

**STAT 611 – Statistical Inference**  
**Spring 2021, Texas A&M University**

**Instructor:** Tiandong Wang

**Office:** 435 Blocker Building

**Class Meeting Time and Location:** TR 5:00-6:15 PM, ETB1037

**Office hours:** Wed 3-4 PM

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**TA:** Connor Brubaker

**TA office hours:** TBA

**Course Description**

This course covers topics on the foundation knowledge of Probability and Statistical Inference. In particular, it gives details of theory of Estimation and testing of hypotheses.

**Prerequisites:**

- o STAT 610 or equivalent

**Learning Objectives:**

A primary objective of the STAT-611 course is to provide a thorough theoretical grounding in statistical inference allowing students to apply important statistical inference tools for real data analysis. Students are expected to have a good understanding of important inference methods and their properties, and some approaches to comparing different inference procedures. At the end of the semester, students will be able to

1. Summarize data using the principle of sufficiency.
2. Estimate parameters in models using the method of moments, maximum likelihood, and Bayes theorem. Understand when these procedures will and will not work.
3. Quantify uncertainty in estimation using loss functions, Fisher information, and posterior distributions.
4. Construct optimal hypothesis testing and interval estimation procedures.
5. Evaluate the asymptotic (large sample) performance of estimators.

**Course Website:**

- All STAT 611 materials will be posted on eCampus.
- All course-related questions should be posted on Piazza. You need to sign up via <http://piazza.com/tamu/spring2021/stat611600>. You can choose to post your question anonymously or set it to be private so that it is visible to only the professor and TA.
- In case of other emergent issues, you should contact the professor directly via email.

**Textbooks:** Statistical Inference, by G.C. Casella and R. Berger

**Statistical software:** we will use R to illustrate some examples.

**Grades:**

18%	Homework	A	90-100%
25%	Prelim 1	B	80-89%
25%	Prelim 2	C	70-79%
30%	Final Exam	D	60-69%
2%	Course Evaluation		

**Course Evaluation:**

Everyone will be given 2 free points if more than 70% of the class has filled out the course evaluation form.

**Homework:**

- Homework will be assigned every week. No homework if: (1) There is a prelim in the following week. (2) First and last week of the course. (3) Spring break.
- Approx 10 homework assignments in total and the lowest two scores will be dropped.
- Homework will be due every **Thursday at 11:59PM**. Please upload your homework onto eCampus.
- Late Homework will not be accepted unless you have a university excused absence (<http://student-rules.tamu.edu/rule07>).

**Exams:**

- There will be two prelims (tentative dates: Feb 18, Mar 25, 5-6:30 PM) and a final exam (2-4:45 PM, May 6).
- The two prelims and final are all take-home open book/notes exams. You will have 1.5 hours for each prelim and 2 hours 45 minutes for the final. After you finish the exam, please scan and upload your answer sheets to eCampus. Please note that compared to Prelim 1 and the original final exam, you have already been given an extra 15min (Prelim 2) or 20min (Final), which is for you to upload your answer. No late submission will be accepted.
- Final exam will be comprehensive.
- If you will be forced to miss an exam, you must notify the professor as soon as possible. Before planning an absence on an exam day, you need to verify that the absence will be considered excused by the university. Makeup exams will be different from the regular exams.

**Teaching:**

- Due to the COVID-19 pandemic, all OHs will be held on Zoom. Links will be provided on eCampus.
- Lectures will be recorded and recordings are going to be posted on Piazza by the end of the week. Please do note that recordings are supposed to help you handle sickness or poor internet connections. Attending lectures on time is also very important.
- Students attending synchronous classes remotely have the opportunity to communicate with the instructor via chat.
- You may opt out of **E2F** instruction at any time during the semester.
- You need to **wear masks** in the classroom and should be dissuaded from congregating near the door or in the hall outside the classroom. Social distancing should be followed at all times. Details are included in the "COVID-19 Temporary Amendment" at the end of the syllabus.
- In the event of the university having to shut down campus again, we would convert our course to Remote / Online instruction.

**Topics & Chapters from the Textbook:**

We will be primarily focusing on Chapter 6-10 of Casella and Berger.

1. Review of statistical models and distribution theory  
Parametric and hierarchical models, exponential family.
2. Data Reduction  
Sufficiency principle (6.2): sufficient statistics, complete statistics, ancillary statistics, and the exponential family of distributions; Likelihood principle (6.3)

3. Point Estimation  
Moment estimator, least squares, quantile estimates (7.2), maximum likelihood estimator, Bayes and minimax estimation (7.2), M-estimation, estimating equations (10.2); Unbiasedness, sufficiency, lower bounds on variance(7.3); Asymptotic properties(10.1)
4. Interval Estimation  
Confidence intervals, Bayes intervals (9.2); Evaluate intervals (9.3); Asymptotic properties (10.4)
5. Hypothesis Testing  
Likelihood ratio tests, Neyman-Pearson Theorem(8.2), p-values, power (8.3), Bayesian tests(8.2), unbiased and most powerful tests(8.3), score tests, large sample tests, chi-square tests(10.3)

**Disabilities Help:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Resources, located in the Student Services Building on the Main Campus, call 979-845-1637, or email [disability@tamu.edu](mailto:disability@tamu.edu). For additional information, visit the Office of Disability Resources (<http://disability.tamu.edu/>).

**Academic Integrity:** “An Aggie does not lie, cheat, or steal or tolerate those who do.” You are expected to maintain the highest integrity in your work for this class, consistent with the university rules on academic integrity. This includes not passing of anyone else's work as your own, even with their permission. Please see the homework and exam policies below for specifics. Further information at <http://aggiehonor.tamu.edu>

**Copyright:** All the resources I provide for this course are copyrighted and may not be copied or distributed without my express, written permission.

**Attendance Policy:** see the university rule on Attendance website Rule 7: <http://student-rules.tamu.edu/rule07>

#### **Makeup Policy:**

- If you missed a homework assignment or exam, see the university rule on Attendance website Rule 7: <http://student-rules.tamu.edu/rule07>
- 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, I will notify you on how you may make up the missed assignment.
- If you must miss an exam 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, I will notify you on how you may make up the exam.
- If you miss a homework assignment or an exam and your reason for missing the assignment or exam is not accepted, then you will receive a score of 0 for the assignment or exam.
- A temporary grade of I (Incomplete) at the end of a semester indicates that the student has completed the course with the exception of final exam, or other work.

#### **COVID-19 Temporary Amendment**

#### **Campus Safety Measures**

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring: Students should follow CDC recommendations for self-monitoring.
- Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.
- Face Coverings: Face coverings (<https://rules-saps.tamu.edu/PDFs/34.99.99.M0.03.pdf>) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the Face Covering policy and Frequently Asked Questions (FAQ) available on the Provost website: <https://provost.tamu.edu/Menu/News/TAMU-Face-Covering-FAQs>
- Physical Distancing: Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress: Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must wear a face covering (or a face shield if they have an exemption letter). If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the Student Conduct office (<https://studentlife.tamu.edu/sco/face-covering-violations/>) for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students.

### **Personal Illness and Quarantine**

Students required to quarantine must participate in courses and course-related activities remotely and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See Student Rule 7, Section 7.2.2.) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred, for Spring 2021 only, students may use the Explanatory Statement for Absence from Class form in lieu of a medical confirmation. Students must submit the Explanatory Statement for Absence from Class within two business days after the last date of absence.

### **Operational Details for Spring 2021 Courses**

For additional information, please review the FAQ on Spring 2021 courses at Texas A&M University.