



RAIL  
ACADEMY

# UIC Rail Academy: Telecoms Section

Specialist Rail Radio Communications  
Training for the Global Rail Industry



#### Learning Solutions:

- UIC Rail Academy: Telecoms Collection
- Diploma in Rail Radio Network Engineering
- Self-Study On-Demand Online:
  - FRMCS Overview
  - FRMCS Engineering
  - GSM-R Engineering
  - ERTMS/ETCS for Radio Engineers
- Instructor-Led Live Online:
  - FRMCS Overview
  - FRMCS Engineering

**FRMCS**  
Future Railway Mobile Communication System

Powered by:

**wray castle**

empowering the telecoms world





# UIC Rail Academy: Telecoms Section Learning Solutions

The UIC Rail Academy: Telecoms Section features a suite of specialist training solutions for the railway industry covering rail radio engineering and associated technologies.

The Telecoms Section includes courses ranging from individual self-study and instructor-led courses to the Diploma in Rail Radio Network Communications and the comprehensive UIC Rail Academy: Telecoms Collection that includes access to all our rail communications system training material (online and instructor-led) plus an additional range of courses on wider telecoms network technologies.

Wray Castle's expertise in telecoms technology training ensures we can help you develop the skills you need to plan, build and optimize rail communications networks as technologies evolve.

Telecoms Collection	Diploma in Rail Radio Network Engineering	Single Course: Self-Study Online	Single Course: Instructor-Led
<b>Delivery Method:</b> On-Demand Live Online	<b>Delivery Method:</b> On-Demand Online	<b>Delivery Method:</b> On-Demand Online	<b>Delivery Method:</b> Live Online Live Classroom
<b>24 Month License</b>	<b>24 Month License</b>	<b>12 Month License</b>	<b>N/A</b>
<b>10 Courses (228 Hours)</b>	<b>5 Course (130 Hours)</b>	<b>1 Course (11-32 Hours)</b>	<b>1 Course (1-2 Days)</b>
<b>Diploma in Rail Radio Network Engineering</b>  <b>Foundation Courses</b> <ul style="list-style-type: none"> <li>• Introduction to Telecoms</li> <li>• Radio Principles</li> </ul> <b>Rail Radio Communications</b> <ul style="list-style-type: none"> <li>• GSM-R Engineering Overview</li> <li>• ERTMS / ETCS for Radio Engineering</li> <li>• FRMCS Engineering</li> </ul>	<b>Foundation Courses</b> <ul style="list-style-type: none"> <li>• Introduction to Telecoms</li> <li>• Radio Principles</li> </ul> <b>Rail Radio Communications</b> <ul style="list-style-type: none"> <li>• GSM-R Engineering Overview</li> <li>• ERTMS / ETCS for Radio Engineering</li> <li>• FRMCS Engineering</li> </ul>	<b>FRMCS Overview</b> <i>Study Time: 11 Hours</i>  <b>FRMCS Engineering</b> <i>Study Time: 22 Hours</i>  <b>GSM-R Engineering Overview</b> <i>Study Time: 11 Hours</i>  <b>ERTMS / ETCS for Radio Engineering</b> <i>Study Time: 32 Hours</i>	<b>FRMCS Overview</b> <i>Duration: 1 Day</i>  <b>FRMCS Engineering</b> <i>Duration: 2 Days</i>  <u><a href="#">Explore public training schedule</a></u>
<b>Choose 5 Additional Courses</b>  <i>From our catalogue of 50+ on-demand distance learning courses</i>			
<b>Instructor-Led Live Online Training Courses</b> <ul style="list-style-type: none"> <li>• FRMCS Overview</li> <li>• FRMCS Engineering</li> </ul>			

*"...the trainer went above & beyond the syllabus, which was fantastic ...up to date on all the latest technology & could relate subjects to real life scenarios."*  
**Network Rail**

*"...knowledgeable & enthusiastic trainer adapted well to the needs of the class. An excellent course."*  
**Siemens Transport**

[Explore public training schedule](#)

## Prices and Licensing Options

	Delivery Method	Study Time/ Licence Length	No. Courses	Price/User		
				Single User	Team (2-4)	Enterprise (5+)
Telecoms Collection	On-Demand & Live Online	228 Hours (12 Months)	10	€5,950	€4,695	POA
Diploma in Rail Radio Network Engineering	On-Demand Online	130 Hours (12 Months)	5	€4,950	€3,895	POA
FRMCS Overview	On-Demand Online	11 Hours	1	€1,390	€1,095	POA
	Instructor-Led Live Online	1-Day	1	€1,450	€1,150	POA
FRMCS Engineering	On-Demand Online	22 Hours	1	€2,570	€2,050	POA
	Instructor-Led Live Online	2-Days	1	€2,700	€2150	POA
GSM-R Engineering	On-Demand Online	22 Hours	1	€2,175	€1,750	POA
ERTMS/ETCS for Radio Engineers	On-Demand Online	32 Hours	1	€3,200	€2,550	POA

- Closed in-company private training courses (Live-Online or Live-Classroom) also available
- Please email [uicacademy@wraycastle.com](mailto:uicacademy@wraycastle.com) to discuss further



# Syllabus - Rail Radio Communication

These specialist rail communications technology courses allow you to build an in-depth knowledge of each technology, its architecture, capabilities and limitations.

## GSM-R Engineering Overview

*Self-Study Online: 22 Hours*  
*Instructor-Led: 2 Days*

Develop a broad overview of the services, features and technology of GSM-R.

### Course Modules:

- Introduction to GSM and GSM-R Networks
- GSM Network Architecture
- GPRS Network Architecture
- GSM-R Network Architecture
- GSM-R Services
- GSM-R Identities
- GSM-R Coverage
- Network Access
- GSM-R Procedures
- European Train Control System

## ERTMS/ETCS for Radio Engineers

*Self-Study Online: 32 Hours*  
*Instructor-Led: 3 Days*

This in-depth course is aimed at radio engineers who need a detailed understanding of the operation of the ETCS.

### Course Modules:

- ERTMS Standards and Legislation
- Basic System Description
- System Architecture
- ERTMS Operating Modes
- ERTMS/ETCS Protocols
- Circuit Switched Signalling
- Circuit Switched Connections
- GPRS for ETCS
- The GPRS Air Interface
- GPRS Procedures
- Transmission through the Network
- Radio Network Optimization

## FRMCS Engineering

*Self-Study Online: 22 Hours*  
*Instructor-Led: 2 Days*

Gain an insight into how mobile telecommunications for railways may migrate from GSM-R to the system known as FRMCS.

### Course Modules:

- FRMCS – An Introduction
- FRMCS Reference Architecture
- FRMCS On-Board Architecture
- FRMCS Addressing
- Common Functions & Apps
- 5G
- The IP Multimedia Subsystem (IMS)
- Mission Critical Push to Talk (MCPTT)
- Mission Critical Data (MCDATA)
- Mission Critical Video (MCVIDEO)
- Radio Spectrum & Coverage

# Syllabus - Foundation Courses

These courses enable you to gain a thorough foundation in the telecom's technologies. Learners are required to complete and pass the courses prior to progressing to study the specialist courses.

## Introduction to Telecoms

*Self-Study Online: 22 Hours*

### Course Modules:

- Telecom Services in the Modern World
- The PSTN and ISDN
- Transmission Networks
- Mobile Cellular Networks
- IP Packet Networks
- Fixed and Wireless Broadband Access Technologies
- VoIP, NGNs and the IMS

## Radio Principles

*Self-Study Online: 32 Hours*

### Course Modules:

- Waveform Fundamentals & Baseband Signals
- Electromagnetism & Radio Signal Measurements
- Analogue Modulation
- Digital Modulation
- Duplexing & Multiplexing
- Transmitter & Receiver Design
- Transmission Lines
- Antennas
- Propagation
- Principles of Cellular Coverage
- Radio Systems
- Regulation & Safety

# Syllabus – Additional Distance Learning Courses

<b>5G &amp; Connected Innovation</b>	<b>Level</b>	<b>Study Time</b>	<b>Essential Technologies</b>	<b>Level</b>	<b>Study Time</b>
5G Air Interface	3	22 Hours	Introduction to Telecoms	1	32 Hours
5G Air Interface Overview	2	11 Hours	Telecoms - Today & Tomorrow	1	32 Hours
5G Architecture and Protocols	3	22 Hours	Telecoms – as an Industry & Business	1	11 Hours
5G Architecture and Protocols Overview	2	11 Hours	Telecoms Fundamentals	1	32 Hours
5G Cell Planning	3	22 Hours	2G to 5G Mobile Technologies	2	22 Hours
5G Engineering	2	22 Hours	eSIM Engineering	3	22 Hours
5G Engineering Overview	2	11 Hours	<b>Network Virtualisation</b>	<b>Level</b>	<b>Study Time</b>
5G Radio Access Network	3	22 Hours	Cloud Computing	1	11 Hours
5G Security	3	11 Hours	Network Functions Virtualisation Engineering	2	22 Hours
5G Service Based Architecture & Core Network	3	22 Hours	Software Defined Networking (SDN)	2	11 Hours
5G Technology, Services and Markets	1	11 Hours	<b>Radio Engineering</b>	<b>Level</b>	<b>Study Time</b>
<b>LTE</b>	<b>Level</b>	<b>Study Time</b>	Introduction to Radio	2	11 Hours
LTE Air Interface	3	32 Hours	Open Radio Access Networks (ORAN)	2	6 Hours
LTE Quality of Service	2	11 Hours	Microwave Link Planning	3	32 Hours
LTE Billing and Charging	3	6 Hours	<b>Telecoms Business</b>	<b>Level</b>	<b>Study Time</b>
LTE Evolved Packet Core Network	3	32 Hours	Strategy in Business	1	11 Hours
LTE End-to-End Signalling	3	22 Hours	Evaluating & Optimising Business Models	1	11 Hours
LTE Voice - VoLTE	3	22 Hours	Business Finance – For Non-Financial Managers	1	11 Hours
LTE Backhaul	2	11 Hours	Leadership in Business	1	11 Hours
<b>GSM</b>	<b>Level</b>	<b>Study Time</b>	Developing & Communicating Customer Propositions	1	11 Hours
GSM Air Interface	3	22 Hours	Optimising Operations and Transformation	1	11 Hours
<b>IP</b>	<b>Level</b>	<b>Study Time</b>	Maintaining Effective Governance	1	6 Hours
IP Engineering	2	22 Hours			
<b>TETRA</b>	<b>Level</b>	<b>Study Time</b>			
The TETRA System – An Overview	2	6 Hours			



# About UIC Rail Academy

The UIC Rail Academy provides the rail industry with a comprehensive suite of training courses covering a wide range of topics from rail safety and operations to rail radio communications and engineering.

The UIC Rail Academy is designed to be a flexible and accessible learning solution for rail professionals. Courses are available via a variety of delivery options, including self-paced online courses, instructor-led training (Live Online and Classroom), and blended learning.

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## About Wray Castle

Trusted by the global telecoms industry since 1958. 300,000 industry professionals have been helped to improve their skills from many major mobile and fixed operators, vendors, regulators, consultants, rail operators, energy suppliers, and government organisations.

Each course features continuously updated content, our courses cover all the major global communications technologies including:

- 5G Technology
- Essential Technologies
- LTE/4G
- UMTS & HSPA
- GSM & GPRS
- IMS & SIP
- Radio Engineering
- ORAN
- Professional Mobile Radio
- IP Engineering
- Network Virtualisation
- Telecoms Business

## About UIC (Union Internationale des Chemins de fer)

UIC is the worldwide organisation for the promotion of rail transport at a global level and collaborative development of the railway system. It brings together some 200 members on all 5 continents, among them rail operators, infrastructure managers, railway service providers, etc. UIC maintains close cooperation links with all actors in the rail transport domain around the world, including manufacturers, railway associations, public authorities and stakeholders in other domains and sectors whose experiences may be beneficial to rail development. UIC's main tasks include understanding the business needs of the rail community, developing innovation programmes to identify solutions to those needs, as well as preparing and publishing a series of documents such as reports, specifications, guidelines and IRS that facilitate the implementation of the innovative solutions.