

Principles of Communications



Prof. Yaohui Jin

Lecture 1, 2008-09-02

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Staff

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- If you wish to discuss with TA or me, please send an email in advance.

Course Material

■ Text books:

- “Digital and Analog Communication Systems” (Sixth Edition) by Leon W. Couch II, Science Press, ISBN 0-13-081223-4

■ Additional recommended:

- “Fundamentals of Communication Systems” by J. G. Proakis & M. Salehi
- 中译本：《通信系统原理》，李锵等译，电子工业出版社，TN914/52-2

■ Homepage

- <http://front.sjtu.edu.cn/~jinyh/course/>

Objective

- Communication systems are designed to transmit information.
- Communication system designers have four main concerns:
 - Selection of the information-bearing waveform
 - Bandwidth and power of the waveform
 - Effect of system noise on the received information
 - Cost of the system
- After this course, the student has to understand:
 - Components of a communication system and draw a block diagram;
 - Principles and techniques of modulation, transmission and coding;
 - Knowledge of current communication systems and their performance analysis.

Suggestion

- The performance analysis for all the communication systems are based on prerequisite courses “signals and systems” and “Random processes”;
- The course focuses on the design of system instead of concrete circuits and implementation. Pay more attention to essential concepts and physical models
- Exercises and project. Consolidate and strengthen the understanding of basic concepts.
- Practice. Subsequent experimental course. Visiting, Understand cutting-through communication technologies
- English. Instruction, Q&A, exam.

Schedule

- 1 Preparatory Lecture
- 26 Formal Lectures
- 1 Mid-Term Test (in about 7th week)
- 3 Tutorials (TA)
- 4 Project Presentations
- 1 Visiting (Do not occupy the formal lectures)
 - State Key Lab of Optical Communication System and Network
- 1 Floating

Tentative Syllabus

- Introduction (1)
- Signal, Random Process and Spectra (4)
- Analog Modulation Systems (5)
- Baseband Digital System (4)
- Digital Bandpass Systems (6)
- Information Theory and Coding (3)
- Advanced Topics (2)

Project

- Contemporary communication systems and performance analysis of their physical layer

There will be one web-based project which will be performed by groups of 3 students. The project results will be a web page by all group members and an in-class presentation by the leader.

- “New” communication techniques and systems:

WDM, PON, FSO, Gigabit Ethernet, ADSL, GSM, CDMA, Bluetooth, WiFi, WiMax, GPS, PHS, CATV, HDTV, 3G, VSAT, etc.

- Phase 1: Gathering Information, DUE on Sept. 28

Submit your combination and the selected topic to TA

- Phase 2: Investigation and Simulation DUE on Dec. 11

Submit the zipped web files.

- Phase 3: Presentation

- The web pages should include:

System overview, frequency range and data rates, and other capabilities
How is information sent and encoded? description of simulation and where you got it or if you built it yourself. description of what you tested and how results, table, chart, compare with the theoretical performance, as well as conclusions.

Grading Policies

- Homework 20%
 - Assigned after each lecture
 - Due following Friday
 - 5-point evaluation for each homework
 - Loss 1 point one week late
 - Reject two or more weeks late
- Project 20%
 - $\text{Score} = (20 + A) * B * C + D$
 - $A = 5$, if you are presenter
 - $B \in [0, 1]$ is the average evaluation by other group members
 - $C \in [0, 1]$ is the average evaluation by staffs
 - $D \in [0, 20]$, if you ask good questions during presentation
- Mid-term Test 20%
- Final Exam 40%

Score Distribution Last Year

