

ECE 462 – Digital Communications & Channel Coding

Catalog Description: Modeling, analysis, design of baseband and passband digital communications systems; geometric representation of signals; correlator receivers for M-ary digital communications systems; decision theory and its application to digital communication systems in additive white Gaussian noise environment; generation, transmission, and reception of passband digital modulated signals (BPSK, QPSK, FSK PAM); basics of information theory and channel encoding.

Credits: 4 **Terms Offered:** Winter

Prerequisites: ECE 461, ECE 351, ECE 352, ECE 353

Courses that require this as a prerequisite: ECE 662

Structure: Two 100-minute lectures per week

Instructors: H. Liu (primary), M. Magaña (secondary)

Course Content:

- Digital modulation techniques
- Performance of digital communication systems in the presence of noise
- Optimum signal detection
- Information theory
- Basic block and convolutional codes

Measurable Student Learning Outcomes:

At the completion of the course, students will be able to...

1. **Apply** the fundamental concepts of a digital telecommunication system (ABET Outcomes a, k)
2. **Analyze** baseband transmission of digital signals (ABET Outcomes a, e, l, m, n)
3. **Characterize** time-domain signals using geometric representations (ABET Outcomes a, e, l, m, n)
4. **Analyze and design** passband digital communication systems (ABET Outcomes a, b, c, m, n)
5. **Explain** the fundamentals of information theory (ABET Outcomes a, j, l, m, n)
6. **Design** basic linear block and convolutional codes (ABET Outcomes a, c, m, n)

Graduate students must also solve an extra exam problem within the exam time and complete an extra course project.

Learning Resources:

- *Modern Digital and Analog Communication Systems*, B. P. Lathi, 3rd Edition, Oxford University Press, 1998

Students with Disabilities:

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible

for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Link to Statement of Expectations for Student Conduct:

<http://oregonstate.edu/admin/stucon/achon.htm>

Revised: 5/25/07