

Colorado State University, Ft. Collins

Spring 2020

## ECE 614: Principles of Digital Communications

3 credits, Tuesday & Thursday 9:30am ~ 10:45am, Engr B3

**Instructor:** J. Rockey Luo                      **Office:** B118, Engineering Building  
**Phone:** (970) 491-7411                      **E-mail:** [rockey@colostate.edu](mailto:rockey@colostate.edu)  
**Office Hours:** After class or by appointment.

**Prerequisite:** Linear Systems, Probability and Random Processes, Introduction to Communications

**Textbook:** John R. Barry, Edward A. Lee, David G. Messerschmitt, "Digital Communication", 3<sup>rd</sup> Ed., Kluwer Academic Publishers, 2003.

**References:** John G. Proakis, "Digital Communications", 5<sup>th</sup> Ed., McGraw Hill, 2008.

**Webpage:** <http://www.engr.colostate.edu/ECE614/>

**Course Description:** This course focuses on the fundamental principles behind reliable digital data transmission over noisy and band-limited channels. Signaling schemes, channel models, and receiver structures widely used in practical systems are developed and analyzed. The communication techniques covered in the course are applications of digital signal processing, detection, estimation, and information theories.

The covered topics include: modern communications; probabilistic viewpoint; vector representation of signal; signal spaces; vector channels; additive white Gaussian noise; optimum receivers; maximum-likelihood detection; error probabilities; memoryless modulation methods: PAM, BPSK, M-PSK, FSK, QAM; message sequences; intersymbol interference (ISI); Nyquist signaling; equalization; complex baseband models; noncoherent detection; source coding; error control coding.

**Course Goals:** Learn to analyze and design digital modulation and demodulation schemes for memoryless channels and channels with memory.

<b>Grading and Exams:</b>	Midterm Exam	35%
	Final Exam	50%
	Homework and MATLAB Assignments	15%

**Tentative Schedule for Exams:**

Midterm:	Tuesday 19:30am~10:45am, 03/24/2020.
Final:	Wednesday 6:20pm~8:20pm, 05/13/2020.