ESE 340
Basic Communication Theory

Fall 2016

Instructor: **Mónica F. Bugallo**
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Office Hours: MW 10:00 AM - 12:00 PM

Class Meetings: MW 8:30-9:50 AM

Grading: Exercises and lab projects: 30%
Four quizes: 20% (best of the two first quizes), 20% (second quiz), 30% (third quiz)

Prerequisites: ESE 305: Deterministic Signals and Systems
ESE 306: Random Signals and Systems

Textbook: (Recommended) B. P. Lathi and Z. Ding *Modern Digital and Analog Communication Systems*, Oxford University Press, 2009.
ISBN: 978-0195331455

Class resources: `http://blackboard.stonybrook.edu`

Learning outcomes:

- Understand the basic concepts in communications: signals, spectra, and linear networks; Fourier transforms, energy and power spectra, and filtering; AM, FM, and PM; time and frequency multiplexing; noise and bandwidth considerations; pulse modulation schemes.
- Develop and analyze a series of programming exercises and projects consisting of application of the materials studied in class.

If you have a physical, psychological or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Disabled Student Services office (DSS), room 133 Humanities, 632-6748/TDD. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information of disability is confidential.

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Topics:

- Introduction to signals.
  - Elements of a communication system.
  - Classification of signals.
- Analysis and transmission of signals.
  - The Fourier transform.
  - Signal transmission through linear systems.
  - Energy and power.
- Amplitude modulation.
  - Baseband and carrier communication.
  - Generation of amplitude-modulated waves.
- Angle modulation.
  - Concept of instantaneous frequency.
  - Generation of angle-modulated waves.
- Random processes.
  - From random variable to random process.
  - Power spectral density of random process.
  - Transmission of random processes through linear systems.
- Behavior of analog systems in the presence of noise.
  - Baseband systems.
  - Amplitude-modulated systems.
  - Angle-modulated systems.
- Sampling and pulse code modulation.
  - Sampling theorem.
  - Pulse-code modulation (PCM).