

**Course Title**                      **Wireless and Radio Engineering – 7CS005**

**Duration**                              **5 Days**

### Course Overview

The course explores several wireless technologies including Tetra/PMR, Microwave and Satellite communications. It delves deeply into the end to end 2G-3G mobile/cellular network and various access methods such as CDMA/TDMA/FDMA/TDD and FDD. Transmitter, receivers and antenna are covered in detail including base stations, distributed antenna systems and small cell technology. It is the first module in achieving a Post Graduate Certificate in Wireless Engineering and is considered a research degree.

### Delivery Method

	Y/N		Y/N		Y/N		Y/N		Y/N
Classroom	y	Tutor Led	y	Webinar		Self-paced labs		Facilitated labs	y
Demonstrations	y	Case studies		Syndicate exercises	y	Self-paced		Lectures	

### Audience

The course is aimed at people who are looking to get into the mobile telecommunications industry for employment as network surveyors, designers, field engineers and planners.

### Course Prerequisites

Students attending this course should have a good understanding of the radio frequency spectrum.

### Course Objectives

**On completion of the course delegates will be able to:**

- Explain a basic transmitter and receiver.
- Understand the relationship between wavelength and frequency.
- Understand PMR, DMR and Tetra technologies, network topologies and functionality.
- Explain modulation and different modulation techniques.
- Understand GSM 2G Circuit Switched technology, network topology and functionality.
- Identify the elements associated with a cellular system along with the functions of each element.
- Explain the role of the SIM, handset and security measures in the mobile environment.
- Identify solutions to reducing the impact of interference and passive intermodulation.
- Specify the correct antenna and suitable frequencies for specific roles or environments.
- Differentiate between different multiple access methods such as TDMA, FDMA, CDMA and OFDMA.

### Content Headings

Course Introduction and Orientation.  
Transmitters and Receivers.  
Modulation techniques PCM, GMSK, 8-PSK, QAM.  
The Role of Base Stations in Mobile Communications.  
AC/DC Power and its Distribution within the base station.  
PMR/DMR and Tetra Topology functionality and equipment.  
The role of SIM cards and handsets and their interaction with the mobile network.  
GSM CS and PS Network Topology and end-to-end functionality.  
GSM Cell Planning.  
GSM Authentication and security.  
GSM access methods and Air interface.  
UMTS PS and CS Network Topology and end-to-end functionality.  
UMTS Cell Planning.  
UMTS Authentication and Security.  
UMTS access methods and Air interface.  
Network Planning Project.

### Assignment/Assessment

The student will submit a 4-6000-word assignment on a subject covered in the course syllabus within six months.