



RF Devices and Transceiver Principles

Fall 2008

Course description

RF transceiver architecture, wireless link budget calculation, wireless communication systems considerations, IQ modulator/demodulator, noise figure, nonlinear distortions, low noise amplifier, mixer, frequency synthesizer, power amplifier and its linearization techniques.

Class work = 3 unit

Textbook

RF Microelectronics. By Behzad Razavi. Prentice Hall, 1998

Reference

1. **The Design of CMOS Radio Frequency Integrated Circuits** By: Thomas H. Lee, Cambridge University Press 1998
2. **Planar Microwave Engineering** by Thomas H. Lee, Cambridge University Press 2004
3. **Digital and Analog Communication System 5th Edition**, by L Couch III, Prentice Hall, 1997
4. **Digital Communications 2nd Edition**, by B Sklar, Prentice Hall 2001,

Prerequisites by Topics:

- 1- Basic Electric Circuit Concepts
- 2- Basic Understandings on Electromagnetics and Microwave
- 3- Basic Understandings on Digital Communications

Course Objectives:

- 1- To learn fundamentals of radio frequency transmitter and receiver architecture and radio frequency integrated circuits design and analysis techniques.
- 2- To acquire basic understanding of various radio frequency circuit blocks used to build power electronics system.
- 3- To acquire the ability to select and design suitable modules in order to meet requirements of industrial applications.
- 4- To gain hands-on experience in designing, testing, and debugging radio frequency integrated circuits in Agilent ADS systems. (It depends on the availability of the facilities at this point.)

Tentative Schedule

Table 1: A tentative schedule about instruction topics, quiz and homework



Week	Topics
1	Introduction and link budget calculation
2	Modulation and Detection (1)
3	Modulation and Detection (2)
4	Multiple Access Technology
5	CDMA + OFDM
6	Noise Figure
7	Nonlinear Distortion
8	Transceiver Architecture (1)
9	Transceiver Architecture (2)
10	Mid Term
11	CMOS and BJT RF modeling
12	Passives
13	Impedance Matching
14	LNA design
15	Mixer design

Grading policy

Quiz has 30 points, midterm has 30 points, and final project plus 15 minutes presentation has 40 points. The total is 100 points for the course work. The letter grade is based on the following table.

A	A-	B+	B	B-
>90%	85% ~ 89%	80% ~ 84%	75% ~ 79%	70% ~ 74%

Instructor

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School of Engineering

Office Hours:

Monday: 11:10 am-12:40 pm; Wednesday: 11:10 am-12:40 pm; at SCI 213C

Others by appointment.

Rules

1. No make up exams will be given without valid unavoidable reason with valid documented proof from a doctor, police officer, Court, etc.
2. If any student is **caught cheating as specified by the university handbook**, I will **report it to the department and strongly recommend University policy** including a **final grade of "F"** in the course.