

Indian Institute of Technology Bombay

Department of Electrical Engineering

Handout 1

General Course Information

EE 703 Digital Message Transmission

July 29, 2019

Schedule:

Monday 8:30-9:30am, Tuesday 9:30-10:30am, Thursday 10:30-11:30am at LT-201.

Web page: <http://www.ee.iitb.ac.in/~bsraj/courses/ee703/>

Instructor:

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

Assistants:

1. R Aditya Narayan (15D070062@iitb)
2. Anil Kumar (18407002@iitb)

Required Background:

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

Course mechanics:

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

“ PhD students will have to give an oral exam on a suggested topic (20%)”

Approximate Outline:

Communication Systems: Current Examples, Baseband System Modeling, Bandwidth, Passband Transmission, Power Spectral density, Spectral efficiency, MIMO.

Detection and Estimation: MAP/ML Decoding, Neyman-Pearson Criterion, Error probability in the presence of Gaussian noise.

Equalization for ISI: OFDM, MIMO-OFDM, Viterbi Equalization.

Error Correction: Convolutional and Turbo codes, Polar codes, Coded modulation.

Synchronization: Techniques for clock and timing recovery, GPS example.

New Topics: Millimeter wave communication, Deep learning in communication.

References:

1. J. Wozencraft and I. Jacobs, *Principles of Communication Engg*, Wiley 1965.
2. U. Madhow, *Digital Communication*, Cambridge University Press 2008.
3. R. G. Gallager, *Principles of Digital Communication*, Cambridge 2008.
4. J. G. Proakis, *Digital Communication*, McGraw-Hill, 2008 (5th edn).
5. A. Lapidoth, *Digital Communication*, Cambridge 2009.

Instructions:

- Assignments will be posted on the website, and will be intimated via moodle.
 - The package GNURADIO will be used for class/assignments, install it from gnuradio.org.
 - Course notes for some lectures will be made available, please do not print the notes.
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