

MA 491-QL, Advanced Statistics, Summer 2025.

Class meets: online course.

Prerequisites: MA486 or equivalent, grade "C" or higher.

Instructor: Dr. Roman Shterenberg, shterenb@uab.edu, UH 4035.

Have Questions? E-mail is the preferred method to contact me and the fastest way to get answers. Please include the course number and the particular module number in the subject line of your email for better communication. For example, "MA491, module 3". If needed, we can also arrange a personal Zoom meeting for discussion.

Materials

Lecture Notes: Pre-recorded video lectures with PowerPoint presentations will be available in Canvas.

Software: Free student version of JMP.

Grading policy: Your grade will be determined by the following: Skill Checks (after each module) - 20% and four projects (every 2-3 weeks) - 20% each.

All Skill Checks and Projects have specific due dates. No extension for Skill Checks is allowed. For the projects, a one-week extension is allowed with a penalty (75% scaling of the score earned for the project).

Each project can be submitted twice. Please allow 1-3 days for grading to receive feedback after the first submission. So, try to submit earlier to save time for modifications and resubmission.

$$A \geq 85\%, \quad B \geq 70\%, \quad C \geq 55\%, \quad D \geq 40\%.$$

Learning Outcomes: Upon completion of this course, you will be able to:

- Define regression analysis and differentiate between its types, including simple linear, multiple linear, polynomial, and non-parametric regressions.
- Apply and interpret the Simple Linear Regression on a real database, evaluate model assumptions, and estimate regression parameters by using OLS method.
- Construct Multiple Linear Regression Models, evaluate model assumptions, and interpret the results.
- Analyze Polynomial Regressions, identify scenarios where polynomial regression is appropriate, select the optimal polynomial degree, and make a decision about the possibility of prediction.

- Implement and interpret non-parametric regression techniques, such as kernel smoothing, LOESS, and generalized additive models (GAMs).
- Distinguish and describe different ANOVA techniques: including one-way, two-way, three-way, repeated measures, mixed-design, MANOVA, and ANCOVA, with post hoc analyses.
- Evaluate Advanced ANOVA Analyses: organize data for ANOVA design, evaluate assumptions, and interpret the results.
- Synthesize Analytical Findings: produce clear, data-driven reports that summarize regression and ANOVA results for technical and non-technical audiences. Use graphical tools (e.g., Q-Q plots, residual vs. leverage plots) to support model diagnostics and conclusions.
- Make an appropriate conclusion from the analysis, and be aware of the limitations when applied to real-life situations.

Time Commitment: You are expected to spend a substantial amount of time working through the course activities and assignments every week. Please know that time management and self-motivation are key components for success in this course and courses in general. There is a lot to be gained in this course, so approach it with an open mind.

Add/Drop and Course Withdrawal: Drop/Add: Deadlines for adding, dropping, or withdrawing from a course and for paying tuition are published in the Academic Calendar available online. Review the Institutional Refund Policy for information on refunds for dropped courses. It is the students responsibility to initiate add/drop procedures. Students may drop and add courses online after they have registered and until the drop/add deadline online using BlazerNET. Withdrawal: To avoid academic penalty, a student must withdraw from a course by the withdrawal deadline shown in the academic calendar and receive a grade of W (withdrawn). Failure to attend class does not constitute a formal drop or withdrawal. The official course withdrawal must be completed online in BlazerNET.

Divisive Concepts: All University faculty, instructors and teaching staff have the academic freedom to explore, discuss, and provide instruction on a wide range of topics in an academic setting. This class may present difficult, objectionable, or controversial topics for consideration, but will do so through an objective, scholarly lens designed to encourage critical thinking. Though students may be asked to share their personal views in the academic setting, no student will ever be required to assent or agree with any concept considered "divisive" under Alabama law, nor penalized for refusing to support or endorse such a concept. All students are strongly encouraged to think independently and analytically about all material presented in class and may express their views in a time,

place, and manner, consistent with class organization and structure, and in accordance with the University's commitment to free and open thought, inquiry, and expressions.

Shared Values Statement: Collaboration, integrity, respect, and excellence are core values of our institution and affirm what it means to be a UAB community member. A key foundation of UAB is diversity. At UAB, everybody counts every day. UAB is committed to fostering a respectful, accessible and open campus environment. We value every member of our campus and the richly different perspectives, characteristics and life experiences that contribute to UAB's unique environment. UAB values and cultivates access, engagement and opportunity in our research, learning, clinical, and work environments. Our CAS aims to create an open and welcoming environment and to support the success of all UAB community members.

Academic Integrity Code: Your success while at UAB and after graduation is valued by the University. To gain and grow in the knowledge and skills needed for your future career, it is vital that you complete your own work in your courses and in your research. The purpose of the Academic Integrity Code is to support our academic mission and to maintain and promote academic integrity. All students in attendance at UAB are expected to pursue all academic endeavors with integrity, honor, and professionalism and to observe standards of conduct appropriate to a community of scholars. Please be sure you understand the different forms of "academic misconduct" covered by the code. See what UAB students say about academic integrity and review the FAQs about the code for details on the Student Academic Integrity webpage.

Artificial Intelligence Use: Academic misconduct is present in an academic work wherever AI assistance has been used when unauthorized, or when authorized, has not been disclosed as required. Such behavior is considered deceit and a violation of UABs shared commitment to truth and academic integrity. Deceit constitutes academic misconduct and is subject to review according to UABs Academic Integrity Code.

Student Conduct Code: The purpose of the University of Alabama at Birmingham (University) student conduct process is to support the vision, mission, and shared values of the University and the tenets of the University's creed, The Blazer Way. Through a student-focused and learning-centered lens, the process strives to uphold individual and community standards; foster an environment of personal accountability for decisions; promote personal growth and development of life skills; and care for the well-being, health, safety, and property of all members of the University community. The Student Conduct Code (Code) describes the standards of behavior for all students and student organizations and outlines students rights and the process for adjudicating alleged violations. It is set forth in writing in order to give general notice of non-academic prohibited conduct. The Code should be read broadly and is not designed to define non-academic conduct in exhaustive terms. All students and student organizations are expected to conduct

themselves in accordance with the Code. The current version of the Code, which may be revised periodically, is available from the Office of Community Standards & Student Accountability.

Intellectual Property: My lectures and course materials, including PowerPoint presentations, quizzes, exams, outlines, and similar materials, are protected by copyright. You may take notes and make copies of course materials for your own use. You may not and may not allow others to reproduce or distribute lecture notes and course materials publicly, whether or not a fee is charged, without my expressed written consent.

DSS Accessibility Statement : Accessible Learning: UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration, and procedures. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact me to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call (205) 934-4205 or visit the DSS website.

Title IX Statement: In accordance with Title IX, the University of Alabama at Birmingham does not discriminate on the basis of gender in any of its programs or services. The University is committed to providing an environment free from discrimination based on gender and expects individuals who live, work, teach, and study within this community to contribute positively to the environment and to refrain from behaviors that threaten the freedom or respect that every member of our community deserves. For more information about Title IX, policy, reporting, protections, resources and supports, please visit the UAB Title IX webpage for UABs Title IX Sex Discrimination, Sexual Harassment, and Sexual Violence Policy; UABs Equal Opportunity and Discriminatory Harassment Policy; and the Duty to Report and Non-Retaliation Policy.

Violence Prevention and Response Policy: The University of Alabama at Birmingham (UAB) is committed to maintaining a safe and secure educational environment and workplace, one which seeks to ensure the well-being and safety of faculty and staff, employees, students and visitors. Violence and threatened violence are prohibited by UAB. Each member of the UAB community has the responsibility to understand, prevent and respond appropriately to campus/workplace violence. View the Violence Prevention and Response Policy.

Technology:

General and course-specific technical skills learners must have to succeed

in the course are as follows:

- Using the learning management system
- Using email with attachments
- Creating and submitting files in commonly used word processing program formats
- Downloading and installing software
- Using spreadsheet programs
- Using presentation and graphics programs
- Using apps in digital devices
- Using web conferencing tools and software

Digital information literacy skills are as follows:

- Using online libraries and databases to locate and gather appropriate information
- Using computer networks to locate and store files or data
- Using online search tools for specific academic purposes, including the ability to use search criteria, keywords, and filters
- Analyzing digital information for credibility, currency, and bias (e.g., disinformation, misinformation)
- Properly citing information sources
- Preparing a presentation of research findings

Access technical support and view privacy policies and accessibility statements for Canvas and other technologies on the Student Academic Technologies website. Additionally, view information about the Minimum System Requirements and Technical Skills.

Student Academic and Support Services:

- One Stop Student Services provides a single point of professional integrated service to students. The One Stop serves students who need assistance with academic records, financial aid, registration, student accounting, ONE card, and other related topics.

- Student Assistance and Support provides individualized assistance to promote student safety and well-being, collaboration and resilience, personal accountability, and self-advocacy. The Care Team consults and collaborates with campus partners to balance the needs of individual students with those of the overall campus community. The UAB Care Team helps find solutions for students experiencing academic, social, and crisis situations including mental health concerns.
- Disability Support Services assists students with in reaching accommodations for their educational experiences at UAB that ensure that they have equal access to programs, services, and activities at UAB.
- The Vulcan Materials Academic Success Center provides tutoring, supplemental instruction, and other services that encourage goal achievement and degree completion.
- The University Writing Center offers free writing assistance for all UAB students. Get help at any stage of the writing process and with any type of writing. Students may meet with a tutor in person or via Zoom. Students may also upload a paper for feedback (called eTutoring in the online system). During in-person and Zoom sessions, tutors can help you understand your assignment, develop and organize your ideas, use and cite sources, revise and edit your draft, and more. When you upload a draft for eTutoring, tutors can provide feedback on both big-picture issues and detail-oriented concerns; please note that you must upload a draft and assignment sheet to use eTutoring. To make an appointment or get more information, please see the UWC website, email writingcenter@uab.edu, or call 205-996-7178. Follow the UWC on Facebook, Instagram, and LinkedIn for daily news and quick writing tips.
- UAB Student Health Services delivers comprehensive, high quality, confidential, primary healthcare to students. Student Health provides testing services and vaccination clinics.
- Student Counseling Services offers students a safe place to discuss and resolve issues that interfere with personal and academic goals. UAB has created a new app (available in the App Store and Google Play) called B Well, that is designed to easily access resources on mobile devices and build a self-care plan. Kognito is a free, interactive simulation-based platform designed to help you talk with someone when you are worried about your mental health.
- UAB Blazer Kitchen at the Hill Student Center provides food and basic supplies for any UAB student in need through in-person or online shopping. Students who can are also able to donate food and supplies to assist their peers. To get more information, call 205-975-9509, email studentoutreach@uab.edu, or visit Student Assistance & Support website.

- eLearning and Professional Studies provides numerous academic technologies and learning resources for students whose learning may be affected by COVID. The following are the various websites describing additional student academic and technology resources:
 - UAB Policies for Students
 - Student Academic and Support Services
 - Technology Resources

Welcome to MA 588 and best of luck to you all.