THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

北京交通大學
BEIJING JIAOTONG UNIVERSITY

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BELT AND ROAD

Advanced Professional Development Programme in Railway Transport

6 - 12 April 2025 Hong Kong
13 - 19 April 2025 Beijing

「一带一路」轨道交通高级管理及专业人才培训项目

香港 2025年4月6至12日
北京 2025年4月13至19日

Sustainable Rail Transport : Planning, Operations and New Technologies

可持续轨道交通：规划、运营与新技术

https://www.polyu.edu.hk/feng/br2025/

Welcome to the Belt and Road Advanced Professional Development Programme on 'Sustainable Rail Transport: Planning, Operations and New Technologies'.

In this programme, we explore the intricacies of planning, operations, and the latest technologies shaping the future of rail transport. Our major theme revolves around the vital goals of developing and running sustainable rail transport networks and services that contribute to economic growth, environmental conservation, and social mobility.

The programme is co-organised by

- **The Hong Kong Polytechnic University (PolyU), Hong Kong**
- **Beijing Jiaotong University (BJTU), Beijing**
- **MTR Academy (MTRA), Hong Kong**

It is a unique programme with comprehensive coverage on both inter-city and inner-city rail transport, riding on the vast experience from the railway industry and the renowned research capability of the universities in Mainland China and Hong Kong.

Join us as we embark on this precious knowledge sharing and experience exchange journey, exploring the realms of sustainable rail transport and shaping the future of transport infrastructure and service provision. Together, we can create a green, connected, and prosperous world through the power of rail transport within the Belt and Road Initiative.

Belt & Road Advanced Professional Development Programme

Sustainable Rail Transport: Planning, Operations and New Technologies

6 – 12 April 2025 Hong Kong • 13 – 19 April 2025 Beijing

Abbreviations

BJTU – Beijing Jiaotong University
BYD – BYD Company Ltd
MTR – MTR Corporation Ltd
MTRA – MTR Academy
SMRT – SMRT Corporation Ltd
PolyU – The Hong Kong Polytechnic University

06/04/2025 (Sunday)	A.M. / P.M.	Transportation	Participants arrive at HK
07/04/2025 (Monday)	A.M.	Lecture	**URBAN MOBILITY AND ROLES OF URBAN RAIL TRANSITS** ***Speakers:*** Ir Carmen Chu, Director, Ove Arup & Partners Hong Kong Limited Ms Cheris LEE, Chief of Operating & Metro Segments, MTR Professor KK LEE, Professor of Practice (Transportation), PolyU & Fellow, MTR Academy ***Abstract:*** Urban mobility plays a vital role in the fulfilment of the economic and social needs of a modern city. This session will cover the key elements of urban mobility including connectivity, accessibility, availability, affordability, acceptability, and integration of various modes of transportation. The concept and development trends of smart and green mobility in the context of an intelligent city will also be presented. The roles of urban rail transits both as a backbone of public transportation for the middle miles of the total journey and as a feeder service for the first mile and last mile will be shared.
		Lecture	**KEY FEATURES AND OPERATION OF URBAN RAIL TRANSITS** ***Speakers:*** Ir Carmen Chu, Director, Ove Arup & Partners Hong Kong Limited Ms Cheris LEE, Chief of Operating & Metro Segments, MTR Professor KK LEE, Professor of Practice (Transportation), PolyU & Fellow, MTR Academy ***Abstract:*** Modern cities rely on the metro rail network as the backbone for public transportation supplemented by other transport modes to complete the first and last mile of the total journey. This session will present an overview and key features of urban rail transits, and the institutional arrangement, key hardware and operation of a metro network. This session will also share Hong Kong's experience on the successful operation of a major metro network to address the city's economic and social needs of mobility through the design of metro lines that are conveniently accessible to the passengers, connectable for the first and last mile of the total journey, and the seamless integration between the rail network and other modes of transport.
	P.M.	Lecture	**ASSET MANAGEMENT WITH MAINTENANCE 4.0** ***Speakers:*** Professor KK LEE, Professor of Practice (Transportation), PolyU & Fellow, MTR Academy Mr KH LEE, Chief of Operations Engineering Maintenance, MTR ***Abstract:*** Maintenance 4.0 fully leverages on the use of Communication and Information Technology (CIT), cybernetics, and other new technologies to improve the reliability, availability, and safety of the assets, and to optimise asset maintenance costs. The trends in the railway industry align well with the growing acceptance of Maintenance 4.0 as the norm in the asset maintenance industry. This session will introduce to the participants the essence of deploying Maintenance 4.0 to the railway industry and share the experience of Hong Kong MTR of incorporating Maintenance 4.0 into its asset management system.
		Activity	**OPENING CEREMONY / PROGRAMME RECEPTION** **Venue: MTRA**
08/04/2025 (Tuesday)	A.M.	Lecture	**NEW URBAN RAIL TRANSIT LINE OPENING READINESS** ***Speaker:*** Ms Bess NG, Head of Line Group Management – East Rail Line and Intercity City, MTR

			Abstract: Urban rail transit line is a complex integration of a set of unique engineering systems, as well as the realisation of the sophisticated process of demand analysis, planning, financing and stakeholder collaboration. With the general public as the end-users, the service provision must meet the societal needs and fits into the local culture and ambience. To prepare for reliable and safe operation readiness of a new line from day-one of operation is thus a monumental challenge for the operator. This session looks into the essential considerations in the preparation to ensure smooth operations of a new line and shares experience through case studies.
		Lecture	**TRANSIT-ORIENTED DEVELOPMENT (TOD): HK EXPERIENCE** ***Speaker:*** Ms Sharon LIU, General Manager-Town Planning, MTR ***Abstract:*** TOD can be a cost-effective approach for the building of the metro network both from the Capex and Opex perspectives. The added value and secured patronage from property development above stations may subsidise Capex and increase the farebox revenue. When TOD is holistically planned for a city, the metro network will enhance mobility and connectivity of the city. This session will share the TOD experience of Hong Kong including the methodology, process, key success factors and lessons learnt.
	P.M.	Activity	**VISIT – HO TUNG BUILDING DEPOT + TAI WAI TRAINING CENTRE@MTR** ***Facilitator:*** Mr William Chow, Technical Training Manager, MTR
		Activity	**CULTURAL VISIT**
09/04/2025 (Wednesday)	A.M.	Lecture	**OPTIMUM AND SAFE DELIVERY OF RAILWAY: GREENFIELD AND BROWNFIELD PROJECTS** ***Speaker:*** Ir CS CHANG, Executive Chairman, Key Direction Ltd & Fellow, MTR Academy ***Abstract:*** The optimum and safe delivery of railway projects requires a total project lifecycle approach starting from project definition and going through design, procurement, construction, testing & commissioning, trial run leading to operational readiness. Key challenges for Brownfield railway projects, in particular, include the need to maintain safe and smooth daily railway operation throughout the project period, limitation of in-situ works to non-traffic hours, and complex staging works. This module shares MTR's experience on optimum and safe delivery of both Greenfield and Brownfield railway projects through the total project lifecycle approach and the successful deployment of project tools such as requirement management, interface management, safety assurance, operability/maintainability studies, track related installation programming, etc.
		Lecture	**CUSTOMER SERVICE IN URBAN RAIL TRANSIT** ***Speaker:*** Mr Jackie CHEUNG, Chief Digital Development & Innovation Manager, MTR ***Abstract:*** Provision of a customer-centric service to the passengers is now prevalent in most of the urban rail transits. This module shares the experience of Hong Kong MTR of tapping into what matters most to the passengers during the design and operation of the urban rail transits. This session will also share the key components of the total journey experience of the passengers such as accessibility/connectivity to the stations, passenger comfort in the stations and onboard the trains, communications with the passengers both in the transits and outside, new technology applications adopted to drive for smart customer service, and the use of monitoring tools including customer pledge, KPIs, customer focus groups. etc.
	P.M.	Activity	**VISITS** • **PolyU-Huawei Joint Laboratory for Optical Interconnection Network and Advanced Computing System** ***Facilitator:*** Professor Chao LU, Chair Professor of Fiber Optics, PolyU • **PolyU-KCRC Smart Railway Research Laboratory** ***Facilitator:*** Professor HY TAM, Chair Professor of Photonics, PolyU • **Research Centre for Electric Vehicles** ***Facilitator:*** Professor KT CHAU, Chair Professor of Electrical Energy Engineering, PolyU • **Research Institute for Artificial Intelligence of Things** ***Facilitator:*** Professor Jiannong CAO, Chair Professor of Distributed and Mobile Computing, PolyU • **Research Institute for Quantum Technology** ***Facilitator:*** Professor Ai-Qin LIU, Chair Professor of Quantum Engineering and Science, PolyU

10/04/2025 (Thursday)	A.M.	Lecture	**DIGITALISATION AND DATA-DRIVEN DECISIONS ON SAFETY, RELIABILITY AND EFFICIENCY** ***Speaker:*** Professor Jiancong CAO, Chair Professor of Distributed and Mobile Computing, PolyU ***Abstract:*** With the latest advances on data science, computing hardware and software, wireless communication and sensing technologies, large-scale complex systems, notably railways, can be designed, monitored and cloned digitally. The abundant volume of data made available and the system intelligence derived subsequently facilitates informed decisions or even autonomous decision-making. This session discusses the necessary setup and requirements to take full advantage of digitisation and the possible applications to enhance safety and reliability of railway services, and efficiency of system performance. Challenges on enabling digitalisation in a railway operation context will also be evaluated.
		Lecture + Discussion Panel	**INNOVATION & TECHNOLOGY: APPLICATIONS IN RAILWAYS AND INTEGRATED TRANSPORT** ***Speaker:*** Professor CC CHAN, Distinguished Chair Professor of Electric Energy and Smart Energy, PolyU Professor CY CHUNG, Chair Professor of Power Systems Engineering, PolyU Professor Edward CHUNG, Professor of Intelligent Transport Systems, PolyU Prof Haibo HU, Professor, PolyU ***Moderator:*** Ir Henry CHEUNG, Managing Director, Kone Elevator (HK) Ltd
	P.M.	Lecture	**COMMUNICATION BASED TRAIN CONTROL (CBTC) SYSTEM** ***Speaker:*** Mr Joe CHOI, Chief E&M Engineering Manager, MTR ***Abstract:*** Communication Based Train Control (CBTC) system with Fully Automated Operation (FAO) GOA4 capability has become a standard provision for new metro lines and also for retrofitting of the signalling system of existing metro lines. This session will walk through the features of the proprietary CBTC systems of the first-tier suppliers and share the development trends of CBTC systems alongside with the rapid advancement of CIT technology.
		Lecture	**EMERGING TECHNOLOGY FOR URBAN GUIDED TRANSITS – SKY SHUTTLES** ***Speaker:*** Mr LI Liang Liang, Director, Light Rail Transport Research Institute, BYD ***Abstract:*** Sky Shuttle is pioneered by BYD as the first monorail system which is powered by train-borne battery and therefore does not rely on guideway power supply. Several lines are already in operation in Mainland China and overseas. In this session, BYD is going to share on the following topics: • Technology and features of the Sky Shuttle • Target segments of urban guided transits best served by Sky Shuttle • Sky Shuttle lines in operation and experience gained • Sky Shuttle lines in the design or construction stage • Future development
		Activity	**PROGRAMME DINNER**
11/04/2025 (Friday)	A.M.	Workshop	**GROUP DISCUSSIONS: SESSION 1 & SESSION 2** ***Facilitator:*** Mr David LEUNG, Principal Advisor, MTR Academy
	P.M.	Activity	**LUNCH**
		Workshop	**STUDY REFLECTION: INDIVIDUAL SHARING FROM PROGRAMME LEARNING**
12/04/2025 (Saturday)	A.M. / P.M.	Transportation	Flight to Beijing

13/04/2025 (Sunday)	A.M.	Lecture	**DEVELOPMENT STATUS AND TRENDS OF CHINA'S HIGH-SPEED RAIL SYSTEM** ***Speaker:*** Professor Lei NIE, Professor, BJTU
		Lecture	**TECHNICAL SYSTEMS OF CHINA'S URBAN RAILWAY** ***Speaker:*** Dr Wenzheng JIA, Global Sustainable Transport Innovation and Knowledge Centre ***Abstract:*** China's urban rail transit mileage has exceeded 10,000 kms, and the rail transit technologies has been rapidly enhanced due to large-scale construction and operation practice. Many new technologies have emerged, particularly in the fields of intelligent operation and digitalisation. This lecture will share technological innovation and achievements of China's rail transit industry in terms of safety, green operation, economic sustainability, inclusiveness and resilience. The lecture will also discuss the issue of technical standards while it is necessary for all stakeholders to develop a set of international standards so as to better achieve inclusive development.
	P.M.	Activity	**VISIT – TRAFFIC CONTROL TECHNOLOGY CO. LTD.** ***Facilitator:*** Ms Shi ZHU, Traffic Control Technology Co. Ltd.
	Evening	Activity	**WELCOME DINNER**
14/04/2025 (Monday)	A.M.	Lecture	**NEW DEVELOPMENTS AND METHODS ON MAINTENANCE SCHEDULES FOR METRO TRAINS** ***Speaker:*** Professor Shaokuan CHEN, Professor, BJTU
		Lecture	**URBAN TRANSPORT SYSTEM DEVELOPMENT, LAND USE (TOD) AND NATIONAL POLICY** ***Speaker:*** Professor Yun BAI, Professor, BJTU
	P.M.	Activity	**VISIT – CHINA RAILWAY CONSTRUCTION CORPORATION LTD.** ***Facilitator:*** Facilitator: Ms Lingjiangfei WU, BJTU
15/04/2025 (Tuesday)	A.M.	Activity	**CULTURAL VISIT – TRAFFIC CONTROL TECHNOLOGY CO. LTD.** ***Facilitator:*** Ms Shi ZHU, Traffic Control Technology Co. Ltd.
	P.M.	Activity	**VISIT – BEIJING MTR CORPORATION LTD.** ***Facilitator:*** Ms Yanni CHONG, Beijing MTR Corporation
16/04/2025 (Wednesday)	A.M.	Lecture	**URBAN RAIL TRANSIT NETWORK OPERATIONS IN CHINA: CHALLENGES AND STRATEGIES** ***Speaker:*** Dr Yao CHEN, Associate Professor, BJTU ***Abstract:*** China has embarked on a period of rapid development in urban rail transit. To date, 11 cities have established rail networks comprising more than ten lines, marking a significant milestone in the nation's transportation infrastructure. However, the operational phase of these urban rail networks presents challenges such as high passenger flow demand, imbalanced passenger flow distribution, and the need to enhance travel service quality. The talk discusses on operational strategies including full-length/short-turn routing, express/local train services, flexible train formation, and cross-line operations. The talk analyses the applicability and effectiveness associated with the operational strategies, aiming to share operation experience and practical insights for the operation of urban rail transit networks.
		Lecture	**TRAFFIC MANAGEMENT OPTIMISATION FOR RAILWAY NETWORKS** ***Speaker:*** Professor Xiaojie LUAN, BJTU ***Abstract:*** In daily train operations, unavoidable perturbations often occur, leading to delays and even service cancellations. Effective railway traffic management is essential for enhancing the punctuality and reliability of train services. This requires efficiently rescheduling trains while considering various resource constraints, such as tracks and rolling stock. This presentation will cover commonly-used train dispatching measures for handling disturbances and disruptions, along with typical modelling methods and solution approaches. Further, some relevant and popular topics will be discussed, including passenger-oriented traffic management, integrated traffic management and train control. Emphasis will also be placed on the advancements and practices in the field.

	P.M.	Workshop	**GROUP DISCUSSIONS** ***Facilitator:*** Ms Lingjiangfei WU, BJTU
		Workshop	**STUDY REFLECTION**
17/04/2025 (Thursday)	A.M.	Lecture	**GOOD PRACTICES IN SUSTAINABLE RAIL TRANSPORT** ***Speaker:*** Invited Speaker (TBC) ***Abstract:*** Governments, operators and the public all demand sustainable rail transit systems, and there are always both experience and lessons learned from rail transit systems that are already in operation, so finding good practice which can be replicated is a very valuable exercise. This presentation discusses the collection of good practices in which the factors such as regulations, technical standards and investment are taken into account. The rationales and processes with which these sustainable practices are designed are comprehensively analysed so that they can be better applied or referred in relevant projects.
	P.M.	Activity	**LUNCH**
		Lecture	**OPERATORS AND CONTRACTORS FOR SUSTAINABLE RAIL TRANSPORT** ***Speaker:*** Invited Speaker (TBC) ***Abstract:*** Both operators and contractors are highly concerned about reliability & safety (R&S) and cost of rail transport, however R&S and cost are always at the two ends of a tug-of-war. More investment is needed to ensure R&S, insufficient investment may also bring risks, so getting the right balance between R&S and cost is a challenge. In this session, operators and suppliers will be invited to discuss what we should do in order to cope with the sustainability challenge in terms of labour costs, energy consumption and equipment life cycle costs, and how they may collaborate on project management and applications of innovative technologies.
18/04/2025 (Friday)	A.M.	Activity	**VISIT – CHINA COMMUNICATIONS CONSTRUCTION COMPANY LTD.**
	P.M.	Lecture	**CASES AND ANALYSIS OF EXTREMELY SERIOUS RAILWAY ACCIDENTS** ***Speaker:*** Dr Haixing WANG, BJTU ***Abstract:*** Based on the data of railway accidents in China and typical accident cases, this presentation provides an analysis on the classification and characteristics of such accidents in China, and hence a review on the current situation and development trend of railway operation safety in China. With investigation into the safety data and typical cases of international railways (e.g. International Union of Railways), the characteristics of international railway safety practices are examined from a number of dimensions. The safety practices and a range of features of safety management between China and international railways are duly compared.
		Lecture	**RAILWAY INFRASTRUCTURE MANAGEMENT: METHODS & TECHNOLOGIES** ***Speaker:*** Dr Yuanjie TANG, Vice Dean, BJTU ***Abstract:*** The lecture will provide an academic discussion on cutting-edge methodologies and technologies on railway asset management, particularly, the track. The discussions will focus on the following: i) health condition diagnostics, taking rail disease/defect detection and identification as examples; ii) condition prediction, with research studies through the application of advanced statistical techniques on classification and regression; and iii) theoretical and empirical perspectives on optimisation of maintenance planning/scheduling informed by track condition.
19/04/2025 (Saturday)	A.M.	Activity	**VISIT – RESEARCH CENTRES AND LABORATORIES @ BJTU** ***Facilitator:*** Dr Yuanjie TANG, Vice Dean, BJTU
	P.M.	Activity	**GRADUATION CEREMONY** ***Venue:*** BJTU

Working Language: English

Speakers/Facilitators: Seasoned academics and professionals of the co-organisers and invited experts of relevant fields

Who Should Attend: Senior executives/managers of railway operators and infrastructure owners; Government planners and regulators; practitioners in the railway industry; and researchers and scholars of relevant research disciplines from the Belt and Road countries and regions.

Participants are expected to possess adequate English proficiency for interactive communication during the programme.

Fees and Expenses

No Programme participation/registration fee is to be incurred. The participants should be responsible for the following –

- **Transportation**

  While the co-organisers will arrange ground transportation for the participants for site visits in Beijing and Hong Kong, the participants are responsible for their own international flights, as well as other local travel, at their own cost (i.e. from home country to Hong Kong, from Hong Kong to Beijing, and from Beijing to home country).

- **Local Accommodation**

  Participants will be responsible for their accommodation expenses in Beijing and Hong Kong during the Programme. The co-organisers will provide recommendations on hotel reservations.

- **Insurance**

  Participants must arrange insurance at their own cost with sufficient coverage for the entire programme period in Beijing and Hong Kong. Participants will be asked to present their insurance certificates.

- **Visa Application**

  Participants must obtain valid visa before entry into Mainland China and Hong Kong respectively, with the exception of visa-free entry based on relevant agreements or regulations.

  For information on Visa to Mainland China

  http://cs.mfa.gov.cn/wgrlh/lhqz/lhqzjjs/

  For information on Visa to Hong Kong

  http://www.immd.gov.hk/eng/services/visas/visit_transit.html

  Participants are required to apply for the visa at their own cost. The co-organisers will provide the necessary support and assistance, such as the issuing of supporting documents.

Please note upon successful registration, if there is any change to your participation, you are required to inform the respective organisers as soon as possible.

Attendance Requirements

- Participants are required to attend **ALL** sessions of the entire Programme. A Certificate of Attendance will be awarded upon successful completion of the Programme.
- To encourage interaction and enhance mutual learning, participants may be requested to present and share their experience and views on the development and operations of rail transport in their countries during the course of the programme.

ENROLMENT by Invitation

Enrolment will be considered via nomination by the invited organisations/ institutions only.

Deadline: 14 February 2025

General Notes

- The co-organisers reserve the rights to cancel the programme and to make any necessary changes to the schedules, contents and mode of delivery of the programme.
- The co-organisers reserve the rights to make an enrolment offer while taking into consideration of the composition of the programme participants.
- All sessions may be recorded by the co-organisers in some form or other. By joining the programme, participants unreservedly agree that the video, audio and photos recorded and retained will be used for related academic and promotion purposes.

Arrangements under Adverse Weather

Beijing

Virtual class will be arranged for lectures and workshops, while technical visit will be cancelled in case of force majeure, such as intensive snowfall. Warnings about adverse weather will be issued by the local observatory.

Hong Kong

Virtual class will be arranged for lectures and workshops, while technical visit will be cancelled in case of force majeure, such as typhoon and rainstorm. Warnings about adverse weather will be issued by the local observatory. This arrangement takes effect when the Hong Kong Observatory issues the Black Rainstorm warning, Typhoon Signal No. 8 or higher signals.

All participants will be well informed of the arrangements under adverse weather warnings.

Programme Lunch/Dinner Arrangements and Dietary Needs

Lunches and one official Dinner will be included. Dietary requirement of a religious or allergen nature will be collected during registration. Co-organisers will try to arrange for your dietary requirements as stated on your application.

Personal Data

Personal data is collected and used for processing registration and administration purpose. Participants' personal data may be shared among the co-organisers and authorised third parties providing services in relation to the programme. In all such circumstances, data will be treated in strict confidence.

Privacy Policy of MTRA:
https://www.mtracademy.com/en/privacypolicy.html

Privacy Policy Statement of PolyU:
https://www.polyu.edu.hk/privacy-policy-statement/

Phototaking and Video Recording

Organisers of this programme may take photographs/ video recordings during this event and use such images in publicity, marketing activities/academic purposes.
The recorded images will be handled by respective organiser according to the prevailing policy. Enquiries shall be addressed to the following emails.

PolyU: Ms Karen Cheung
karen.cheung@polyu.edu.hk

BJTU: Ms. LIAO Yi
ysws@bjtu.edu.cn

MTRA: Ms. Ng Sei Ling
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Remark: Information presented in this leaflet is subject to change and does not form part of any contract between the University /Organisers and any person.

https://www.polyu.edu.hk/feng/br2024/