ECE 637 Fall 2014
Channel Coding University of Arizona

Syllabus

Instructor: O. Ozan Koyluoglu (ozan@email.arizona.edu).

Class Times and Office Hours: Class meets TTh 9:30am - 10:45am in Architecture, Rm 302A. Office hours are Th 11:00am - 12:00pm in ECE Bldg., Rm 456C. If you can not make it to the office hours, we can schedule a meeting via email.

Topics: This course helps the students to develop a solid understanding of the fundamental concepts in coding theory with applications to some engineering problems. Topics covered in this course include the followings.

1. Fundamentals
   (a) Channels, errors, erasures, and capacity
   (b) Linear codes
   (c) Finite fields
   (d) Bounds
2. Core concepts (classical and modern approaches)
   (a) Reed-Solomon and MDS codes
   (b) Cyclic codes
   (c) Trellis and convolutional codes
   (d) LDPC and graph codes
3. Recent developments
   (a) Regenerating and locally repairable codes
   (b) Polar codes
   (c) List decoding of Reed-Solomon codes
   (d) Rateless codes

Prerequisite: Graduate standing (+ knowledge of basic linear algebra and probability).

Course textbook and references: The course (mostly) follows [1].

[1] R. M. Roth, Introduction to Coding Theory, Cambridge University Press, 2006.

[2] F. J. MacWilliams and N. J. A. Sloane, The Theory of Error Correcting Codes, North-Holland, 1977.

[3] J. H. van Lint, Introduction to Coding Theory, Springer, 1991.

[4] S. B. Wicker, Error Control Systems for Digital Communication and Storage, Prentice-Hall, 1994.

[5] S. Lin and D. J. Costello, Error Control Coding, Prentice Hall, 2004.

[6] T. Richardson and R. Urbanke, Modern Coding Theory, Cambridge University Press, 2008.

[7] W. Ryan and S. Lin, Channel Codes: Classical and Modern, Cambridge University Press, 2009.

Grading policy: The course grade will be based on 100 points.

Bonus Quizzes 20% (around 10 online quizzes, each with 2%)
Midterm 30% (TBD, late September or early October)
Final 30% (December 17, 10:30 am - 12:30 pm)
Homeworks 40% (around 5 assignments, each with 8%)

Exam policy: Both midterm and final are closed book exams. Students are allowed to use their notes: One sheet of paper (i.e., two sides of standard letter size - 8.5×11 inches - paper) for the midterm exam, and two sheets for the final exam. Only one make-up exam will be administered during the semester and it will be for those students who have missed an exam with a valid excuse that is recognized by the university.

Late policy: No late material will be accepted unless prior arrangements have been made with the instructor. Arrangements must be made at least 24 hours in advance. Emergency situations will be handled on a case by case basis.

Homework policy: Students are encouraged to discuss homework problems with each other. Final submitted material must be students' own work. A subset of the homework problems will be graded. Solutions to the graded problems will be provided.

Email policy: Students need to use "ECE 637" at the beginning of the subject line when emailing to the instructor.

Special needs and accommodations: Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: `uadrc@email.arizona.edu`, `http://drc.arizona.edu`. You must register and request that the Center or DRC send me official notification of your accommodations needs as soon as possible.

Student code of academic integrity: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: `http://deanofstudents.arizona.edu/codeofacademicintegrity/`.

Some of the course materials will be online. Please check D2L regularly. Information contained in the course syllabus may be subject to change with advance notice.