Statistical Inference

STA 7346

Fall 2025

Course Information:

Section: 4468

Time and Classroom:

T |	Period 6	| 12 : 50 PM $-$ 1 : 40 PM	| *TUR 2342*
R |	Period 6 $-$ 7	| 12 : 50 PM $-$ 2 : 45 PM	| *FLO 0100*

Instructor: Dr. Satarupa Bhattacharjee

Office hour	Contact
TR 3:00-4:00 pm or by appointment on Zoom	Office: 203 Griffin-Floyd Hall Email:bhattacharjee.sa@ufl.edu Phone: 352-273-2980

Course Materials: We will mostly follow the materials from the in-class lecture notes and handouts.

Recommended Textbooks: Here are some additional textbooks – some of the homework problems will be given from them, but the statement of the problem will be clearly written on the homework assignments for your convenience.

1. *All of Statistics: A Concise Course in Statistical Inference* by Larry Wasserman
2. *Mathematical Statistics: Basic Ideas and Selected Topics* by Bickel and Doksum
3. *Theory of Point Estimation* by Lehmann and Casella
4. *Testing statistical hypotheses* by Lehmann and Romano

Web resource : 1. All the assignments and lecture notes for the courses will be posted on Canvas. https://ufl.instructure.com/courses/550273.

2. For course-related peer discussion please follow the Piazza page for the course https://piazza.com/ufl/fall2025/sta7346/info. This page will not be monitored very regularly but is mostly for your own doubt-clearning and discussion.

Course Objective:

The objective of STA 7346 is to provide a solid foundation in the theory of statistical inference. The course will focus on concentration inequalities, convergence of sequance of random variables, point estimation in parametric models including maximum likelihood estimation and Bayesian point estimation, decision theory, hypothesis testing including likelihood ratio tests, p-values, and multiple testing.

Course Contents:

- Foundations of probability and Random variables
- Concentration inequalities, subGaussian tail bounds, Rademacher complexity
- Parametric statistical models and point estimation : MLE
- Bayesian inference and decision theory
- Hypothesis testing : Likelihood ratio test, p-values,
- Multiple testing

Exams:

Tentative dates:

Exam I: September 16, 2025 (Tuesday)
Exam II: October 28 (Tuesday)
In-class Quizzes: September 4, September 11, September 25, October 9, October 30, November 13 (all Thursdays)
Presentation on selected topics: November 20, December 2.

- The exams will be non-cumulative and will be held in the classroom during class time.
- The exams can only be made up for legitimate reasons, such as verified illness, participation in other university-sponsored activities, jury duty, military service, and religious observances. Only one make-up exam will be offered and you must

either let the instructor know well before the scheduled day of the exam which you need to be excused from (for a non-emergency reason), or produce a proof of emergency (or medical problem) as soon after the missed exam as possible.

- You will be permitted to bring one 8.5 by 11 inches sheet of paper with formulas or notes written on both sides to each exam.

Quizzes:

- There will be five/six in-class quizzes - each will take place during the final 10 to 15 minutes of class time.
- There will be typically 1 or 2 problems in each quiz, based on homework exercises assigned about a week before, problems done in class, or of similar difficulty level.
- No books, notes or other references may be used during a quiz.
- All quizzes have equal weight for grading. No make-up quizzes will be offered.

Homework Assignments:

- Five or Six homework assignments will be posted on Canvas. **Homeworks are to be submitted in class on the due date.**
- Homeworks can be typed or handwritten. The only condition is that they should be neat and legible. **Illegible homeworks will be penalized**.
- **Late HW submissions will not be accepted regardless of reason.**
- The homework with the lowest scores (in terms of percentage) will be dropped.
- Please write STA 7346 on your submitted Homework along with your name and your student ID. Follow the instructions for each individual assignment.

Grades:

Exam I: 25%, Exam II: 25%, Final Presentation: 25%, Quizzes: 15%, Homework: 10%.

Tentative schedule:

Date	Day	Topic
21-Aug	R	Syllabus + Handout on Random variables and probability distributions + Concentration Ineq (1)
26-Aug	T	Concentration Ineq (2)
28-Aug	R	Convergence of random variables (1)
2-Sep	T	Convergence of random variables (2)
4-Sep	R	Central limit theorem + Uniform convergence + in-class quiz (1)
9-Sep	T	Uniform Laws and Empirical Process Theory (1)
11-Sep	R	Uniform Laws and Empirical Process Theory (2) + Review + in-class quiz (2)
16-Sep	T	Exam 1
18-Sep	R	Statistical Models : Parametric family – handout on sufficiency + likelihood + exponential family +point estimation : MOM, MLE
23-Sep	T	MLE (1)
25-Sep	R	MLE (2) + Asymptotic theory + in-class quiz (3)
30-Sep	T	MLE (3) + M estimation
2-Oct	R	Bayes estimation (1)
7-Oct	T	Bayes estimation (2)
9-Oct	R	Decision Theory (1) + in-class quiz (4)
14-Oct	T	Decision Theory (2)
16-Oct	R	Decision Theory (3) – Minimax estimator
21-Oct	T	Catching up + Review for Exam 2
23-Oct	R	Hypothesis testing: handout on basics, NP, p values – review + LRT(1)
28-Oct	T	Exam 2
30-Oct	R	LRT (2)
4-Nov	T	LRT(3)
6-Nov	R	Multiple testing (1) + in-class quiz (5)
11-Nov	T	Holiday
13-Nov	R	Multiple testing (2) + in-class quiz (6)
18-Nov	T	Permutation test + bootstrap test
20-Nov	R	Presentation (1) – topics/papers to present – choose from: Two-sample tests, Statistical distances, Minimax lower bounds, Empirical process theory, Confidence intervals, Nonparametric regression, High-dimensional statistics
2-Dec	T	Presentation (2) – topics/papers to present – choose from: Two-sample tests, Statistical distances, Minimax lower bounds, Empirical process theory, Confidence intervals, Nonparametric regression, High-dimensional statistics

Course policies:

Attendance: This course abides by the UF Class Attendance Policy.
Classroom lecture attendance is fully expected, even if not strictly enforced. You are responsible for learning all material presented during lecture, and any topic covered is a potential exam topic (unless otherwise stated).

Reasonable Accommodations To request classroom accommodation, please be certain that you have made all necessary arrangements with the Dean of Students

Office, and obtain from them documentation to submit to the instructor at the time of your request. A request must be made to the instructor at least one week in advance of the date for which the accommodation is requested. This course information and policies sheet can be made available in alternative formats to accommodate print-related disabilities. Contact the instructor for more information. Resources: Disability Resource Center

UF Policies All UF, College of Liberal Arts and Sciences, and Department of Statistics policies regarding ethics, honorable behavior, and mutual respect apply in this course.

- UF Grading Policy:
  https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/
- Course Evaluation :
  https://gatorevals.aa.ufl.edu/
- UF Academic Regulations:
  https://catalog.ufl.edu/UGRD/academic-regulations/
- ALL UF Policies and Procedures:
  https://aa.ufl.edu/policies/
- UMatter WeCare:
  https://umatter.ufl.edu/
- UF Registrar:
  https://registrar.ufl.edu/
- ONE.UF:
  https://one.ufl.edu/
- Academic Integrity:
  https://www.cise.ufl.edu/static/conflict-resolution-fall2017-presentation.pdf and http://www.dso.ufl.edu/sccr/honorcode.php
- Educational Equity Statement:
  https://soccrim.clas.ufl.edu/wp-content/uploads/sites/143/2023_Equity_in_Education_Syllabus.pdf
- Student Honor Code and Student Conduct Code:
  https://policy.ufl.edu/regulation/4-040/
- Academic Misconduct:
  https://phhp-academic-integrity.sites.medinfo.ufl.edu/helping-students-suspe suspecting-academic-misconduct/
- Student Concern Reporting:
  https://report.ufl.edu/student-concern/
- Mental Health Services:
  https://counseling.ufl.edu/resources/

Help and Discussion: Although you are encouraged to work with other students on the class activities and discussion sessions, the homework write up and exams must be your own work. Academic dishonesty will be treated very seriously. Do not put yourself and another student in jeopardy by cheating.

Do not hesitate to get in touch with me if you are experiencing problems, need help, or have any questions or other course-related concerns. You can contact any of them via Canvas discussion board, an email or by coming to office hours.