Syllabus

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

Class Times and Office Hours: Class meets MWF 3:00pm - 3:50pm in ECE, Rm 102, and online at D2L. Office hours are W 2:00pm - 3:00pm in ECE, Rm 456C, and online at D2L. 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 information theory. Topics covered in this course include the followings.

1. Entropy, relative entropy, and mutual information

2. Asymptotic equipartition property

3. Entropy rates of stochastic processes

4. Date compression

5. Channel capacity

6. Differential entropy

7. Gaussian channel

8. Rate distortion theory

9. Advanced topics: Maximum entropy, coding, security, network information theory, ...

Prerequisite: ECE 503 (Probability).

Course Materials and references: The course depends primarily on lecture notes, which follows [1] quite closely. The followings are helpful references for this class.

[1] T. M. Cover and J. A. Thomas, Elements of Information Theory, Wiley, 2nd Edition, 2006. (`http://www.elementsofinformationtheory.com`.)
[2] A. El Gamal and Y.-H. Kim, Network Information Theory, Cambridge University Press, 2011. (`http://circuit.ucsd.edu/~yhk/nit.html`.)
(Lecture notes are available at `http://arxiv.org/abs/1001.3404v4`.)
[3] I. Csiszár and J. Körner, Information Theory: Coding Theorems for Discrete Memoryless Systems, Cambridge University Press, 2nd Edition, 2011.
[4] R. G. Gallager, Information Theory and Reliable Communications, John Wiley & Sons, 1968.
[5] C. E. Shannon, The Mathematical Theory of Communication, University of Illinois Press, 1949.

Grading policy:
Quizzes 10% (5 online quizzes)
Project 15% (TBD)
Homeworks 20% (5 homeworks)
Midterm 25% (TBD)
Final 30% (University schedule)

Exam policy: Both midterm and final are closed book exams. Students are allowed to use one sheet of paper (i.e., two sides) of standard letter size (8.5×11 inches). 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.

Project policy: This is a semester project where a group/individual will do a research on a topic relevant to information theory. The goal of the project is either to have a progress on a new/existing problem, or to summarize an advanced topic. The topic should be finalized by mid-September. More details will be given during the semester. The project results will be presented in class and grading will be based on a) effective communication of the research findings, and b) progress/effort made for the project.

Email policy: Students need to use "ECE/MATH 636" at the beginning of the subject line when emailing to the instructor.

Accessibility and accommodations: It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources Center (520-621-3268, `http://drc.arizona.edu`) to establish reasonable accommodations.

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/`.

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