KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF ELECTRICAL ENGINEERING

EE 672

SATELLITE COMMUNICATIONS

Second SEMESTER 062 (2006/07)

Course Instructor: Dr. Mahmoud M. Dawoud
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Office Location : 59/2070
Office Hours : 16:00 - 16:50 **S. M.**

Or by appointment.

Course Description:

EE 672 - Satellite Communications (3-0-3)

Introduction to satellite communication systems. Satellite orbits. The satellite channel. Satellite links. Earth stations. Modulation and multiplexing. Digital modulation. Multiple access and demand assignment. Satellite cross links. VSAT and mobile satellite systems.

Prerequisite: EE 571

Test Book:

Satellite Communications, Prat, Bostian, and Allnut, Second edition, John Wiley & Sons. 2003,

Reference Books:

1. Satellite Communication Systems, by Moral and Bousquet, John Wiley & Sons. 2002.
2. Satellite Communications, 4th Edition, by Dennis Roddy .
3. ITU Handbook on Satellite Communications.
4. The Satellite Communications Applications Handbook, by Bruce Albert.
5. Introduction to Satellite Communications, by Bruce Albert.
6. Satellite Communications Systems, by M. Richharia, 1999.
7. Satellite Communications Engineering, by M. Kolawole and K. Kolawole, 2002.
8. The Satellite Communications Ground Segment and Earth Station Handbook, by Bruce Albert, 2001.

Distribution of Marks:

Attendance, assignments, and quizzes	**20 % (3 % – 7 % – 10 %)**
Two Major Examinations	**30 %**
Projects	**20 %**
Final Examination	**30 %**

Examinations:

Examination I	Monday	17 March, 2008.
Examination II	Monday	5 May, 2007.

Course Breakdown

Week	Date	Lecture Topics	
1	February 16-20	Introduction, background, basic sat. system, Milestones.	
2	February 23-27	Satellite orbits, Kepler's & Newton's laws of sat. motion, coordinate systems, orbital parameters, sat. path in space.	
3	March 1-5	Look angle determination	
4	March 8-12	Geostationary sats., launching of geostationary sats., frequency & propagation considerations, ITU regulations, tropospheric & ionospheric effects.	
5	March 15-19	Communication link design, Antenna basics, transmission formula.	
6	March 22-26	Noise, thermal, noise figure & temperature. Antenna noise temp. and system noise temp. Interference.	
7	March 29-April 2	Link design considerations, up & down links, examples of link design.	
8	April 5-9	Modulation, system consideration, linear schemes, FM, Digital modulation schemes.	
April 12 – 16 Midterm Vacation			
9	April 19-23	Digital modulation schemes, selection of modulation for the different satellite services.	
10	April 26-30	Multiple Access Techniques, FDMA, multiple & single channel per carrier, TDMA.	

11	May 3-7	CDMA, frequency hopped spread spectrum, Access protocols for data traffic, ALOHA & slotted ALOHA schemes, examples.	
12	May10-14	Communication satellite sub-systems, payload (repeaters and antennas), bus (Attitude & control, Telemetry, tracking & command and power subsystems).	
13	May 17-21	Earth stations, design considerations, general configuration, antenna system, antenna mounts, LNA and HPA.	
14	May 24-28	Earth station characteristics, Fixed Satellite Service (FSS) earth stations, large & small (VSAT), Mobile Satellite Service earth stations, large & small.	
15	May 31-June 4	Future trends and applications.	