Digital Communications (ELC 623)

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Postgraduate Program

Outline

Introduction: Why ELC 623?

Digital Communications

Activity: Discussion

Introduction: ILOs of ELC 623?

By the end of this course, the student should be able to:

- Describe the channel imperfections
- Study different digital modulation techniques
- Know different methods to combat the channel imperfections
- Analyse communication systems
- Choose methods to improve the performance of communication systems
- Design communication systems using software tools
- Present a research paper
- Write a report

Instructors

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How is the ELC 623 organized?

ELC 623

The course is divided into the following topics:

1. Statistical decision theory/M-ary signal detection
2. Channel capacity and coding
3. Channel characteristics (models)
4. Communication over band-limited linear channels
5. Communication over fading channels
6. Advanced wireless communication systems

Introduction: Grading System

Item	**Grade**
Projects	15%
Assignments/Quizzes	15%
Final Exam	70%
Total	100%

Table: Grading System - ELC 623

Introduction: Course Contents

1. **Introduction to statistical decision theory**
   1. Basics of statistical detection
   2. AWGN model characteristics
   3. Optimum receivers for deterministic signals in AWGN
   4. Extended results for M-ary signaling
2. **Introduction to channel capacity and coding**
   1. Introduction to coding
   2. Introduction to capacity of AWGN channel - Shannon capacity
   3. Capacity of AWGN channel with M-ary signaling
   4. Spectral efficiency and different trade-off metrics

Introduction: Course Contents

3. **Introduction to channel characteristics and models**
    1. Band-limited linear models
    2. Characteristics of fading channels
4. **Communication over band-limited linear channels**
    1. Optimum receivers
    2. Different equalizers
5. **Communication over fading channels**
    1. Optimum receivers
    2. Different equalizers
    3. Diversity techniques
6. **Introduction to advanced communication** systems
    1. MIMO Systems
    2. Multi-User Systems
    3. Wireless Cooperative Systems

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T. Rappaport,
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L. Couch,
Digital and Analog Communication Systems, 6th Edition.


S. Kay,
Fundamentals of Statistical Signal Processing: Detection Theory.


A. Paulraj, R. Nabar and D. Gore,
Introduction to Space-Time Wireless Communications.

Thank You

Questions ?

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