Colorado State University, Ft. Collins   **Spring 2024**

ECE 614: Principles of Digital Communications

3 credits,   Tuesday & Thursday 9:30am ~ 10:45am,   Eddy 106

Instructor: J. Rockey Luo   **Office:**   B118, Engineering Building
Phone: (301) 502-2203   **E-mail:**   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", 3rd Ed., Kluwer Academic Publishers, 2003.

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.

Grading and Exams: Midterm Exam   35%
                                 Final Exam   50%
                                 Homework and MATLAB Assignments   15%

Tentative Schedule for Exams:
                          Midterm: Tuesday 9:30am~10:45am, 03/19/2024.
                          Final: Wednesday 2:00pm~4:00pm, 05/09/2024.

Exams will be open book open notes.

All homework submissions will be done online on Canvas. If you prefer working on paper copies, you can take photos of the papers and then upload the PDF file on Canvas.