

INTRODUCTION TO SATELLITE ENGINEERING

EEEN 567 –SATELLITE ENGINEERING

Friday, 05 September 2025

EEEN 567 SYLLABUS: PURPOSE

Course Purpose:

This course provides an introduction to the fundamental principles and technologies of satellite communication systems.

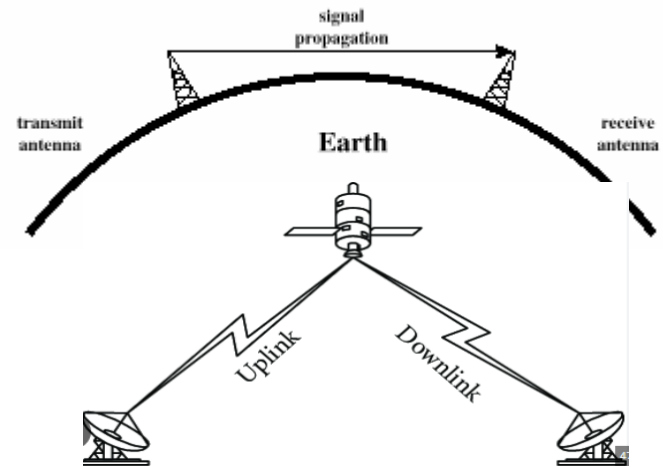
EEEN 567 SYLLABUS: LEARNING OUTCOMES

By the end of this course unit, the student should be able to:

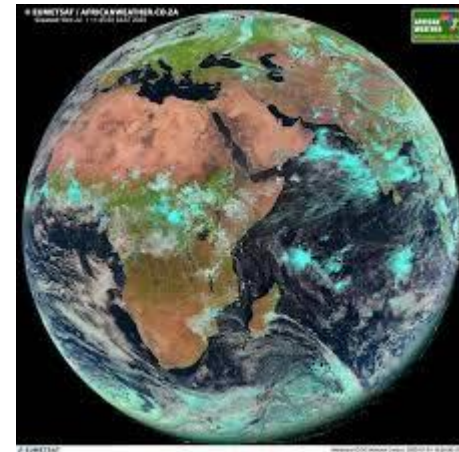
1. Grasp the fundamental concepts and principles of satellite communication.
2. Analyze satellite orbits and understand their impact on communication system performance.
3. Design and evaluate satellite communication systems, considering architecture, link budget, and modulation techniques.
4. Conduct link budget analysis for satellite communication, accounting for various factors influencing signal quality.
5. Implement and analyze communication protocols used in satellite systems for error correction, encryption, and data compression.
6. Operate and manage earth stations and ground segment components in satellite communication networks.
7. Stay abreast of emerging technologies and applications in satellite communications.

WHY IS THIS COURSE IMPORTANT? /2-1

1. Satellite systems allow us to communicate at microwave frequencies over the radio horizon.

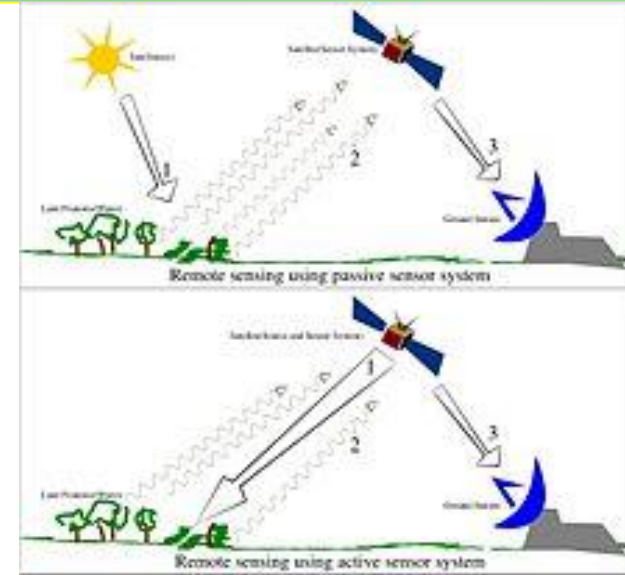


2. Weather Satellite systems allow us to monitor and predict weather conditions.



WHY IS THIS COURSE IMPORTANT? /2-2

1. **Satellite systems** support remote sensing applications for surface mounted and underground objects/conditions.



2. **Satellites** are used as recovery systems when fibre communication system fail or are under maintenance.

EEEN 567 SYLLABUS /01

1. Introduction to Satellite

Communications: Historical overview of satellite communication, Role of satellites in modern telecommunications, Satellite communication applications and use cases.

2. Orbital Mechanics and Satellite Orbits:

Basic principles of orbital mechanics, Types of satellite orbits (LEO, MEO, GEO), Impact of orbital parameters on communication system design.

- 3. Satellite System Architecture:** Satellite design and construction, Payload configuration and functionality, Ground station components and satellite operations.
- 4. Link Budget Analysis:** Components of a link budget, Signal propagation considerations, Antenna gain, system noise, and power budget analysis.

5. **Modulation and Multiple Access**

Techniques: Modulation schemes in satellite communication, Multiple access techniques (FDMA, TDMA, CDMA), Spread spectrum and advanced modulation techniques

6. **Satellite Communication Protocols:**

Error correction techniques in satellite communication, Encryption methods for secure communication, Data compression protocols.

- 7. Earth Stations and Ground Segment:** Design and operation of earth stations, Ground segment components and functions, Satellite communication network architecture.
- 8. Emerging Technologies and Applications:** Advances in satellite design and technology, Inter-satellite communication and satellite constellations, Small satellite systems and their applications.

9. Regulatory and Legal

Considerations: International regulations governing satellite communication, Licensing and frequency allocation, Legal considerations and spectrum management.

10. Case Studies and Project Work:

Analysis of real-world satellite communication systems, Project-based assignments involving system design and optimization, Case studies on successful satellite communication deployments

COURSE TEXTBOOKS


1. "Satellite Communications" by Timothy Pratt, Charles W. Bostian, and Jeremy E. Allnut
2. "Communication Satellite Antennas: System Architecture, Technology, and Evaluation" by Robert Dybdal
3. "Satellite Communications Systems: Systems, Techniques and Technology" by Gerard Maral and Michel Bousquet
4. "Understanding Satellite Communications" by Elbert, Bruce R.

COURSE WEBSITE



EEEN567.ELIMU.COM

Course website for ECE 514E-Radiation x +

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EGERTON UNIVERSITY
EEEN 567 - SATELLITE ENGINEERING
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	<p>EEEN 567 - Satellite Engineering Curriculum</p>
	<p>Glossary of Terms Used in Satellite Engineering</p>