

Course Title: Microwave Devices and Systems

Course Code: ETEG 408

Credit Hours: 3

Course Description:

This course focuses on microwave technology from a systems viewpoint

Course Contents:

Unit 1: Microwave Communication Basics

The frequency spectrum; Communication using microwaves; Microwave devices, Waveguides, Cavity resonators, Tunnel and gunn diodes, Parametric amplifier, Traveling wave tube, Circulator, Strip-line, Micro-strip, SAW devices, Parabolic reflector, Magnetron, Klystron

Unit 2: Microwave Radio Relay Systems

Microwave link repeater system, Design considerations, Fresnel zones, Refractivity, FDM system - CCITT recommendations, Power requirements, Fading- CCITT recommendations

Unit 3: Satellite and Space Communication

Satellite orbital dynamics, Kepler's laws, Orbits, Range, Doppler shift, Link budgets, Carrier to noise ratio, Satellite specification, Applications

Unit 4: Radar Systems

Pulse radar, The radar equation, Noise, Radar cross section, Factors affecting pulse requirements, antennas, Displays, Doppler radar, System block diagrams, Pulse radar, CW Doppler, FM CW radar, Search and tracking radar, Primary and secondary radar, Moving target indicator (MTI)

Unit 5: Microwave Navigation Systems

Overview of common systems, Satellite systems; GPS, GLONASS, VOR and related systems

Unit 6: Case Studies

Examples of microwave systems used in Nepal- e.g. airport radar, VSAT, Mobile phones

References:

1. John Griffiths, *Radio Wave Propagation and Antennas*, PHI
2. George Kennedy, *Electronic Communication Systems (3rd Ed)*, Tata McGraw Hill
3. J. J. Spilker, *Digital Communications by Satellite*, Prentice Hall