

## ECGR 4123/5191 Analog and Digital Communications - Spring 2009

- Instructor:** Dr. Ivan Howitt;  
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- Office Hours:** Tuesday & Thursday 4:00 – 5:00;  
Other times by appointment (Set up appointment by email).
- Class Info:** Tuesday & Thursday 11:00 – 12:15
- Final Exam:** TUE MAY 5 11:30 - 2:30 p.m.
- Grading:**
- |                   |     |
|-------------------|-----|
| Homework          | 5%  |
| Computer Projects | 10% |
| Term Project      | 10% |
| Exam I            | 20% |
| Exam II           | 20% |
| Final Exam        | 35% |
- Text:** *Modern Digital and Analog Communication Systems, 3rd ed.*, B.P. Lathi, Oxford U. Press (Required)
- Matlab References:** **Available From Class Website**  
*Matlab Primer*, 3<sup>rd</sup> edition, Kermit Sigmon, 1993.  
*Introduction to Matlab & Applications to DSP*, Ivan Howitt, 2003.
- References:** (Not Required)  
*Communication Systems*, 4<sup>th</sup> edition, A. Bruce Carlson, Paul Crilly, Janet Rutledge, McGraw Hill, 2002.  
*Communication Systems*, 4<sup>th</sup> edition, Simon Haykin, Wiley, 2001.
- Prerequisite:** ECGR3111 – Signals & Systems.

**Class Description:** Analysis and transmission of signals, including analog communication systems (amplitude and frequency modulation, effect of noise); digital communications systems (pulse code modulation, data transmission systems phase-shift keying, and frequency-shift keying, effect of noise).

**Homework:** Assigned approximately every week. Collaboration (not copying) on homework is encouraged.

**Computer Projects & Term Project:** Several projects assigned over the course of the semester. Projects will be based on using Matlab. Term Project will be team based, with teams expected to work independently of other teams (see note on academic integrity).

### Advice:

- 1) Be consistent in doing the assignments. Start the assignments early and be diligent on keeping your work on track.
- 2) If you run into trouble completing an assignment or making it to class for a test, contact instructor at least 24 hours **prior** to the due date or test time. Contact me either by email or phone. Failure to comply will result in no credit for the assignment or test (except for documented emergencies).

**Tentative Schedule:**

<b><u>Week</u></b>	<b><u>Lecture Topic:</u></b>	<b><u>Chapters</u></b>
1-2	Comm. Overview; Signals: Classification, Operations on signals, Orthogonality, Fourier Series (FS) (Periodic Signals).	1, 2
2-3	Sampling Theorem/ Intro Matlab	6, Notes
4-6	Fourier Transforms (FT) (Aperiodic Signals); Linear Systems; Signal Transmission & Communication Channel Characterization; Energy Spectral Density and Power Spectral Density.	3
6	Midterm Exam	1 - 3
7-9	Linear Modulation: DSB, AM, SSB, VSB; Tx Characteristics: Bandwidth, Power, Complexity; methods for modulation and demodulation; Carrier Acquisition; Superheterodyne Receiver.	4
9-10	Exponential Modulation: FM, PM; Tx Characteristics: Bandwidth, Power, Complexity; methods for modulation and demodulation.	5
10	Midterm Exam	1 - 4
11	PCM	6
12-13	Data Transmission: line codes, pulse shaping, ISI; WLAN, Cellular Telephony	7, 9.1-9.3
14	Probability, Random Variables, Random Process	10, 11
15	Signal Detection in Noise	7.6, 12, 13
16	Final Exam	1-7, 9.1-9.3, 10-13.

**ACADEMIC INTEGRITY:**

Students have the responsibility to know and observe the requirements of *The UNCC Code of Student Academic Integrity* (obtain @ Dean of Students Office or at <http://www.uncc.edu/catalog/yr9799/studcond.html> ). This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Students are expected to report cases of academic dishonesty to the course instructor.

Academic evaluations in this course include a judgment that the student's work is free from academic dishonesty. Grades on individual assignments and the course grade will be adversely affected by academic dishonesty. For the benefit of all students enrolled in this course and for the integrity of the university, standards of academic integrity will be enforced in this course.