

# FAST TRACK TO SUCCESS

POSTGRADUATE RAIL  
TRAINING COURSES

**RAIL INNOVATION AUSTRALIA  
RAIL INDUSTRY EDUCATION  
POSTGRADUATE COURSES IN:**

- ⌘ RAILWAY SIGNALLING
- ⌘ RAILWAY OPERATIONS MANAGEMENT
- ⌘ RAILWAY INFRASTRUCTURE (TRACK)
- ⌘ ROLLING STOCK ENGINEERING

**+ short-term/customised  
training in Australia  
and overseas**

**R·I·A**  


# ENHANCE RAIL SKILLS

Unique postgraduate rail training programs developed by a team of Australian rail industry and academic personnel are now available at some of Australia's top universities – in areas such as railway signalling, railway rolling stock engineering, railway track infrastructure engineering and railway operations management.



## TOM ANDERSEN QUIT MASTER OF ENGINEERING (RAILWAY INFRASTRUCTURE) TRACK ENGINEER – TRACK MAINTENANCE, BHP BILLITON

I highly recommend this course to anyone involved in the railway engineering industry, as it provides a fantastic opportunity to experience and explore all areas of railway engineering while also providing a great networking opportunity.

“Tailored rail training packages can be developed utilising material from specialised engineering and operations management modules”

Developed over six years (2001 to 2007) during the life of the first Australian Cooperative Research Centre (CRC) for the rail industry – Rail CRC, the programs are best-practice examples of rail training and were developed to fast-track the careers and usefulness of Australia's newest rail industry recruits. In an industry experiencing a revival of support and demand, but struggling to cope with the skills shortage, the rail industry has accredited the following programs as world-first rail-specific postgraduate material to reduce the time required to train new rail industry engineers and managers.

The material, which can also be customised for delivery to specialised Australian or international rail audiences is managed by Rail Innovation Australia Pty Ltd, a new company on the scene of rail training and development and commercialisation of rail technologies.

### RAIL INNOVATION AUSTRALIA IS WORKING IN PARTNERSHIP WITH THREE LEADING AUSTRALIAN UNIVERSITIES TO OFFER THE FOLLOWING POSTGRADUATE PROGRAMS BY DISTANCE EDUCATION:

- Railway signalling programs recognised by the international Institution of Railway Signal Engineers (IRSE) (Graduate Certificate, Graduate Diploma and Master of Railway Signalling) via CQUniversity

- Railway operations management programs (Graduate Certificate, Graduate Diploma and Master of Rail Operations Management) via CQUniversity
- Railway infrastructure programs (Graduate Certificate and Master of Engineering (Railway Infrastructure)) via Queensland University of Technology
- Railway rolling stock programs (Graduate Certificate and Master of Rolling Stock Engineering) via University of Wollongong

With the postgraduate courses currently offered by CQUniversity, the Queensland University of Technology and the University of Wollongong, graduates can be assured of qualifications from leading universities and an ongoing network of contacts within the industry for long-term career benefit.

Tailored rail training packages can also be developed utilising material from specialised engineering and operations management modules, including short-term company training or licensing of full rail training programs to international training providers for specific markets. Calling on its extensive contacts within the rail industry, the company is also well positioned to develop comprehensive face-to-face and rail site training programs.

On the international scene, these rail education products offer comprehensive, best-practice material developed by experienced rail personnel from one of the world's leading heavy haul nations.

# COURSES IN RAILWAY SIGNALLING



## COURSE DESCRIPTION

Developed as a cooperative project between the rail industry and CQUniversity, this course captures the knowledge and expertise of long-term railway signalling engineers working in the Australian rail industry. It is provided as a professional development program for people working in the rail industry. The course offers a good understanding of signalling and the telecommunication environment and covers the topics of safety and best practice signalling. The Program is recognised by the International Institute of Railway Signalling Engineers (IRSE) and the degree is an acceptable equivalent to the IRSE exam for the purpose of membership. The course is delivered via flexible online learning suitable for mature-age students studying part-time and working full-time.

## ENTRY REQUIREMENTS

A Bachelor of Engineering degree from a recognised tertiary institution, or equivalent. Applicants holding other tertiary qualifications with at least five years' relevant industry experience and who are nominated by their employer may also be considered.

## COURSE STRUCTURE

### GRADUATE CERTIFICATE IN RAILWAY SIGNALLING

CPD1 Signalling and safe rail operations  
CPD2 Signalling principles  
CPD3 Signalling layout

### GRADUATE DIPLOMA IN RAILWAY SIGNALLING

CPD4 Signalling applications engineering  
CPD5 Signalling system, management and engineering

CPD6 Signalling research/investigation project

### MASTER OF RAILWAY SIGNALLING

CPD7 Signalling project definition and planning  
CPD8 Signalling project implementation 1  
CPD9 Signalling project implementation 2

## CURRENT FEES, SESSION DETAILS AND ENROLMENTS

Contact 13CQUNI (13 27 86) or <http://seh-postgrad.cqu.edu.au> for latest enrolment deadlines, fees and session dates. One intake per year – Autumn commencement (February)

### CASSANDRA GASH PROJECT ENGINEER UNITED GROUP LIMITED

I have found the course material useful in my roles as design, test and project engineer as I have a greater appreciation for all aspects of railway signalling and the different principles/practices used in other states in Australia.



### CPD 1 SIGNALLING AND SAFE RAILWAY OPERATION

Provides broad, systematic and multidisciplinary knowledge and skills for railway signal engineers and technologists on the role of signalling in safe railway operation and on signalling principles and equipment. This will provide the foundation on which the remaining courses within the Diploma will build. Attention will be focused on the current business environment of the rail industry and the demand for quality and safety management practices in the delivery of signalling systems. The content of this course shares much commonality with the IRSE examination module 'Safety of Railway Signalling and Communications'.

### CPD 2 SIGNALLING PRINCIPLES

Provides a fundamental understanding of Signalling and Signalling systems from first principles, and ensures that students can apply this knowledge in a safe, fit for purpose and cost effective manner. Students must be able to show in their work that the issues that arise when multiple units of equipment of diverse types are combined have been taken into account. The content of this course is aligned with the IRSE examination module 'Signalling Principles'.

### CPD 3 SIGNALLING LAYOUT

Provides students with skills to design a signal layout for a variety of different traffic patterns and equipment systems in a professional and cost effective manner, taking into account the constraints of the layout and safety requirements. Students also need to demonstrate a professional understanding of the integration of the equipment and subsystems used to form the complete signalling system. The content of this course is aligned with the IRSE examination module 'Signalling the Layout'.

### CPD4 SIGNALLING APPLICATIONS ENGINEERING

Provides students with professional skills when dealing with equipment at the individual unit or subsystem level. Students are required to demonstrate a professional understanding of the factors to be considered when applying signalling and communications equipment at all stages in the lifecycle (including research and development), from specification to replacement. The content of this course share much commonality with the IRSE examination modules 'Signalling and Control Equipment, Applications Engineering' and 'Communications Engineering Applications Engineering'.

### CPD 5 SIGNALLING SYSTEMS, MANAGEMENT AND ENGINEERING

Assists students to further develop a Systems Engineering perspective of Railway Signalling, Control and communications systems and to develop professional skills for the integration of many subsystems and diverse equipment in a professional manner. The content of this course shares substantial commonality with the IRSE examination module 'Systems, Management and Engineering'.

### CPD 6 SIGNALLING RESEARCH / INVESTIGATION PROJECT

Continues with students' development of a Systems Engineering perspective of the Railway Signalling, Control and Communications System and to enhance their capability to contribute to the body of professional know-how in Railway Signalling. On successful completion of this course, students are expected to have produced investigative/research works that are suitable for presentation to IRSE and other professional body technical meetings.

### CPD 7 RAILWAY SIGNALLING PROJECT DEFINITION AND PLANNING

This course requires the student to perform background research in the area of their project; establish project goals, as well as a plan for the completion of their research/investigation work. On successful completion of the course, students should have demonstrated their ability to identify a suitable problem relevant to their area of work, determined an appropriate research methodology, conducted adequate literature survey, as well as developed and communicated a plan for the completion of the proposed project.

### CPD 8 RAILWAY SIGNALLING PROJECT IMPLEMENTATION 1

This course follows on from CPD7 and requires the student to implement investigation and research in the area of their project; in accordance with the established project goals and project plan, and to communicate their findings to a professional audience. On successful completion of this course, students should have demonstrated their ability to complete planned tasks within the duration of the term, applied suitable research methodology towards the problem being investigated, and increasing mastery of their area of study.

### CPD 9 RAILWAY SIGNALLING PROJECT IMPLEMENTATION 2

This is the final course of the master program. On successful completion of this course, students should have demonstrated their ability to conduct industrial research and achieved the goals of their investigative study. They should also have demonstrated mastery of their area of study and be able to defend their thesis to a professional panel.

# COURSES IN RAILWAY OPERATIONS MANAGEMENT



## COURSE DESCRIPTION

A cooperative project between the rail industry and CQUniversity, this course captures the knowledge and expertise of long-term railway managers working in the Australian rail industry. It is provided as a professional development program for people working in the rail industry. Graduates will gain skills and knowledge of the complex and interactive railway operating environment including legal, technical, operational and community requirements. The degree offers understanding of safety and risk management issues in railways and introduces the best practices in operation. The course is delivered via flexible online learning suitable for mature-age students studying part-time and working full-time.

## ENTRY REQUIREMENTS

A Bachelor degree from a recognised tertiary institution, or equivalent. Applicants holding other tertiary qualifications with at least five years' relevant industry experience and who are nominated by their employer may also be considered. Applicants

must be working in the railway industry and have the support of their employer to study the degree.

## COURSE STRUCTURE

### GRADUATE CERTIFICATE IN RAIL OPERATIONS MANAGEMENT

OPS1 Introduction to rail operations management

OPS2 Rail infrastructures

OPS3 Network and localised train control

### GRADUATE DIPLOMA IN RAIL OPERATIONS MANAGEMENT

OPS4 Train planning

OPS5 Passenger and freight operations

OPS6 Rail operations risk management and administration

### MASTER OF RAIL OPERATIONS MANAGEMENT

OPS7 Rail operations management project definition and planning

OPS8 Rail operations management project implementation 1

OPS9 Rail operations management project implementation 2

## CURRENT FEES, SESSION DETAILS AND ENROLMENTS

Contact **13CQUNI** (13 27 86) or <http://seh-postgrad.cqu.edu.au/>

for latest enrolment deadlines, fees and session dates.

One intake per year –

Autumn

commencement

(February)



## BROOKE MARKEWICZ CONSULTANT, SYSTEMWIDE

I chose to complete this degree because it covers a wide-range of contemporary rail industry issues and enhances my rail knowledge in my job as railway consultant at Systemwide. As well as receiving a university qualification to further my career, this course has given me the opportunity to interact with other students from rail operators around Australia via online forums and gain a greater understanding of the national railway industry.

### OPS1 INTRODUCTION TO RAIL OPERATIONS MANAGEMENT

This course aims to provide broad, systematic, and multidisciplinary awareness for people engaged in railway operations activities. This will provide the foundation on which the remaining courses will build. Attention will be focused on the principles of rail operation as well as the current business, legislative, industrial, environmental, and social environment of the rail industry and the demand for quality and safety management practices in the running of train services. In addition, students will be introduced to basic analysis and analytical tools in rail operation such as demand and performance analysis and public, private, and PPP financing. Further more, the importance of human factors and people skills in rail operations will be examined, particularly in the context of industrial process and change management.

### OPS2 RAILWAY INFRASTRUCTURES

This course aims to provide an overview of railway technologies and their impact on rail operations activities. This and the previous course will provide a solid foundation on which rail operations skills can be developed. Coverage will include both above rail and below rail infrastructures. The principle of asset management within rail operations context will be explained, as well as the general process of track possession planning and management.

### OPS3 NETWORK AND LOCALISED TRAIN CONTROL

This course aims to assist students to develop critical skills in network and localised train control. Students will be introduced to the fundamental principles of train movement control systems; the legislative requirements of emergency planning, preparedness, recovery, and response. In addition, students will learn techniques on disruption management and rail operations in degraded mode; as well as incident management & investigation & reporting process. Other topics to be covered include crisis management and the impact of train control systems in rail operation.

### OPS4 TRAIN PLANNING

This is the first of the level 2 courses and aims to assist students to develop professional competencies required in train planning. Topics to be covered include goals and current art in train planning; performance measurement, and factors influencing optimal train planning including human resource issues, market and industry sector needs. In addition, the course covers opportunity management and planning for special events; as well as leadership in train planning.

### OPS5 PASSENGER AND FREIGHT OPERATIONS

This is the second of the level 2 courses and aims to assist students to develop professional competencies required in passenger or freight operations. Topics to be covered include goals and current art in freight and/or passenger operations, and factors influencing 'best performance' in this sphere. In addition, issues relating to industry based service delivery and the role of rail operation managers in managing external relationships will be studied.

### OPS6 RAIL OPERATIONS RISK MANAGEMENT AND ADMINISTRATIONS

This course guides students through the ultimate goal of rail operations - one of business continuity; and assists students to develop professional competencies in the business of train operations and risk management. Topics to be covered include rail business continuity - which centres on rail business analysis and management; rail business marketing, and managing changes within rail operations. Students will also be exposed to the process of rail safety accreditation, legislative framework, and factors critical to obtaining, and maintaining, this accreditation.

### OPS7 RAIL OPERATIONS MANAGEMENT PROJECT DEFINITION AND PLANNING

### OPS8 RAIL OPERATIONS MANAGEMENT PROJECT IMPLEMENTATION 1

### OPS9 RAIL OPERATIONS MANAGEMENT PROJECT IMPLEMENTATION 2

# COURSES IN ROLLING STOCK ENGINEERING



## COURSE DESCRIPTION

Developed as a cooperative project between the rail industry and the University of Wollongong, this course captures the knowledge and expertise of long-term rolling stock engineers working in the Australian rail industry. It is provided as a professional development program for people working in the rail industry in Australia or overseas. The course is delivered via flexible online learning suitable for mature-age students studying part-time. A one-day compulsory workshop for each subject provides a firm foundation and interaction with peers and experts.

## ENTRY REQUIREMENTS

A Bachelor of Engineering degree from a recognised tertiary institution, or equivalent. Applicants holding other tertiary qualifications with at least five years' relevant industry experience and who are nominated by their employer may also be considered.

## COURSE STRUCTURE

### MASTER OF ROLLING STOCK ENGINEERING

- ENGG924 Railway and rolling stock environment
- ENGG925 Rail motive power
- ENGG926 Rail vehicle design
- ENGG927 Rolling stock safety and braking systems
- ENGG928 Rolling stock dynamics and bogies
- ENGG929 Rolling stock construction maintenance and design
- ENGG940 Dissertation (in rolling stock engineering)

(The GRADUATE CERTIFICATE IN ROLLING STOCK ENGINEERING comprises four subjects from the above list.)

## CURRENT FEES, SESSION DETAILS AND ENROLMENTS

Contact <http://www.uow.edu.au/handbook/>, 61+2 4221 4566 or e-mail [engineering@uow.edu.au](mailto:engineering@uow.edu.au) for latest enrolment deadlines, fees and session dates. Two intakes per year - February and July commencement.

### ADI MIFTARI RELIABILITY & MAINTENANCE ENGINEER, V/LINE PASSENGER PTY LTD

I decided to study the masters of rolling stock engineering to gain more knowledge about rolling stock design methods, system specifications for components and operations. Completing this course will help me to pursue a career in rolling stock engineering. I've found the study forums very useful and have gained a lot of information.



### ENGG924 RAILWAY AND ROLLING STOCK ENVIRONMENT

Develops understanding of and ability to work with the systems in which rolling stock must operate. Topics covered: rail within a transport industry context, historical perspective on railways development, business structures for rail organisations, rolling stock interfaces, safety considerations, design drivers, system design specification, rolling stock operations, servicing, maintenance, component interfaces, asset management, railway cost perspectives and technological development trends.

### ENGG925 RAIL MOTIVE POWER

Develops application of engineering knowledge to traction systems primarily through a study of locomotives. Topics covered: elements of a traction and locomotive system: interfaces with other systems, interactions between elements, limitations on tractive effort, traction control, basic traction technologies, and their design, operation and maintenance characteristics; safety and environmental issues, performance criteria and measurement.

### ENGG926 RAIL VEHICLE DESIGN

Develops understanding and design specification of common and specific features for passenger, locomotive and freight wagons. Students can specialise in passenger or freight vehicle design. Topics covered: Crew cab design, vehicle dimension and load constraints, Types and application, configurations, structure, performance,

control, human interfaces of passenger rolling stock; structures, configurations, coupling systems performance, auxiliary fittings, loading and unloading systems for freight wagon.

### ENGG927 ROLLING STOCK SAFETY AND BRAKING SYSTEMS

Develops a fundamental understanding and specification of systems that maintain control over train speed. Topics covered: Rail safety systems and the interface with train braking systems, historical development of train brakes, train brake fail-safe concepts, train brake types, components and applications, compressed air systems, train brake control and controllers, train brake system performance and design – parking, normal and emergency operation, train brake examination and testing, deadman and vigilance control.

### ENGG928 ROLLING STOCK DYNAMICS AND BOGIES

Develops fundamental understanding of the dynamic behaviour of rolling stock and the specification of elements that control it. Topics covered: Wheel-rail interface and resulting dynamic forces applied to bogies, wind loadings on vehicles, forces arising from abnormal conditions, modes of vibration, control of longitudinal dynamics, control of lateral dynamics, control of vertical dynamics, suspension design, stability of wagons, passenger cars, locomotives and trains.

### ENGG929 ROLLING STOCK CONSTRUCTION MAINTENANCE AND DESIGN

Deals with the integration of activities to deliver rolling stock solutions. Topics covered:

Integration of factors governing rolling stock design including safety, dynamic performance, structural integrity, environmental and social impact, crashworthiness. Rolling stock construction methods and techniques, couplers and draft gear, air and water piping, electrical cabling, internal fit out, auxiliary systems, passenger car door mechanisms, wagon loading and unloading design. Maintenance strategies, rolling stock maintenance techniques, rolling stock maintenance facilities, life-cycle considerations in design.

### ENGG940 DISSERTATION (IN ROLLING STOCK ENGINEERING)

Project allows pursuit of a particular area in-depth, focusing on the solution of a specific practical engineering problem. This will allow students to apply the knowledge and skills acquired in the structured coursework and thus gain valuable confidence in their ability to practice engineering at a high professional standard. This individual supervised project develops skills in information retrieval, project planning and organisation, analysis, problem solving and effective communication of results. Students would normally be required to do a literature survey, analysis, and develop suitable solutions to the selected problem.

# COURSES IN RAILWAY INFRASTRUCTURE



## COURSE DESCRIPTION

Developed as a cooperative project between the rail industry and the Queensland University of Technology, this course captures the knowledge and expertise of civil infrastructure engineers working in the Australian rail industry. It is provided as a professional development program for people working in the rail industry. Graduates will gain skills and knowledge in a range of areas related to the design, construction, maintenance and management of railway infrastructure. The degree offers both theoretical understanding and practical applications of advanced professional practice. The course is delivered via flexible online learning suitable for mature-age students studying part-time and working full-time.

## ENTRY REQUIREMENTS

A Bachelor of Engineering degree from a recognised tertiary institution, or equivalent. Applicants holding other tertiary qualifications with at least five years' relevant industry experience and who are nominated by their employer may also be considered.

Applicants must be working in the railway industry and have the support of their employer to study the degree.

## COURSE STRUCTURE

### MASTER OF ENGINEERING (RAILWAY INFRASTRUCTURE)

- UDN500 Ballast sleepers and fasteners
- UDN501 Rail and related track structures
- UDN502 Track stability design and formation
- UDN503 Geometry and track-train interaction
- UDN504 Track construction and civil structures
- UDN505 Assets environment and safety
- BEN910 Integrated project ELECTIVE

### GRADUATE CERTIFICATE (RAILWAY INFRASTRUCTURE)

Any 4 of the above subjects.

## CURRENT FEES, SESSION DETAILS AND ENROLMENTS

Contact **61+7 3138 1433**, [bee.enquiries@qut.edu.au](mailto:bee.enquiries@qut.edu.au) or visit <http://www.bee.qut.edu.au/study/cpe/railwayinfrastructure.jsp> for latest enrolment deadlines, fees and session dates. Two intakes per year – February and July commencement.

## ALEX HOWIE TRACK DESIGN ENGINEER QR NETWORK

The material has been developed from within the industry and is well written and should be directly relevant to anyone working on railway civil infrastructure. The course is unique and represents an excellent means of broadening your understanding of railway engineering quickly.



### UDN500 BALLAST, SLEEPERS AND FASTENERS

This unit will help you to competently interpret and prepare specifications for ballast, analyse below-rail track superstructure problems as well as determine appropriate rectification procedures, and determine appropriate sleeper maintenance strategies.

### UDN501 RAIL AND RELATED TRACK STRUCTURES

This unit will help you to develop your knowledge of the characteristics of rails and principles of the selection and maintenance of rails and apply it towards the safe operation of trains; you will also be able to describe the operation of rail related track structures and determine their maintenance requirements.

### UDN502 TRACK STABILITY, DESIGN AND FORMATION

This unit will help you to explain and apply geotechnology theory as it refers to the rail permanent way and track substructures, undertake an economic assessment of the selection of track structures, evaluate and mitigate the likelihood of track instability, and undertake a first order track design by applying track design processes and theories incorporating the effect of individual parameters.

### UDN503 TRACK GEOMETRY AND TRAIN INTERACTION

This unit will help you to assess the significance of geometry imperfections in track and deduce appropriate remedial measures, describe the physical characteristics and key elements of track and vehicles insofar as they affect track-train interaction, explain the theoretical bases for

development of wheel-rail forces and the influence of vehicle and track parameters on those forces, and assess the impact of design parameters for and deterioration processes within wheels and track on the operation of trains.

### UDN504 TRACK CONSTRUCTION AND CIVIL STRUCTURES

This unit will help you to contribute to the management of track construction projects, recommending appropriate construction methodologies and monitoring tools, describe and assess the maintenance needs of civil structures within the rail corridor, and investigate, evaluate and mitigate the risks of geotechnical hazards in the corridor.

### UDN505 ASSETS, ENVIRONMENT AND SAFETY

This unit will help you to apply appropriate tools, concepts and life cycle evaluations to the management of railway infrastructure assets at an introductory level, assess and monitor the parameters associated with safe operation of the rail corridor and its interfaces with the rail track, and evaluate environmental assessment plans and their implementations with respect to operations and construction within the rail corridor.

### BEN910 INTEGRATED PROJECTS

The aim of this unit is to provide you with research skills that acknowledge prior learning and that can develop further through an authentic learning project of relevance to your career aspirations and to your employer.

## TOM ANDERSEN TRACK ENGINEER – TRACK MAINTENANCE, BHP BILLITON

I chose the Master of Engineering (Railway Infrastructure) course as it was both interesting and relevant to my current role at BHP Billiton Iron Ore. I have been working in the railway engineering industry for the past 10 years, so when this course came online I jumped at the chance to further develop my technical education and enhance my credentials as a Track Engineer for future employment opportunities.



FOR MORE INFORMATION ABOUT  
THE CURRENT POSTGRADUATE COURSES AVAILABLE  
OR TO INQUIRE ABOUT TAILORING RAIL TRAINING  
FOR YOUR ORGANISATION PLEASE CONTACT:



**RAIL INNOVATION AUSTRALIA**

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