

Information Theory

Instructor :

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Text :

There is no *required* text. A set of copyrighted class notes will be provided in installments. You can obtain the latest version of the lecture notes from

<http://shannon.cm.nctu.edu.tw/it.htm>

The following is a list of *recommended* texts:

1. *A First Course in Information Theory (Information Technology: Transmission, Processing, and Storage)*, Raymond W. Yueng, Plenum Pub Corp., May 2002.
2. *Elements of Information Theory*, Thomas M. Cover and Joy A. Thomas, John Wiley & Sons, Inc., 1991.
3. *Principles and Practices of Information Theory*, Richard E. Blahut, Addison Wesley, 1988.
4. *Information Theory and Reliable Communication*, Robert G. Gallager, 1985.
5. *Mathematical Foundations of Information Theory*, A. I. Khinchin, Dover Publications, Inc., 1957.
6. *Information Theory*, Robert B. Ash, Dover Publications, Inc., 1965.

Grading System :

Your semester grade will be contributed equally by the *midterm exam* (50 points) and a *paper study* (50 points) on a self-selected paper on *IEEE transactions on Information Theory*. The grade of the *paper study* will again be equally contributed by a pre-scheduled 15-minute oral presentation (25 points) and a written report (25 points).

A list of the key factors that affect your grade of the presentation and report is provided below.

- 50% will be emphasized on your answers to the following two questions:
 - (1) What is the problem the paper tried to solve (Problem formation)?
 - (2) What is the achievement or the conclusion of the paper?
- The remaining 50% will be contributed from:
 - (3) Technical background dated back to the time the paper was written. (Some students may select a very old paper, so some of the problems may already have a better solution than the one proposed in the paper. Hence, the technical background dated back to the time the paper was written is important.)
 - (4) The key idea (on which the solution is based) proposed in the paper.
 - (5) Something, in your opinion, needs to be further explored.
 - (6) Personal comments on the paper.
 - (7) Any potential applications.
 - (8) Any potential future extensions.
- Please note that a written report that selectively copies the sentences from the paper is not preferred. I will appreciate more to a written report that is full of “your own words.” Hence, it is suggested that you read the paper several times, dig into its details, collect the thoughts, and then put the paper aside before your starting the report writing.

Please be noted that the selected paper has to be one that is published on IEEE transactions on Information Theory. Papers published in other journals are not acceptable in this course.

Since it is an advanced course for which the objective is mainly to provide you with the necessary background on underlying communication theories, your attendance to each lecture is important. I will bring a sign-in sheet in every lecture, and you shall sign your name on it. Students who fail to show up over three times (i.e., four times, five times, etc) will flunk the course.

Lecture Schedule :

- The first lecture will be given on **February 22**.
- There will be no lecture on **March 14** since I will be in US on that day.
- You need to submit the *title, authors, page numbers, month and year* of the paper you select for reporting by the end of **March 22** lecture. I will then post the list of papers being selected on my website two days after. Students who fail to submit his/her choice in time will be deducted 5% from his/her 50-point *paper study* grade.
- Some students may not like to select a paper that others have selected, so you can switch to other paper at any time before the end of **April 26** lecture. I will constantly update the list on my website so that the most recent choices are always posted.

You can also use the month between **March 22** and **April 26** to make a trial study to see whether the paper you selected is proper to you or not.

The sequence for oral presentation will be based on some random distribution, and will be posted before **May 2**.

- There will be no lecture on **April 5**, a national holiday.
- **Midterm**, which covers the entire Volume I of the lecture note, will be held two weeks after the last slide regarding Volume I of the lecture note is delivered.
- The last lecture will be given on **May 31**.
- The oral presentation will be held on **June 7, June 14 and June 21**. Please be noted again that the presentation shall be ended within 15 minutes.
- The written report will be due on **June 24 noon**. (A box will be placed outside my office, and you shall put your report in by 12:00pm on June 24).