323 CNE Course Syllabus

Course Code	323CNE
Course Name	Satellite Communications
Credit Hours	3
Contact Hours	4
Instructor Name	Dr. Sahmimul Qamar, Engr. syed aftab alam

Text Book (title, author, and year)
Satellite Communications, Deniss Roddy, 4e, 2006. Satellite communication applications handbook, Bruce R. Albert, 2e, 2004.

Specific Course Information	
Catalog Description	This course gives fundamentals and the techniques for the design and analysis of satellite communication systems, basics of Satellite Networking, Satellite Application Types, Satellite Selection and System Implementation, Communications Payload Configurations, Spacecraft Bus Considerations, and Contingency Planning.
Prerequisites	CNE 221
Co-requisites	NIL
Required/Elective	required

Course Learning Outcomes	
1	To outline the mathematical and physical concepts used for link budget modeling and calculations.
2	To explain orbital diagram in satellite communication and apply knowledge of mathematics for link budget modelling.
3	To design and conduct experiments for satellite communication link budget.
4	To design a transponder for satellite system and estimate the optimum design strategy for it.
5	To recognize the impact of modern satellite networks on economic and society.
6	To operate various simulation tools such as MATLAB in order to perform uplink and downlink calculations.
7	To develop professional experimental skills for operating earth station and satellite.
8	To prepare graduates for oral presentation through small group projects about modern satellite communications techniques.

Mapping course LOs to the SLO.												
Course LOs #	Student Learning Outcomes											
	a1	a2	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
1	√											
2			√									
3				√								
4				√	√							
5						√						
6							√					
7									√			
8												√

List of Theory Topics

Evolution of Satellite Technology and Applications: Satellite Network Fundamentals, Satellite Application Types. Satellite Links, Multiple Access Methods, and Frequency Bands: Design of the Satellite Link, Multiple Access Systems, Frequency Band Trade-Offs,
Issues in Space Segment and Satellite Implementation: Satellite Selection and System Implementation, Communications Payload Configurations, Spacecraft Bus Considerations, Contingency Planning,
Two-Way Interactive Applications for Fixed and Mobile Users: VSAT Networks for Interactive Applications, Interactive Data Networks, VSAT Star Networks. Technical Aspects of VSAT Networks: Capacity Planning and Sizing, Sizing of VSAT Networks, Hub Implementations, **Fixed Telephony Satellite Networks:** Role of Satellites in Telephone Services, Domestic, Regional, and International Services, Estimating Telephone Traffic, VoIP, Mobile Satellite Service (GEO and Non-GEO), Foundation of the Mobile Satellite Service,

List of Lab Experiments

1. Design of a Satellite link
2. Design of a Digital Satellite Receiver
3. Analysis of a GPS Receiver Analysis of Modulation Techniques for LEO
4. Satellite Downlink Communications setup and verification
5. Analysis of Data services in INMARSAT communication system
6. Analysis of Direct Sequence Spread Spectrum (DSSS) Technique in satellite communication
7. Analysis of Frequency Hopping Spread Spectrum (FHSS) Technique in satellite communication
8. Evaluation of SNR in Satellite Links
9. Analysis of Link Budget Equation