

Course Information

Course Number:	STAT 445/STAT 645
Course Title:	Applied Biostatistics and Data Analysis
Section:	500, 600, 700
Time:	Monday, Wednesday and Friday 9:10 am-10 am
Location:	BLOC 448
Credit Hours:	3

Instructor Details

Instructor:	Samiran Sinha
Office:	415F Blocker building
Stat office phone:	979 845 3141
E-Mail:	sinha@stat.tamu.edu
Office Hours:	11:30 am-1 pm, Monday and Wednesday, in person and online
Q&A:	Friday 4-5 pm Blocker 411, the link will be given in CANVAS

Course Description

Applications of regression methods in biostatistics, including linear and non-linear regression analysis, survival analysis, some concepts of clinical trials, and bootstrap methods. The R programming language is used in the homework and in the exams.

Course Prerequisites

STAT 630, STAT 652, STAT 641, STAT 642, or STAT 611, and prior knowledge of R programming would be helpful. Students must have math-stat and regression background before this course.

Special Course Designation

None

Course Learning Outcomes

At the conclusion of this course, successful students will be able to:

- *Explore biostatistics data using pictures and summary statistics.*
- *Apply a wide range of regression models to biostatistics data.*
- *Identify and apply the appropriate exploratory and inferential methods.*
- *Identify and apply the appropriate exploratory and inferential methods to survival data.*
- *Use diagnostic methods to assess the appropriateness of different models.*
- *Use R statistical software for computation.*
- *Interpret/express/communicate the results of the statistical analysis in writing.*
- *Work in a collaborative environment.*

Textbook and/or Resource Materials

I will use the book *Regression Methods in Biostatistics* by Vittinghoff et al. and my own materials. My own materials are based on different articles, books, online blogs. The soft copy of the book is available from the university library. Here I list the above-mentioned book along with other reference materials.

- *Regression Methods in Biostatistics* by Vittinghoff, Glidden, Shiboski, and McCulloch
- *Applied Survival Analysis* by Hosmer and Lemeshow
- *Biostatistics with R* by Ciprian Crainiceanu, Brian Caffo, and John Muschelli

We will be using statistical software R (<https://cran.r-project.org/>). Please download R and R-studio, these are freely available.

Datasets used in the book, *Regression Methods in Biostatistics*, are available at <https://regression.ucsf.edu/second-edition/data-examples-and-problems>

All course related materials including course notes, assignments, videos, exams, will be posted on CANVAS.

Grading Policy

- Course grades will be assigned as follows: 90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D, and 0-59 = F
- The course grade will be determined based on 25% homework assignments and 75% exams. Homework problems will be posted in CANVAS. All homework assignments must be submitted as a PDF file in CANVAS. There will be three exams, each worth 25% of your grade.

Grades for Stacked Course (UG/GR) – Undergraduate students (registered in STAT 445) will do less problems in a homework compared to graduate students (registered in STAT 645). Compared to the undergraduate students, graduate students will likely face more questions in third exam.

Late Work Policy

- Homeworks will be posted at least couple of weeks before the due date. So, there should not be any reasonable excuse of submitting late.
- If homework is submitted within 24 hours after the due date and time, then 50% penalty will be incurred. That means, if someone gets 80 out of 100, then after adding the penalty, his/her score will be 40 out of 100. After 24 hours of the due date and time, no late homework will be accepted.
- If a student misses a homework due to university excused reasons, then she/he should contact the instructor, and it will be handled case-by-case basis.

Course Schedule

Topics to be covered and a tentative schedule of the semester (15 weeks)

1. Review of basic methods (parts of Chapter 3 of the book) (covered in Assignments 1 and 2, spans over two weeks, Exam 1)

t-tests

Homogeneous variance assumptions

Correlation coefficient

One-way ANOVA

Multi-way ANOVA

2. Linear regression (parts of Chapter 3 and Chapter 4 of the book) (covered in Assignments 1 and 2, spans over three weeks, Exams 1 & 3)

Simple linear regression

Multiple regression

Mediation analysis

3. Count data (Chapter 3) (covered in Assignment 3, spans over two weeks, Exams 2 & 3)

Different measures of association, Test of independence

4. Survival analysis (parts of Chapter 3 and Chapter 6 of the book) (covered in Assignment 4, spans over four weeks, Exams 2 & 3)

Nonparametric approaches

Parametric approaches

Semiparametric models

5. Some concepts of clinical trials (covered in Assignment 5, spans over two weeks, Exam 3)

6. Bootstrap methods (covered in Assignment 6, spans over two weeks, Exam 3)

-September 4 Labor Day Holiday, October 9-10, Fall break, no classes, November 22 reading day, no class, Nov 23-24 Thanksgiving Holiday

-November 15 is the Q-drop date

-December 04 is the last day of our class

Optional Course Information Items

Teaching assistant (TA): Eric Gao, email: eric2018@tamu.edu,
Office: 464A, Blocker Building, Office hours: **Tuesday and Thursday, 10-11 am**, The office hours are online and also in person. The zoom link is given in CANVAS.

Homework – All homework must be submitted on CANVAS in PDF format. For help regarding homework, please submit your question to the discussion board, either the TA or the instructor will respond to your question in due time. Either the TA, Mr. Alex Coulter, or the instructor, Dr. Sinha, will visit the discussion board once every day. You may also talk to the TA during his office hours.

1. Homework assignments will be available under the Assignment tab on CANVAS.
2. Homework solutions must be in a single portable document format (PDF) file. The initial page of each submitted homework should contain your TYPED name and e-mail address on the provided cover page for that homework. Students will submit the homework to the TA by the posted deadline using CANVAS.
3. Your homework solutions must be your own work, not from outside sources, and consistent with the university rules on academic integrity. I expect you to follow this policy scrupulously.
4. You may use:
 - Your textbook and notes from class.
 - R software.
 - Notes, homework, etc., from a related class.
 - References are listed on the syllabus.
 - Discussion with the instructor or grader.
 - Voluntary, mutual, and cooperative discussion with other students currently taking the class.
 - There will be an online discussion board available to facilitate this.
5. You may not use:
 - Solutions manuals (printed or electronic).
 - Solutions from previous classes or classes taught elsewhere.
 - Copying from students in this class, including expecting them to reveal their solutions in “discussion”.

Learning Resources – Course materials will be posted on CANVAS, you can access the book through the Texas A&M library, get help from the TA and the instructor, and also help each other through the CANVAS discussion board.

Exams—In the exam, you write your answers by hand. But make sure that they are legible. You do not need to show me the computational code. However, you need to provide sufficient explanations and justifications about how you reach the answer. In the end, you may scan your answer into a pdf document, and then upload it to CANVAS. There are many freely available scanning apps for smartphones, you can use any one of them. **Do not take a photo of the answers sheet to create the pdf file.** A detailed exam policy is given below.

1. Exams are un-proctored, open book, note, internet.
2. Exams are available in CANVAS for a 24-hour period starting from 6 am on the day of the exam

until 6 am on the next day.

3. Once you start the exam by entering the password, the time will be counted. You will get exactly **2 hours** to complete and upload the exam in CANVAS. You may submit the exam late. But late submission will be penalized as follows. 1 sec -5 minutes late: lose 50% of your earned percentage scores, 5-10 minutes late: lose 100% of your earned percentage score.
4. Do not type/print the solution, **hand write the solution. Use a pen. Do not show me your R code.**
5. You should be identified on the initial page with your PRINTED name, course, section number, and e-mail address.
6. Your exam solutions must be entirely your own work, consistent with the university rules on academic integrity.
7. Copies of old exams will be available for you to review.

Exam schedule:

Exam 1: October 03, 2023, Tuesday

Exam 2: November 07, 2023, Tuesday

Exam 3: December 04, 2023, Monday

Makeup Policy-- This policy is based on the university policy on attendance given in Student Rule 7

1. If you must miss an exam because of a university excused absence or due to illness or circumstances beyond your control, notify me (before, if feasible, otherwise within two working days after you return). If your absence is approved, I will notify you of how you may make up the missed exam.
2. If you fail to submit a homework assignment by the due date because of a university excused absence or due to illness or circumstances beyond your control, notify me in writing or by email (before, if feasible, otherwise within two working days after you return). If your absence is approved, then the missed homework will be dropped before the grade calculation.
3. TAMU Student Rule 10.6: "A temporary grade of I (incomplete) at the end of a semester or summer term indicates that the student has completed the course with the exception of final examination or a single major assignment. The instructor shall give this grade only when the deficiency is due to an approved university excused absence (see Rule 7 of TAMU Student Rules)..." This grade is not to be given because you feel that you have too much other work or study or because you think that you will not earn an acceptable grade in the course.

University Policies

This section outlines the university-level policies that must be included in each course syllabus. The TAMU Faculty Senate established the wording of these policies.

NOTE: Faculty members should not change the written statements. A faculty member may add separate paragraphs if additional information is needed.

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reasons deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" ([Student Rule 7, Section 7.4.1](#)).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

NOTE: Faculty associated with the main campus in College Station should use this Academic Integrity Statement and Policy. Faculty not on the main campus should use the appropriate language and location at their site.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

NOTE: Faculty associated with the main campus in College Station should use this Americans with Disabilities Act Policy statement. Faculty not on the main campus should use the appropriate language and location at their site.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

NOTE: Faculty associated with the main campus in College Station should use this Title IX and Statement on Limits of Liability. Faculty not on the main campus should use the appropriate language and location at their site.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. on weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at <https://suicidepreventionlifeline.org>.