

Indian Institute of Technology Bombay

Department of Electrical Engineering

Handout 1

General Course Information

EE 708 Information Theory and Coding

Jan 5, 2018

Time and location: Tuesdays 5:30pm and Fridays 5:30pm at Room: EEG-102

Web page: <http://www.ee.iitb.ac.in/~bsraj/courses/ee708/>

Instructor:

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

Assistants:

1) Haseen Rahman (144070031@iitb)
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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 of abstraction.

Course mechanics:

Assignments + Paper Reading + Quiz [30 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
New Applications: Biology, Energy Harvesting, Statistical Physics

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