

University of Florida  
Department of Electrical and Computer Engineering  
Course Outline

**EEL 6537 — SPECTRAL ESTIMATION**

**Spring, 2008**

---

**Pledge:** We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

**Texts:** P. Stoica and R. L. Moses, *Spectral Analysis and Signals*, Prentice Hall, 2005.

S. M. Kay, *Modern Spectral Estimation: Theory and Application*, Prentice Hall, 1988.

**References:** S. Lawrence Marple, Jr., *Digital Spectral Analysis with Applications*, Prentice Hall, 1987.

Charles W. Therrien, *Discrete Random Signals and Statistical Signal Processing*, Prentice Hall, 1992.

<b>Grading:</b> Homework	20 %
Exam	30 %
Projects (2)	25 % each

**Content:** The primary focus of this course is on various aspects of spectral estimation. Topics on both parametric and nonparametric spectral estimation methods will be covered. The applications of spectral estimation to diverse fields will be addressed.

**Prerequisite:** EEL 5544 and EEL 5701.

**Instructor:** Dr. Jian Li

**Office:** 465 EB; Phone: 392-2642; Email: li@dsp.ufl.edu

**Office Hours:** 3rd and 5th periods on Tues and 3rd period on Thurs., or by appointment.

- Topics:**
1. Introduction to spectral estimation and review of the fundamentals of digital signal processing – 2 lectures.
  2. Fundamentals of estimation theory including maximum likelihood estimators and Cramer-Rao bounds – 2 lectures.
  3. Nonparametric methods and the trade-offs between resolution and variance – 5 lectures.
  4. Parametric methods including AR, MA, and ARMA methods and model order selection methods – 14 lectures.
  5. General filtering problem including noncausal, causal, and FIR filters – 2 lectures.
  6. Parametric methods for line spectral estimation including Prony, HOYW, MUSIC, ESPRIT, and RELAX methods – 9 lectures.
  7. Filter-bank approaches for spectral estimation – 5 lectures.

**Miscellaneous:** Homework problems will be assigned and discussed on a regular basis. You are responsible for all assignments, changes of assignments, announcements of project due dates, and other course-related events which occur in class. *No late project reports will be accepted.*

**Academic Honesty:** All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.

This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.