

ECGR 6090/8090: Information Theory and Applications
(cross-list: ITCS 6165/8165: Coding and Information Theory)

Instructor: Prof. Ahmed Arafa, Spring 2022

- Class: MW 4:00–5:15 pm (EPIC 2230 – [online via Zoom till 1/24/2022](#)).
- Office hours: TR 12:00 noon – 1:00 pm (EPIC 2262 – [online via Zoom till 1/24/2022](#)).
- Course website: In addition to Canvas, course updates will also be posted at <https://webpages.uncc.edu/aarafa/current-teaching.html>
- Topics:
 1. Theory: probability review; information measures; asymptotic equipartition property; source coding and compression; channel coding and capacity; differential entropy and Gaussian channels; rate-distortion theory; (time-permitting) network information theory.
 2. Applications: information-theoretic security; private information retrieval; information theory and machine learning; caching systems; low latency communications.
- Readings:

Posted lecture notes + your own notes should be sufficient for the theoretical understanding of the material. In addition, the following reference is required:
Thomas M. Cover and Joy A. Thomas, *Elements of Information Theory*, Wiley, 2nd edition, 2006.
- Grading:
 1. Homework: weekly, due Thursdays 5:00 pm, 25% (least grade will be dropped).
 2. Class participation: 10% (ask questions during lectures and/or office hours; get involved in discussions).
 3. Exam: 25% (\sim first week of April).
 4. Project: 40% (this will involve a written report and a presentation; more details revealed during the semester).
- Prerequisites:

Knowledge of probability theory, such as in the treatment of ECGR 4422/5122.

- Academic Integrity:
Students have the responsibility to know and observe the requirements of the [UNCC Code of Student Academic Integrity \(2001-2003 UNCC Catalog, p. 275\)](#). This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty.
- University Policy 409: Religious Accommodations for Students:
The University maintains a [list of religious and cultural holidays](#) that have particular significance to some traditions represented on campus. More on this regard can be found in the following link: <https://legal.uncc.edu/policies/up-409>.