

**BSTA 622 Statistical Inference II**  
**Fall 2022**

**Content:**

This course focuses on theoretical statistics. We will cover a series of classical statistical inferential methods, including the method of estimating equations, the asymptotic theory for maximum likelihood estimation, the generalized method of moment estimation, and inference by influence functions. This course will emphasize concepts, methods and theories, rather than applications. Successful completion of this course will provide you with a foundation in probability-based statistical inference.

**Intended Audience:**

The course is designed for Biostatistics Ph.D. students in their 2nd year or beyond. Students are required to complete Probability I (BSTA 620) and Inference I (BSTA 621) before taking this course. Exceptions may be made with permission of the instructor.

**Instructor:**

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**TA:**

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Office Hours: TBD

**Class Schedule:**

Mon and Wed 10:15-11:45 am in Blockley Hall 701.

**Textbooks:**

Recommended, not required, textbooks:  
Theory of Point Estimation, by E.L. Lehmann and G. Casella, Springer  
Elements of Large-Sample Theory, by E.L. Lehmann, Springer  
Asymptotic Statistics, by A.W. van der Vaart, Cambridge  
Theoretical Statistics, by D. Cox and D. Hinkley, Chapman and Hall

**Grading:**

Homework: 40%. We will have 3-6 homework assignments. You are encouraged to discuss your homework among classmates, but each should write up his/her own assignments.

Midterm: 30%

Final exam: 30%

Both midterm and final exams will be closed book.

### Tentative Schedule

Date		Topics
Aug	31	Mathematics Primer
Sep	5	Labor Day no class
	7	Mathematics Primer
	12	Unbiased estimation and Unbiased estimating functions
	14	Unbiased estimation and Unbiased estimating functions
	19	Unbiased estimation and Unbiased estimating functions
	21	Statistical Information
	26	Statistical Information
	28	Large Sample Theory
Oct	3	Asymptotic Theory of Estimation
	5	Asymptotic Theory of Estimation
	10	Asymptotic Properties of the MLE
	12	Asymptotic Properties of the MLE
	17	Asymptotic Properties of the MLE
	19	Asymptotic Properties of the MLE
	24	Midterm review
	26	Midterm
	31	Generalized Linear models
Nov	2	Generalized Linear models
	7	Generalized Method of Moments
	9	Influence Functions
	14	Influence Functions
	16	Likelihood Functions (conditional, profile, plug in)
	21	Likelihood Functions (conditional, profile, plug in)
	23	Thanksgiving No class
	28	Likelihood Functions (conditional, profile, plug in)
	30	Guest Lecture
Dec	5	Semiparametric Inference & student presentation of final project
	7	Semiparametric Inference & student presentation of final project
	12	Semiparametric Inference & student presentation of final project
		Final