

BMED 6700 Syllabus

Biostatistics

Early Short Summer Session (5/18/26 – 6/22/26)

3 credits – virtual asynchronous – canvas.gatech.edu

Instructor

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General Information

This course teaches students how to design, execute, and interpret statistical analyses for biomedical research using real-world datasets.

Delivery Mode

This is a fully online course. Lectures are pre-recorded (asynchronous) videos viewed anytime online. See p. 5 of syllabus for *Course Schedule*.

Course Goals and Learning Outcomes

- Formulate a statistical analysis plan by translating biomedical research questions into appropriate variables, study designs, and analytical methods
- Select and apply appropriate statistical techniques (e.g., t-tests, ANOVA, regression, chi-squared, survival analysis) based on data type and research objectives
- Evaluate data quality and assumptions, including identifying missingness, outliers, and distributional issues that influence analysis choices
- Interpret and communicate statistical results in a clear, scientifically meaningful way, including effect sizes, confidence intervals, and practical significance

Course Requirements & Grading

Assessment	Duration	Canvas Availability Start	Canvas Availability End	Value (%)	Points
Module 1 Exam	30 min	Th. May 21 @ 12:01am ET	M. June 1 @ 11:59pm ET	12.5%	125
Module 2 Exam	30 min	M. June 1 @ 12:01am ET	M. June 8 @ 11:59pm ET	12.5%	125
Module 3 Exam	30 min	M. June 8 @ 12:01am ET	Th. June 11 @ 11:59pm ET	12.5%	125
Module 4 Exam	30 min	Th. June 11 @ 12:01am ET	Th. June 18 @ 11:59pm ET	12.5%	125
Project Component 1		M. May 18 @ 12:01am ET	Th. May 21 @ 11:59pm ET	8%	80
Project Component 2		M. June 1 @ 12:01am ET	M. June 8 @ 11:59pm ET	8%	80
Project Component 3		M. June 1 @ 12:01am ET	M. June 8 @ 11:59pm ET	18%	180
Project Component 4		M. June 8 @ 12:01am ET	Th. June 11 @ 11:59pm ET	8%	80
Project Component 5		M. June 15 @ 12:01am ET	Th. June 18 @ 11:59pm ET	8%	80

Exams are online Canvas quizzes taken in continuum during the availability window. Project components are online Canvas quiz with a set due date. Students are allowed one automatic make-up Assessment which must be taken on the designated course make-up day listed on the Course Schedule.

Extra Credit: extra credit may be provided to encourage participation and will be announced in Canvas.

Grading Scale

The final grading scale is based on cumulative points earned. The standard, set grading scale is based on a 1,000-point maximum total value for the Assessments. Additional points may be acquired from Extra Credit opportunities. Each Extra Credit point is equivalent to an Assessment point.

<u>Grade</u>	<u>Points</u>
A	>=900 points
B	800-899 points
C	700-799 points
D	600-699 points
F	<600 points

Description of Assessments

Student performance in this course is evaluated through a combination of module quizzes and a structured, multi-stage project designed to develop and apply statistical analysis skills.

Module Exams (50%)

Four module quizzes assess understanding of core statistical concepts, method selection, and interpretation. Quizzes emphasize rapid application of knowledge rather than memorization or complex calculation.

Each quiz is 30 minutes and aligned with a course module and may include a combination of conceptual questions and brief calculations. Module Exams are timed multiple choice quizzes in Canvas (select one best answer) and use a **forward-only (no backtracking) format** to support the learning goals. Randomized question banks ensure academic integrity while maintaining equivalency and fairness.

Students may take quizzes at the physical location of their choosing, but all work must be performed individually. Once a student starts, the Canvas quiz and corresponding automatic Canvas quiz countdown timer runs continuously and cannot be stopped [without submitting your quiz for a grade]. If you have not submitted your quiz after the Canvas quiz countdown timer goes to zero **OR** the Canvas live clock time exceeds the Canvas quiz availability clock time, your quiz will auto-submit. Quizzes are open notes, open book, open laptop computer, open internet but closed communication (i.e. NO verbal, written, electronic communication, etc.)

Students must take assessments as scheduled; see *Rescheduled/Missed Assessments* for rules regarding make-up policy. Saving or dispersing questions or answers before, during, or after the quiz/Exam is not allowed and will be considered an honor code violation.

Project (50%)

Students will complete a structured project using one of several instructor-provided biomedical datasets. The project is divided into multiple components that mirror the workflow of applied statistical analysis:

- Research Question and Variable Definition (8%)
- Data Audit (8%)
- Statistical Analysis Plan (SAP) (18%)
- Results (8%)
- Final Interpretation (8%)

Each component builds on the previous one, guiding students from initial problem formulation through analysis and interpretation. The Statistical Analysis Plan (SAP) is the central component and carries

increased weight, reflecting its importance in developing appropriate analytical strategies.

Extra Credit Opportunities

This course offers extra credit opportunities to motivate your timely participation.

Extra credit quizzes are completely risk-free way to acquire extra credit while practicing Exam-style questions. Earned extra credit points directly add to student point total (see *Grading Scale*). Extra Credit cannot be made up for any reason

Practice Problems for Skill Development

Optional homework and solutions are viewable within the Canvas quiz through the duration of the course. Homework scores will not be included in the final grade.

Software & Coding

This is NOT a coding course. Nonetheless, we will use software for analysis. A very basic level of coding is expected. Most analyses can be completed in Excel (primary learning tool) with some analyses requiring Python (recommended) or another equivalent tool such as Matlab or R. The choice of computing tool is up to the student. Code templates will be provided for analyses that must be performed outside of Excel.

Course Expectations & Guidelines

Students will take Assessments as scheduled online in Canvas at the location of their choosing.

Extra credit quizzes/surveys. Extra credit cannot be made up for any reason

Make-up of Module Exams or the Final Exam is only allowed for excused, documented absence.

Documentation requirements are listed in the *Documentation for Make-Up Approval* section. A Make-up Exam may *not be identical* to the original Exam but will cover similar material. **All pre-approved make-up Assessments will be administered during the class's pre-approved Make-Up Period on Monday, June 22, 2026.**

Documentation for Make-Up Approval. Students experiencing a personal emergency or medical absence must contact and submit documentation to the Georgia Tech Office of the Vice President or Dean of Students to request certification for excused absence using their website: <https://studentlife.gatech.edu/request-assistance>. For approved Institute activities (conference presentations, GT athletic events, religious observations, etc.), please contact the Student Academic and Financial Affairs Committee of the Academic Senate at least two weeks prior to the approved Institute activity event to obtain the appropriate approval letter. The Institute approved activity form is also available online: <https://new.iaa.gatech.edu/info/>. An Institute approval letter for a potential Regular Make-Up Assessments must be received via email to the professor by **11:59pm ET on June 19, 2026**. Only official correspondence from one of the above-named Institute offices will be accepted.

Academic Integrity

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. For information on Georgia Tech's Academic Honor Code, please visit the Policies and Honor Code in the Georgia Tech online Catalog: <https://catalog.gatech.edu/policies/honor-code/>.

Student-Faculty Expectations Agreement

See <https://catalog.gatech.edu/rules/21/> for an articulation of some basic expectations.

Accommodations for Students with Disabilities

If you have a disability that requires accommodation, please contact the Office of Disability Services at 404-894-2563 or <http://disabilityservices.gatech.edu/> to obtain an accommodation letter. Students must request in the ODS online AIMS system any accommodations for each course each semester. Reach out to

Dr. Mitchell as soon as possible to ensure timely implementation of your course accommodations

Attendance Policy

There is no formal attendance policy for lecture viewing. However, online participation is required for Assessments. See *Rescheduled/Missed Assessments* for Make-Up policy.

Campus Resources for Students

Please see the following website for access to resources that cover these aspects of student life: <https://counseling.gatech.edu/content/campus-resources-0>.

Collaboration & Group Work

Collaboration is allowed for homework. All Assessments represent individual student work only.

Class preparation and participation

This course is extremely flexible but requires self-discipline. It is critical to keep up with the schedule.

Course Structure

Class structure consists of short online lecture segments, guided examples, and applied problem-solving activities. Graded performance is based on module quizzes and a structured project that progresses from data understanding to full analytical execution. Five major modules include:

- **Module 1: Foundations and Data Understanding**
This module introduces how to translate biomedical research questions into statistical problems, including study design, variable types, and core data concepts. Emphasis is placed on understanding data structure, identifying missingness and outliers, and recognizing distributional patterns.
- **Module 2: Core Statistical Methods**
This module covers fundamental statistical techniques used in biomedical research, including t-tests, ANOVA, chi-squared tests, odds ratios, and logistic regression. The focus is on selecting appropriate methods based on data type and research questions.
- **Module 3: Regression and Analysis Planning**
This module develops skills in linear regression and introduces the construction of a Statistical Analysis Plan (SAP). Students learn how to systematically choose analytical approaches, specify models, and connect data characteristics to methodological decisions.
- **Module 4: Advanced Methods and Common Pitfalls**
This module introduces survival analysis and Cox regression, along with common statistical pitfalls such as multiple comparisons, assumption violations, and misinterpretation of results. Emphasis is placed on recognizing and avoiding analytical errors.
- **Module 5: Interpretation and Communication**
This module focuses on interpreting statistical results and communicating findings effectively. Students learn to translate outputs into meaningful scientific conclusions, develop clear visualizations, and present results in a reproducible and defensible manner.

See p. 5 for the detailed *Course Schedule*. Please be sure to regularly check Canvas each course day for new material, updates, and announcements.

Course syllabus & schedule may be subject to change due to unforeseen circumstances. Updates posted to Canvas.

BMED 6700 Course Schedule Early Short Summer 2026

Date	Topic
5/18-5/21	MODULE 1: FOUNDATIONS & DATA UNDERSTANDING
5/18-5/21	L1.1. Translating research questions into statistical questions L1.2. Types of biomedical studies and variables L1.3. Data processing, missingness, outliers L1.4. Distributions and visualization
5/21	Project Component 1: Research Question and Variables - due @ 11:59pm ET <i>Module 1 Quiz opens</i>
Mon. 5/25	School Holiday - Memorial Day
5/26-6/1	MODULE 2: CORE STATISTICAL METHODS
5/26-6/1	L2.1. t-tests (paired and unpaired) L2.2. ANOVA and group comparisons L2.3. Chi-squared tests and odds ratios L2.4. Introduction to logistic regression
6/1	Module 1 Quiz - due @ 11:59pm ET <i>Module 2 Quiz opens</i>
6/2-6/8	MODULE 3: REGRESSION & ANALYSIS PLANNING
6/2-6/8	L3.1. Linear regression and model interpretation L3.2. Sample size and power (conceptual overview) L3.3. Statistical Analysis Plan (SAP) development L3.4. Case-based analysis planning
6/8	Module 2 Quiz - due @ 11:59pm ET Project Component 2: Data Audit - due @ 11:59pm ET Project Component 3: Statistical Analysis Plan (SAP) - due @ 11:59pm ET <i>Module 3 Quiz (opens)</i>
6/9-6/11	MODULE 4: MODULE 4: ADVANCED METHODS & PITFALLS
6/9-6/11	L4.1. Survival analysis (Kaplan-Meier) L4.2. Cox regression (interpretation-focused) L4.3. Common statistical pitfalls and misinterpretation
6/11	Project Component 4: Results - due @ 11:59pm ET Module 3 Quiz - due @ 11:59pm ET <i>Module 4 Quiz (opens)</i>
6/15-6/18	MODULE 5: INTERPRETATION & COMMUNICATION
	L5.1. Interpreting statistical output L5.2. Communicating results through figures and tables L5.3. Integrating analysis into scientific conclusions
6/18	Project Component 5: Final Interpretation - due @ 11:59pm ET Module 4 Quiz (due) - due @ 11:59pm ET
6/22	Pre-approved Make-Up Day - due @ 11:59pm ET