

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF ELECTRICAL ENGINEERING

EE 418

INTRODUCTION TO SATELLITE COMMUNICATIONS

First SEMESTER 091 (2009/10)

Course Instructor: Dr. Mahmoud M. Dawoud
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Office Location : 59/2070
Office Hours : 10:00 - 10:50 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.

Textbook

Satellite Communications Pratt, Bostian & Allnutt, 2nd Edition, Wiley, 2003

Distribution of Marks:

Attendance, assignments, and quizzes	20 % (3 % – 5 % – 12 %)
Two Major Examinations	30 %
Projects	20 %
Final Examination	30 %

Examinations:

Examination I	Monday	9 November, 2009.
Examination II	Monday	4 January, 2010.

Course Breakdown

Week	Date	Lecture Topics	Text
1	October 3-7	Introduction, background, basic sat. system, applications and future trends.	Chapter 1
2	October 10-14	Satellite orbits, Kepler's & Newton's laws of sat. motion, coordinate systems,	Chapter 2
3	October 17-21	orbital parameters, sat. path in space.	Chapter 2
4	October 24-28	Look angle determination	Chapter 2, Hand-out
5	October 31-November 4	Frequency & propagation considerations, ITU regulations, tropospheric & ionospheric effects.	Chapter 8, Hand-out
6	November 7-11	Antenna basics	Hand out
7	November 14-18	Satellite link design, basic transmission theory.	Chapter 4(1-2) & Hand-out
Eid Al-Adha Vacation			
8	December 5-9	Noise, thermal, noise figure & temperature. Antenna noise temp. and system noise temp. Interference.	Chapter 4(3)
9	December 12-16	Design of down links and direct broadcast TV	Chapter 4(5, 6) & Hand-out
10	December 19-23	Link design considerations, up & down links, examples of link design.	Chapter 4(7, 6)
11	December 26-30	Modulation, system consideration, linear schemes, FM, Digital modulation schemes.	Chapter 5(1-3)
12	January 2-6	Digital modulation schemes, selection of modulation,	Chapter 5(4-5),
13	January 9-13	Multiple Access Techniques, FDMA, multiple & single channel per carrier, TDMA.	Chapter 6(1-3)
14	January 16-20	CDMA, frequency hopped spread spectrum, Access protocols for data traffic, ALOHA & slotted ALOHA schemes, examples.	Chapter 6(8)
15	January 23-27	. Communication satellite sub-systems, payload (repeaters and antennas), bus (Attitude & control, Telemetry, tracking & command and power subsystems).	Chapter 3