

Indian Institute of Technology Bombay

Department of Electrical Engineering

Handout 1
General Course Information

EE 708 Information Theory and Coding
Jan 3, 2022

Time and location: Mondays 10:35am, Tuesdays 11:35am, Thursdays 8:30am

Google Classroom: <https://classroom.google.com/c/NDQzODk5NzcyNjQ2?cjc=3jzqxe5>

Google Meet: <https://meet.google.com/ipo-oksm-pud>

Instructor:

Prof. Sibi Raj B Pillai
331D, Electrical Engineering
Timings: call 7419 and walk-in

Assistants:

1) Anil Yadav (184070002)
2) Abhishek Sarkar (194076007)
3) Tanmay Goyal (17D070041)

Keywords:

Entropy, Mutual Information, Data Compression, Channel Capacity, Multiuser networks.

Required Background:

Probability Theory (fundamentals, law of large numbers), Logical and Analytical reasoning, and an appreciation for abstraction.

Course mechanics:

Assignments + Quiz [xx marks],
Midterm exam [30 marks],
Final exam [40 marks]

Approximate Outline:

Information Measure
Source Coding: Loss-less, Rate distortion and lossy coding
Channel Coding: Capacity, Channels with state, Compound Channels
Information Theory and Wireless communication
Network Information Theory: Multiple Access and Broadcast

Textbook: Feel free to choose one among the many good books listed below. The book by Cover and Thomas [2] is widely recommended for undergraduate/postgraduate courses in engineering disciplines. Selected slides/lecture-notes will be posted on the website .

Reference Material:

1. C. E. Shannon, *A Mathematical Theory of Communication*, Bell Sys. Tech Journ, 1948. (available online)
2. T. M. Cover and J. A. Thomas, *Elements of Information Theory*, Wiley 1991. (paperback Indian edition available)
3. R. G. Gallager, *Information Theory and Reliable Communication*, Wiley, 1968.
4. A. ElGamal and Y. H. Kim, *Network Information Theory*, Cambridge, 2011.
5. I. Csiszar and J. Korner, *Information Theory*, Hungarian Acad. Sciences 1983.
6. R. Ash, *Information Theory*, Dover 1960.

Further Reading/Visuals:

1. Gallager, R.G. *Claude E. Shannon: a retrospective on his life, work, and impact*, Information Theory, IEEE Trans on: July 2001, Pages: 2681 - 2695.
2. Renyi, A. *A Diary on Information Theory*, Akademiai Kiado, 1967.
3. Videos at techchannel.att.com