



E2-242 Jan. 3:0

Multiuser Detection

Instructor

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Teaching Assistant

Email:

Department: Department of ECE

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

This course is for M.Tech/Ph.D students. This course will give exposure and in-depth treatment to detection/receiver techniques suited for modern multiuser communication systems.

Prerequisites

A course on digital communication is preferred.

Syllabus

- * Direct Sequence spread spectrum, spreading sequences and their correlation functions, near-far effect in DS-SS, error probability for DS-SS on AWGN channels.
- * Multiuser Detection – MF detector, decorrelating detector, MMSE detector. Successive interference canceller, parallel interference canceller (PIC), linear PIC. Performance analysis of multiuser detectors and interference cancellers. Multicarrier CDMA.
- * Low complexity multiuser detectors for MIMO systems. Channel hardening in large-scale MIMO systems. Multiuser/MIMO detection using belief propagation, probabilistic data association, local search, meta-heuristics, and Markov chain Monte carlo techniques. Spatial modulation and detection in multiuser

MIMO systems.

Course outcomes

The students would learn modeling of various multiuser communication systems as linear vector channels, learn optimum detection, linear and non-linear detection algorithms, and multiuser/MIMO signal detection algorithms based on local search, meta-heuristics, message passing, and Markov Chain Monte Carlo techniques.

Grading policy

2 tests (25 marks each)

1 final exam (50 marks)

Total: 100 marks

Assignments

Resources

* Text Books / Reference Material

- Sergio Verdu, Multiuser Detection, Cambridge University Press, 1998.
- A. Chockalingam and B. Sundar Rajan, Large MIMO Systems, Cambridge University Press, 2014.
- Andrew J. Viterbi, CDMA Systems: Principles of Spread Spectrum Communication, Addison Wesley, 1995.
- Research papers in journals and conferences.