Statistical Communication Theory

ECE 630

Spring 2019

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Time and Place Tuesday 4:30pm — 7:10pm, Engineering Building 1108, Room 242

Office Hours Tuesday 3:00pm — 4:00pm and Wednesday 1:00 — 2:00pm.

Required Textbook Upamanyu Madhow, *Fundamentals of Digital Communication*, Cambridge University Press, 2012.

Recommended Further Reading

1. J.M. Wozencraft and I.M. Jacobs, *Principles of Communication Engineering*, New York: Wiley & Sons, 1965. (reissued by Waveland Press, Prospect Heights, IL, 1990.)
2. H.L. van Trees, *Detection, Estimation, and Modulation Theory, vol. I*, New York: Wiley & Sons, 1968.
3. J.G. Proakis, *Digital Communications*, 5th ed., New York: McGraw-Hill, 2007.

Homework will be assigned every week except when an exam is scheduled the following week. A set of solutions will be made available. You are encouraged to work on the assignments in small groups.

Two Exams will be given: one midterm exam and a comprehensive final exam. All exams are conducted under the rules and regulations of the Honor Code (see University Catalog).

On-line Class Material Class material will be distributed electronically via the World-Wide Web. Use a browser to find the ECE 630 homepage at URL `http://www.spec.gmu.edu/~pparis/classes/ece630.html`.

I will also correspond with you through your Mason e-mail account — check your e-mail regularly. The BlackBoard page for this course will contain homework assignments, syllabus, and your grades.

Final Grades are determined as a weighted average of homeworks and exams in the following way:

Homework	30%
Midterm	35%
Final	35%

Tentative Course Schedule

Background Material

Week 1: Introduction and Overview

Week 2: Random variables with emphasis on the Gaussian distribution

Week 3: Random processes.

Week 4: Signal space concepts.

Optimal Receiver in White Gaussian Noise

Week 5: Binary hypothesis testing

Week 6: The matched filter.

Week 7: M-ary signal sets and the union bound.

Week 8: Midterm Exam.

Week 9: Message sequences.

Digital Modulation

Week 10: Complex baseband representation of signals and random processes.

Week 11: Linear, digital modulation methods and their bandwidth.

Week 12: Orthogonal, bi-orthogonal, and differential modulation.

Advanced Topics: The final two weeks of the class will consider advanced topics, options include:

- Introduction to error correction coding.
- Dispersive channels and equalization.
- Fading channels and diversity.
- OFDM

Final Exam: May 14, 4:30–7:15pm