendix to the submitted PDF/report or as a separate PDF when Canvas allows multiple files.
- Handwritten work is acceptable if it is neat, organized, and scanned clearly.
- Students may collaborate on homework as permitted by the collaboration policy, but submitted work must reflect the students' own understanding.
- Homework solutions will be released on Canvas after the deadline.
- Questions about homework should generally be directed to the teaching assistants first.
- Regrade requests should be made within one week after grades are returned.

Project Policy

- Students may complete the project individually or in groups of 2-3 students. Individual projects are implemented as one-person Canvas project groups.

- Students should join a Canvas project group and complete the Project Team Formation Confirmation quiz by Friday, June 12, 2026 at 11:59 PM ET. After this deadline, project groups will be locked and later changes require instructor approval.
- Each group should define a real-life problem, identify suitable data, use regression and/or forecasting methods, and communicate findings in a professional form.
- Everyone in the same group will generally receive the same project grade unless the instructor announces a different policy.
- The Project Proposal is a group PDF upload due Wednesday, July 8, 2026 at 11:59 PM ET. The main proposal body is limited to 2 pages; references, appendix, and AI Usage Report do not count toward the limit. Appendix pages are unlimited, but the main proposal body must be self-contained.
- The Final Project Deliverables assignment is due Thursday, August 6, 2026 at 11:00 AM ET. It includes an 8-page final paper, a 1-page poster PDF, and a 5-10 minute presentation video or a PDF containing a stable video link.
- References, appendix, code links, and AI Usage Report do not count toward the 8-page final-paper limit. Appendix pages are unlimited, but the main paper must be self-contained.
- Slides may be used in the presentation video, but they are optional; a clear poster walkthrough is sufficient.
- A LaTeX template package will be linked in the Project Proposal and Final Project Deliverables Canvas assignments. Students may use the template package, Overleaf, local LaTeX, Word, Google Docs, PowerPoint, Google Slides, Canva, or another suitable tool as long as the submitted PDFs satisfy the content and page-limit requirements.
- Canvas file upload supports multiple files for the project assignments; a zip file is not required unless the instructor explicitly asks for one.
- Project deliverables must include an AI Usage Report when AI tools are used. The AI Usage Report does not count toward the project page limits.

Required project file names should use the Canvas project group name as <TeamName>, replacing spaces and special characters with hyphens. Example: Project-Team-07.

Assignment	Required File Names
Project Proposal	ISYE4031_ProjectProposal_<TeamName>.pdf; ISYE4031_ProjectProposal_AIUsage_<TeamName>.pdf if submitted separately
Final Project Deliverables	ISYE4031_FinalPaper_<TeamName>.pdf; ISYE4031_FinalPoster_<TeamName>.pdf; ISYE4031_FinalVideo_<TeamName>.mp4 or .mov, or ISYE4031_FinalVideoLink_<TeamName>.pdf; ISYE4031_FinalProject_AIUsage_<TeamName>.pdf if submitted separately

Grading Scale

Letter	Range
A	90-100%

B	80-89%
C	70-79%
D	60-69%
F	0-59%

Collaboration Policy

Discussion and exchange of ideas are essential to academic work. For assignments in this course, students are encouraged to consult with classmates when allowed. After discussion, students must work through the problem themselves and ensure that submitted answers reflect their own understanding. Students must cite books, articles, websites, lectures, AI tools, and peers that materially helped with their work.

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.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at 404-894-2563 as soon as possible to discuss your needs and obtain an accommodations letter. Please also email the instructor as soon as possible to discuss implementation of accommodations in this course.

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.

AI Policy

The use of AI tools is encouraged as part of learning, analysis, writing, coding, and professional collaboration when used responsibly. The ability to work with AI systems will be an important skill in future study and work.

AI is an efficiency tool, not a substitute for understanding. If students do not understand what an AI tool did, what its output means, or how to verify the result, then they cannot control or take responsibility for that output.

Every assignment that uses AI tools must include an AI Usage Report. The report must include:

- Which AI tools were used.
- Screenshots or complete copied text of all prompts or prompt threads that materially affected the submission.
- A brief explanation of why each prompt was used.
- How the AI output contributed to the final submission or helped form the final output.
- How the student or group checked, modified, or rejected the AI output before submitting.

If no AI tools were used, include the statement: "No AI tools were used for this submission." Undisclosed AI use, fabricated data or sources, or submission of AI output that students cannot explain may be treated as an academic integrity issue.

Tentative Summer 2026 Schedule

This schedule is tentative and may be adjusted through Canvas announcements. All class meetings are Monday and Wednesday, 12:30 PM - 02:40 PM (ET), except where noted.

Session	Date	Topic	Notes
1	Mon May 18	Course orientation; forecasting motivation; project overview; statistical refresh start	L1; release HW1; first-week survey opens
2	Wed May 20	Statistical review for regression	L2; survey reminder
-	Mon May 25	No class - Memorial Day	Institute holiday
3	Wed May 27	Simple linear regression I	L3; release HW2
4	Mon Jun 1	Simple linear regression II; project launch	L3; release team formation and project proposal
5	Wed Jun 3	Multiple linear regression I	L4.1; release HW3
6	Mon Jun 8	Multiple linear regression II	L4.2; release HW4
7	Wed Jun 10	Multiple linear regression III	L4.3
8	Mon Jun 15	Regression pitfalls	L5.1; release HW5
9	Wed Jun 17	Variable selection and project proposal methods clinic	L5.2
10	Mon Jun 22	Regression synthesis and project proposal workshop	Release HW6; Proposal Q&A
11	Wed Jun 24	Project proposal workshop and scope check	Proposal Q&A
12	Mon Jun 29	Time series foundations I	L6.1; release HW7
13	Wed Jul 1	Time series foundations II	L6.2; proposal feedback target
14	Mon Jul 6	Exponential smoothing I	L7; release HW8
15	Wed Jul 8	Exponential smoothing II; project proposal checkpoint	L7; 2-page proposal due 11:59 PM ET
16	Mon Jul 13	Nonseasonal Box-Jenkins I; final project deliverables launch	L8.1; paper/poster/video instructions open
17	Wed Jul 15	Nonseasonal Box-Jenkins II	L8.2; release HW9
18	Mon Jul 20	Nonseasonal Box-Jenkins III	L8.3
19	Wed Jul 22	Seasonal Box-Jenkins and final project synthesis	L9; final project checklist
20	Mon Jul 27	Final instructional class and project workshop	Confirm Aug 6 project deadline
Final	Aug 3-6	Final project submission window	Paper, poster, and video due Thursday, August 6, 11:00 AM ET

Key Assignment Dates

Item	Available	Due	Notes
First-Week Survey	May 18	May 22, 11:59 PM	Complete time-zone and availability survey.
HW1	May 18	May 31, 11:59 PM	Statistical review.
HW2	May 27	Jun 7, 11:59 PM	Simple linear regression.
HW3	Jun 3	Jun 14, 11:59 PM	Regression application and data files.
Project Team Formation Confirmation	Jun 1	Jun 12, 11:59 PM	Join a Canvas project group and submit the confirmation quiz; groups lock after the deadline.
HW4	Jun 8	Jun 21, 11:59 PM	Multiple regression.
HW5	Jun 15	Jun 28, 11:59 PM	Diagnostics/model comparison.
HW6	Jun 22	Jul 5, 11:59 PM	Regression wrap-up.
Project Proposal	Jun 1	Jul 8, 11:59 PM	2-page project topic, data, and modeling plan; template package linked in Canvas.
HW7	Jun 29	Jul 12, 11:59 PM	Time series foundations.
HW8	Jul 6	Jul 19, 11:59 PM	Exponential smoothing.
HW9	Jul 15	Jul 26, 11:59 PM	ARIMA / Box-Jenkins.
Final Project Deliverables	Jul 13	Aug 6, 11:00 AM	Submit final paper, poster, video or video-link PDF, and AI Usage Report if separate.