

Railway Risk and Safety Management Masters/MSc/Diploma/Certificate

Postgraduate degree programme Railway Risk and Safety Management Masters/MSc/Diploma/Certificate:

The programmes in Railway Risk and Safety Management have been jointly developed by the [Birmingham Centre for Railway Research and Education \(/research/activity/railway/index.aspx\)](#) (BCRRE) at the University of Birmingham and the High Integrity Systems Engineering (HISE) Group at the University of York.

The programme team aims to create a deep and robust understanding of approaches to manage safety and risk in transport systems and projects. The partners recognise that each transport sector and mode has its own specific features but seek to ensure that a common approach is taken to the generic issues involved in ensuring dependable operations.

From September 2014, the partner programme Graduate Diploma in Railway Risk and Safety Management will run at the Zhejiang Institute for Cybernetics at Zhejiang University in Hangzhou, China. This course is designed jointly by the Birmingham Centre for Railway Research and Education (BCRRE) at the University of Birmingham and the High Integrity Systems Engineering (HISE) Group at the University of York. View the [website for further information \(http://www.rism.org\)](#).

The development of the RISM programme at the University of Birmingham and the University of York and its partner programme at Zhejiang University are sponsored by the Lloyd's Register Foundation.



[\(http://www.lrfoundation.org.uk/\)](http://www.lrfoundation.org.uk/)

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[Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14 \(http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx\)](#)

Course fact file

Type of Course: Continuing professional development, taught

Study Options: Full time, part time

Duration: 1 year full-time, or on a part-time basis, typically over 24–36 months

Start date: September

Related courses

[Taught postgraduate degree courses - School of Civil Engineering \(/schools/civil-engineering/postgraduate/taught-degrees.aspx\)](#)

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[School of Civil Engineering \(/schools/civil-engineering/index.aspx\)](#)

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Details

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The full-time programme consists of eight classroom taught modules and two research-oriented modules. Part-time students follow the same syllabus as full-time students but complete the taught modules in a sequence that suits their work-commitments.

The full-time study periods are:

- Master of Science Degree: 12 months
- Postgraduate Diploma: 8 months
- Postgraduate Certificate: 4 months
- Continuing professional development options: 1 week modules

Related links

- [Railway Risk and Safety Management brochure \(pdf 1.5 MB\) \(/Documents/college-eps/civil/admissions/railway-risk-safety-masters.pdf\)](#)
- [Birmingham Centre for Railway Research and Education \(/research/activity/railway/index.aspx\)](#) (BCRRE)

- **High Integrity Systems Engineering** (<http://www.cs.york.ac.uk/research/research-groups/hise/>) (HISE),
- **Professor Felix Schmid** (<http://staff/profiles/civil/schmid-felix.aspx>), Programme Director, University of Birmingham, Tel: +44 (0) 121 414 5138
- **Dr Mark Nicholson** (<mailto:mark.nicholson@york.ac.uk>), University of York, Tel: +44 (0) 190 432 5568
- **Ms Holly Pike** (<mailto:h.j.pike@bham.ac.uk>), University of Birmingham, Tel: +44 (0) 121 414 4029

Why study this course

This postgraduate programme is intended for people that work for or expect to work for mainline railways, metros, tram systems or automated people movers.

The full-time programme suits numerate graduates who wish to enter the railway industry and professionals in the industry who wish to develop the necessary skills in the shortest possible time. Ideally candidates will have at least 18 months of relevant experience.

Modules

- Download the **Railway Risk and Safety Management timetable (pdf)** ([/Documents/college-eps/civil/admissions/railway-risk-safety-timetable.pdf](#))

G0: Foundations of System Safety Thinking (September)

This is an introductory module. It outlines the principles of system safety, including risk, basic terminology and the main types of hazard and safety assessment techniques. It also overviews materials covered in later modules. It will be delivered through distance learning. This module is run by the HISE Group at the University of York.

G1: Induction Weekend (September)

This weekend course prepares the new students for the challenge of postgraduate study. It provides an introduction to railway systems engineering, a team activity, and lectures on the history, the legislative and financial background and the structure of British and European railway industry. It includes an introduction to human factors and safety issues. A thorough grounding in research techniques and in academic writing is also provided. This module is run by the BCRRE at the University of Birmingham.

S1: Railway Operations and Control Systems Design (October)

The module covers the interdependent technical areas of the railway of operations and control systems. Areas addressed include the management of complexity, safe operation of freight and passenger train services, human resource management and environmental issues, as well as operations management and economics for the rail industry. The design of railway control and signalling systems requires a detailed understanding of the principles relating to braking performance, block operation, route setting, failsafe principles and the mathematical theories of safe software design. Interlocking design, automatic train control (ATP and ATO) and moving block are covered, together with the new European TrainControl System (ERTMS). The special requirements of metro and light rail operations are considered alongside signalling maintenance and EMC issues. Modelling of signalling systems and the simulation of simple railway networks are introduced through lectures and practical activities. The module is run by the BCRRE at the University of Birmingham, with many speakers from the railway industry.

S4: Technology Strategy and Supply Chain Management (October)

This module addresses the choice of railway technology elements; matching technology to route, operational requirements and legislation. It discusses the option of future proofing, back-up systems and emerging technologies. It covers issue such as obsolescence management, managing tolerances in documentation and manufacturing. Topics of quality control are covered. The module also addresses management of design processes, supply chain specification, risks and change. The teaching will be complemented with case studies of system application and relevant projects. This module is run by the BCRRE at the University of Birmingham.

S2: Railway Traction Systems and Traction Supplies (November)

This module covers all aspects of motive power, from diesel-electric propulsion through to pulse width converter systems for electric motive power units. Individual lectures deal with the basic physics of traction, friction braking and dynamic braking systems, DC and AC motor design and traction supplies, power converters, and train detection. Industry-based speakers address the topics of station design, station systems and infrastructure power supply components. The module is run by the BCRRE at the University of Birmingham.

G2: Safety and Risk Management in the System Development Process (November)

This module addresses hazard identification, the application of hazard analysis techniques, and the management and tracking of safety related risks through the development of a system. It also covers classical system safety analysis techniques such as fault trees (FTA) and Failure Modes and Effects Analysis (FMEA). This module is run by the HISE group at the University of York.

S3: Rolling Stock and Infrastructure Systems Interactions (December)

The infrastructure portion of this module is designed to give students an in-depth technical knowledge of the rolling stock and infrastructure systems and an understanding of how to design and maintain them in order to minimise risk and maximise safety. Railway alignment design, gauging, and maintenance issues are discussed in detail, as are issues relating to the rolling contact behaviour of the wheel-rail interface and to rail vehicle dynamics, including the steering of wheelsets. Aerodynamics, body-shell design and crashworthiness issues, choice of materials, vehicle maintenance, and the design and behaviour suspensions are covered in some detail. Also addressed are the topics of station design, station systems and infrastructure power supply components. The module is run by the BCRRE at the University of Birmingham, with many speakers from the railway industry.

G4: Safety Management Systems (January)

This module provides an awareness of the issues associated with conducting technical safety activities within an organisational and regulatory environment. It also aims to develop skills at applying theoretical safety engineering knowledge in situations constrained by human competency, resources and organisational culture. This module is run by the HISE group at the University of York.

G6: Systems Engineering and Ergonomics for Dependable Operations (February)

Dependability is defined as the combination of acceptable levels of reliability, availability and safety, often measured as service performance. The systems engineering portion of the module covers two broad areas: systems engineering and management of the engineering process, including project risk, risk control and reliability engineering. Lectures cover both hard and soft systems approaches, systems engineering tools, case studies and safety management issues. Human factors and organisational systems are also addressed in the lectures. The programme team covers the ergonomic needs of customers of railways and of the staff associated with their operation, together with the design of work places and railway related environments. The philosophical frameworks of fitness for purpose, usability and acceptance by users are explored in lectures and exercises. This module is jointly run by the University of Birmingham and the University of York.

G3: Computers and Safety in Critical Systems (February)

This module provides an introduction to the issues that must be considered when computers are used in safety-critical or safety-related applications. The emphasis throughout is on areas that are of potential concern to safety engineers. This is followed by a more in-depth examination of the software development process considering especially aspects of requirements specification, design and analysis that are all critical to the deployment of computers in safety-critical applications. The course also considers the software safety cases and the structuring and collection of evidence for the software safety case. This module is run by the HISE Group at the University of York.

G5: Through Life Safety (March)

This module addresses the safety issues that arise after system deployment, including safe management of operational systems; procedures required to maintain the

safety of systems when maintenance or modification is required; and safety monitoring and advanced safety monitoring techniques. This module is run by the HISE group at the University of York.

G7: Review of Group Exercise-Based Learning

This module provides a summary review of the previous modules and calls upon the students to synthesise the objectives and the course in professional presentations. Also included are railway industry site visits to area companies in order to allow students to witness first-hand the implementation of the systems which have been exhibited in the course.

Research Modules

- R1: Literature Review
- R2: Research Skills Workshop
- MSc Individual Investigative Research Project (January onwards)
Project topics are agreed between the student, the Universities and the sponsor, whether or not the student is a permanent employee. A project workshop help before the main project activity allows the postgraduate to learn more about finding a topic, developing a hypothesis and about carrying out the necessary research.
- Download the [Railway Risk and Safety Management timetable \(pdf\) \(/Documents/college-eps/civil/admissions/railway-risk-safety-timetable.pdf\)](#)

Fees and funding

Fees 2014/15

UK and EU

- Full-time MSc (180 credits): £13,410
- Part-time MSc (180 credits): £6,705 per year for two years
- Full-time Diploma (120 credits): £8,940
- Part-time Diploma (120 credits): £4,470 per year for two years
- One-year Certificate (60 credits): £4,470
- Two-year Certificate (60 credits): £2,430 per year for two years

International

- Full-time MSc: £17,960
- Part-time MSc: £8,683 per year for two years
- Full-time Diploma: £11,974
- Part-time Diploma: £5,987 per year for two years
- One-year Certificate: £5,987
- Two-year Certificate: £2,430 per year for two years

Learn more about [fees and funding \(/postgraduate/pgt-fees/fees.aspx\)](#)

Scholarships and studentships

Scholarships may be available. International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

For further information contact the School directly or email [sfo@contacts.bham.ac.uk \(mailto:sfo@contacts.bham.ac.uk\)](mailto:sfo@contacts.bham.ac.uk)

Entry requirements

The basic requirement is a good Honours degree in an appropriate science-related discipline (for example, Engineering, Physics, Economics or Mathematics) and evidence of a very good knowledge of the English language. However, practical experience may also be an important consideration or an alternative to a numerate degree.

International students:

We accept a range of qualifications from different countries – learn more about [international entry requirements \(/undergraduate/requirements/international/index.aspx\)](#). Also [Standard English language requirements \(/postgraduate/requirements-pgt/international/index.aspx\)](#) apply.

How to apply

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the [How to apply pages \(http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx\)](http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx)

Apply now (<https://pga.bham.ac.uk/lpages/EPS093.htm>)

Related links

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[Taught postgraduate degree courses - School of Civil Engineering \(/schools/civil-engineering/postgraduate/taught-degrees.aspx\)](#)

[Postgraduate degree courses in Civil Engineering at Birmingham \(pdf 1 MB\) \(/Documents/college-eps/civil/brochure/postgraduate-courses-civil-engineering.pdf\)](#)

Related news and events

[The William E Lardner Award in Civil Engineering \(/schools/civil-engineering/news/william-lardner-award.aspx\)](/schools/civil-engineering/news/william-lardner-award.aspx)

[University to play key role in training of HS2 engineers \(/news/latest/2014/09/training-of-hs2-engineers-30-09-14.aspx\)](/news/latest/2014/09/training-of-hs2-engineers-30-09-14.aspx)

Learning and teaching

The primary method for teaching is classroom-based lectures, which are delivered in one week blocks. In addition, some distance learning through software tools is part of the taught programme.

Several lectures are given by industrial speakers. Further learning is achieved through individual literature review, as part of assignments, or in group exercises.

The research and taught parts are complemented by site visits, study excursions, and working weekends throughout the year. A several day European study tour is also part of the programme.

Employability

This postgraduate programme is intended for people working on or expecting to work for mainline railways, metros, tram systems and automated people movers.

University Careers Network

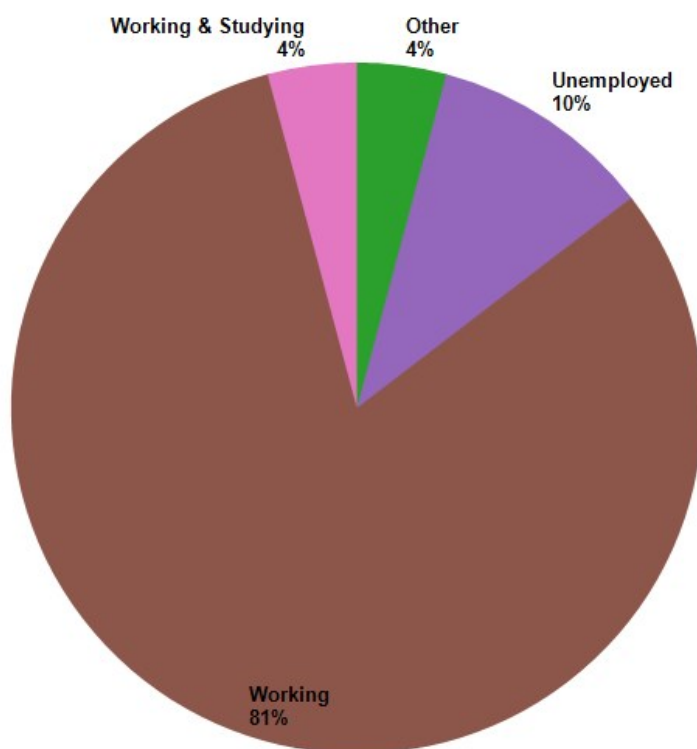
Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge.

If you make the most of the **wide range of services** (<https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx>) you will be able to develop your career from the moment you arrive.

Destinations of Leavers from Higher Education (DLHE) 2011/12 (postgraduate taught graduates)

The DLHE survey is conducted 6 months after graduation.



Examples of employers

- AECOM
- Amey
- Arup
- Atkins
- British Army
- Hyder Consulting
- Interserve
- Laing O'Rourke
- Mouchel
- Network Rail

Examples of occupations

- Assistant Civil Engineer
- Consultant Engineer
- Graduate Bridge Engineer
- Graduate Leader
- Graduate Site Engineer
- Graduate Tunnelling Engineer
- Officer Cadet
- Site Engineer
- Structural Engineer
- Water Engineer

Further study - examples of courses

- MRes Materials and Sustainable Technology

- MRes Science and Engineering of Materials
- MSc Computer Science
- MSc Construction Management
- MSc Environmental Technology
- MSc Railway Systems Engineering and Integration
- MSc Road Engineering and Management
- PhD Civil Engineering

