

EE 672

SATELLITE COMMUNICATIONS

Second SEMESTER 062 (2006/07)

Course Instructor: Dr. Mahmoud M. Dawoud
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Office Location : 59/2094
Office Hours : 17:30 - 18:30 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	25 %
Projects	25 %
Final Examination	30 %

Examinations:

Examination I	Monday	26 March, 2007.
Examination II	Monday	14 May, 2007.

Course Breakdown

Week	Date	Lecture Topics	
1	February 17-21	Introduction, background, basic sat. system, Milestones.	
2	February 24-28	Satellite orbits, Kepler's & Newton's laws of sat. motion, coordinate systems, orbital parameters, sat. path in space.	
3	March 3-7	Look angle determination	
4	March 10-14	Geostationary sats., launching of geostationary sats., frequency & propagation considerations, ITU regulations, tropospheric & ionospheric effects.	
5	March 17-21	Communication link design, Antenna basics, transmission formula.	
6	March 24-28	Noise, thermal, noise figure & temperature. Antenna noise temp. and system noise temp. Interference.	
7	March 31-April 4	Link design considerations, up & down links, examples of link design.	
8	April 7-11	Modulation, system consideration, linear schemes, FM, Digital modulation schemes.	
Midterm Break Sat.-Sun. April 14-15			
9	April 16-18	Digital modulation schemes, selection of modulation for the different satellite services.	
10	April 21-25	Multiple Access Techniques, FDMA, multiple & single channel per carrier, TDMA.	

11	April 28-May 2	CDMA, frequency hopped spread spectrum, Access protocols for data traffic, ALOHA & slotted ALOHA schemes, examples.	
12	May 5-9	Communication satellite sub-systems, payload (repeaters and antennas), bus (Attitude & control, Telemetry, tracking & command and power subsystems).	
13	May 12-16	Earth stations, design considerations, general configuration, antenna system, antenna mounts, LNA and HPA.	
14	May 19-23	Earth station characteristics, Fixed Satellite Service (FSS) earth stations, large & small (VSAT), Mobile Satellite Service earth stations, large & small.	
15	May 26-30	Future trends and applications.	