Application of ABET CRITERION (2202)

King Saud University
Electrical Engineering Department
EE 414: Electronic Circuits For Communications
Second Semester 1425/26 (2004/2005)

Instructor: Dr. Mohamed A. ABOU ELELA
Office 2C 91
Phone: 467-5615
E-mail: maboelela@ksu.edu.sa

Textbook: "Electronic Communication Techniques" By Paul H. Young
Published by Prentice -Hall Inc., New Jersey, 2000.

Description: Concepts of Communication circuits and system operation, Analysis and Design of radio frequency amplifiers, Circuits for: Oscillator, Mixers, Detectors, AM & FM Modulators, Phase locked Loop and frequency synthesizers.

Prerequisite: EE 315, EE320

Co requisites: --

Course Objectives: Learn how to analyze and design electronic circuits used in building communication systems. Relating system parameters to circuit parameters in order to analyze and circuit design of standard communication system.

Topics Covered: Circuit design and analysis of tuned amplifiers, RF oscillators, mixers,

Class B and Class C power amplifiers, AM modulators/detectors, FM/PM modulators / detectors, PLL and frequency synthesizers.

Class/Tutorial Schedule: Class is held two times per week in 50-minute lecture sessions. There is also a 50-minute weekly tutorial associated with this course.

Professional Component Contributions: Students learn the design methodology of communication circuits. They have already got knowledge about communication systems, however the system implementation is the challenge they will face when going into the real world. Throughout this course the student study the basic circuit used to build a given communication system, methods for circuit analysis and design. The circuit components as well as circuit parameters are parts of the design and determine the overall circuit behavior. The assembly of several circuits to build a system is a main objective in this course. The student learns how to derive the transfer characteristic of a given circuit and extract the circuit parameters which affect the overall system parameters. For example controlling the modulation index m (communication parameter) of an AM transmitter is achieved by simply varying the dc bias in the modulator circuit (circuit parameter).This course also help student to build some hardware in his graduation project.

Relationship to Program Objectives:

Objective A: By teaching students how to analyze his designed circuits and relate it to systems, this course supports the objective of producing graduates with a strong foundation in basic science.

Objective B: By teaching students how to deal with high frequency circuits and networks and solve the problems associated with signal transmission, the course helps in the department's production of students with a strong foundation in electrical engineering.

Objective C: By encouraging students to participate in class, acquire basic group dynamics skills and provide personal assessments on alternative solutions to operating problems and discuss such alternatives among themselves, this course supports the objective of producing graduates with good communication skills.

Objective D: By encouraging students to learn pertinent ethical and professional standards in dealing with real-life systems and acquire mutual respect for diverse opinions relating to solving system and circuit design problems, this course supports the objective of providing graduates with a broad-based education so that they can appreciate diversity of opinion, better understand ethical issues and develop a more global perspective of the profession.

Objective E: By teaching students how to integrate his circuits into a complete system, this course supports the objective of producing graduates with the relevant engineering design experience.

Evaluation: There are graded home works, two 2-hour mid-term exams and a three-hour final exam. The course grade distribution is as follows:

20% Attendance, in-class quizzes and tutorial home-work
40% Two Midterm Exams
40% Final Examination

Challenges and Actions Taken to Improve the Course: Some basic background and prerequisite-type material are often reviewed during this course, notably those related to recent IC,s and design tools. Some additional background material is often handed to students to introduce digital techniques in communication circuits.

Course schedule

Lecture	*Description*
1	Series and parallel resonance circuit Q and BW
2	High frequency model of BJT and FET
3	Small signal RF amplifier analysis
4	RF amplifier design
5	RF amplifier design (continued)
6	Coupling tuned Circuit & effect of coupling coefficient
7	Double tuned amplifier analysis .
8	Theory of Oscillations and positive feedback
9	LC oscillators : Hartly , Colpitts, Clap
10	Analysis of Hartly Oscillator
11	Analysis of Colpitts and Clap oscillators
12	Tuned input / Tuned Output oscillator
13	Stability and Crystal oscillators

14	**LNA and Mixers**
15	**Mixer Circuits analysis**
16	**Mixer Circuit design**
17	**IF amplifier and receiver alignment**
18	**Class C power amplifier**
19	**AM modulator Circuit**
20	**AM demodulation technique**
21	**AM demodulation circuits : Envelop detector analysis**
22	**AGC circuit and function**
23	**FM modulators and VCO**
24	**FM demodulator : slop /ratio / phase discriminator**
25	**PLL system and applications**
26	**PLL analysis and parameters**
27	**PLL for FM and AM demodulation**
28	**PLL frequency synthesizer**
29	**Introduction to Digital Communication Circuits : Sampling circuit , TDM circuits, Codec circuits**
30	**Review .**