



EMORY

ROLLINS  
SCHOOL OF  
PUBLIC  
HEALTH

**DEPARTMENT:** BIOS  
**COURSE NUMBER:** 735 **SECTION NUMBER:** 1  
**CREDIT HOURS:** 2 **SEMESTER:** FALL

**COURSE TITLE:** Estimating Function Theory

**CLASS HOURS AND LOCATION:** Tuesdays 1-2:50 pm,  
GCR 107

**INSTRUCTOR NAME:** John Hanfelt, PhD

**INSTRUCTOR CONTACT INFORMATION**

EMAIL: jhanfel@emory.edu

PHONE: 404-727-2876

SCHOOL ADDRESS OR MAILBOX LOCATION: GCR 330

**OFFICE HOURS** By appointment

**Teaching Assistant(s):** N/A

**COURSE DESCRIPTION**

Examines topics in the theory of estimating functions. This course presents measures of efficiency of estimating functions; methods to produce efficient estimating functions using orthogonal projection theory; conditional estimating functions based on partially ancillary statistics; modern methods to reduce the sensitivity of an estimating function to nuisance parameters; artificial likelihood functions to accompany estimating functions; and model selection issues. Applications from biomedical studies are used to illustrate the concepts discussed in class.

Prerequisites: BIOS 711 or permission of instructor. Some knowledge of statistical computing will be needed to complete the final project.

## **MPH/MSPH FOUNDATIONAL COMPETENCIES: n/a**

## **CONCENTRATION COMPETENCIES:**

- Use central concepts in statistical theory and inference
- Use statistical software for both data management and data analyses, including coding of custom techniques
- Demonstrate technical accuracy with advanced analytic methods
- Conduct complex statistical analyses for a broad range of applications

## **COURSE LEARNING OBJECTIVES: n/a**

## **EVALUATION**

Homework - 50 %

Final Project - 50 %

## **COURSE STRUCTURE**

This course will cover material from various journal articles, manuscripts and selected portions of the following texts:

Mukhopadhyay P. (2004). An Introduction to Estimating Functions. Alpha Science International.

Small, C.G. and Wang, J. (2003). Numerical Methods for Nonlinear Estimating Equations. Oxford

## **COURSE POLICIES**

As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Equity and Inclusion, 404-727-9877.

## **RSPH POLICIES**

### **Accessibility and Accommodations**

Accessibility Services works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, you must contact the Office of Accessibility Services (OAS). It is the responsibility of the

student to register with OAS. Please note that accommodations are not retroactive and that disability accommodations are not provided until an accommodation letter has been processed.

Students who registered with OAS and have a letter outlining their academic accommodations are strongly encouraged to coordinate a meeting time with me to discuss a protocol to implement the accommodations as needed throughout the semester. This meeting should occur as early in the semester as possible.

Contact Accessibility Services for more information at (404) 727-9877 or [accessibility@emory.edu](mailto:accessibility@emory.edu). Additional information is available at the OAS website at <http://equityandinclusion.emory.edu/access/students/index.html>

## Honor Code

**You are bound by Emory University's Student Honor and Conduct Code.** RSPH requires that all material submitted by a student fulfilling his or her academic course of study must be the original work of the student. Violations of academic honor include any action by a student indicating dishonesty or a lack of integrity in academic ethics. *Academic dishonesty refers to cheating, plagiarizing, assisting other students without authorization, lying, tampering, or stealing in performing any academic work, and will not be tolerated under any circumstances.*

The RSPH Honor Code states: "Plagiarism is the act of presenting as one's own work the expression, words, or ideas of another person whether published or unpublished (including the work of another student). A writer's work should be regarded as his/her own property."

([http://www.sph.emory.edu/cms/current\\_students/enrollment\\_services/honor\\_code.html](http://www.sph.emory.edu/cms/current_students/enrollment_services/honor_code.html))

## COURSE CALENDAR

This course meets on Tuesdays from 1-2:50 pm. There will be 3 homework assignments. The final take-home project will be conducted during the period from December 4 – 18.

## COURSE OUTLINE

Units:

1. Introduction (motivation, definitions, historical background, examples)
2. Efficiency considerations, role of unbiasedness, optimality of maximum likelihood
3. Role of orthogonal projections
4. Generalized information measures; ancillarity; partial ancillarity
5. Optimality of conditional maximum likelihood
6. & 7. Lindsay's conditional score
8. Projected score
9. Adjusted profile score

10. Quasi-score
11. Quasi-likelihood and other artificial likelihoods
12. Model selection issues