KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF ELECTRICAL ENGINEERING

EE 418

INTRODUCTION TO SATELLITE COMMUNICATIONS

First SEMESTER 051 (2005/06)

Course Instructor: Dr. Mahmoud M. Dawoud
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Office Location : 14/277
Office Hours : 10:00 - 11:00 am **S. M. W.**

Or by appointment.

Course Description:

EE 418 - Introduction to Satellite Communications (3-0-3)

Overview of satellite systems. Orbits and launching methods. Communication satellite subsystems. Modulation schemes and satellite multiple access (FDMA, TDMA, CDMA, and SDMA). Space link analysis. Satellite antennas. Applications of satellites.

Prerequisites : EE 340 and EE 370.

Distribution of Marks:

Attendance, assignments, and quizzes	**20 %**
Two Major Examinations	**30 %**
Projects	**20 %**
Final Examination	**30 %**

Examinations:

Examination I	Monday	17 October, 2005.
Examination II	Wednesday	14 December, 2005.

Course Breakdown

Week	Date	Lecture Topics	Text
1	September 10-14	Introduction, background, basic sat. system, applications and future trends.	Chapter 1
2	September 17-21	Satellite orbits, Kepler's & Newton's laws of sat. motion, coordinate systems, orbital parameters, sat. path in space.	Chapter 2
3	September 24-28	Look angle determination	Hand-out
4	October 1-5	Geostationary sats., launching of geostationary sats., frequency & propagation considerations, ITU regulations, tropospheric & ionospheric effects.	Chapter 3
5	October 8-12	Communication link design, Antenna basics, transmission formula.	Chapter 4(1-3) & Hand-out
6	October 15-19	Noise, thermal, noise figure & temperature. Antenna noise temp. and system noise temp. Interference.	Chapter 4(4)
7	October 22-26	Link design considerations, up & down links, examples of link design.	Chapter 4(5) & Hand-out
Eid Al-Fitr Vacation			
8	November 12-16	Modulation, system consideration, linear schemes, FM, Digital modulation schemes.	Chapter 5(1-5)
9	November 19-23	Digital modulation schemes, selection of modulation, coding, classes of codes.	Chapter 5(5-6), Chapter 6(1-2)
10	November 26-30	Multiple Access Techniques, FDMA, multiple & single channel per carrier, TDMA.	Chapter 8(1-4)
11	December 3-7	CDMA, frequency hopped spread spectrum, Access protocols for data traffic, ALOHA & slotted ALOHA schemes, examples.	Chapter 8(5-7)
12	December 10-14	Communication satellite sub-systems, payload (repeaters and antennas), bus (Attitude & control, Telemetry, tracking & command and power subsystems).	Chapter 9
13	December 17-21	Earth stations, design considerations, general configuration, antenna system, antenna mounts, LNA and HPA.	Chapter 10(1-3)
14	December 24-28	Earth station characteristics, Fixed Satellite Service (FSS) earth stations, large & small (VSAT), Mobile Satellite Service earth stations, large & small.	Chapter 10(4)
15	December 31 - January 4	Future trends and applications.	Chapter 11