University of Nottingham
UK | CHINA | MALAYSIA

Department of Civil Engineering
Faculty of Engineering

Programme Outcomes

The Civil Engineering department at the University of Nottingham, Malaysia considers and integrates the programme outcomes (POs) from both the Malaysia Engineering Accreditation Council (EAC) and United Kingdom Joint Board Moderators (JBM).

For the Malaysia Engineering Accreditation Council (EAC), the programme outcomes for the Master of Engineering (MEng) in Civil Engineering are:

PO1	**Engineering Knowledge** - Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problems;
PO2	**Problem Analysis** - Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;
PO3	**Design / Development of Solutions** - Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations;
PO4	**Investigation** - Conduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;
PO5	**Modern Tool Usage** - Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations;
PO6	**The Engineer and Society** - Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice;
PO7	**Environment and Sustainability** - Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development;
PO8	**Ethics** - Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice;
PO9	**Individual and Team Work -** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;
PO10	**Communication -** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

PO11	**Project Management and Finance -** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments;
PO12	**Life Long Learning -** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Also, in delivering the same course as in the UK, the Civil Engineering department at UNMC adopts the same POs which maps onto those from JBM and ECUK. The POs encompass various aspects identified in the UK Spec requirements such as:

- Science and Mathematics
- Engineering Analysis
- Design
- Economic, legal, social, ethical and environmental context
- Engineering practice
- Additional General Skills

These aspects and level of competency/skill are structured and presented in the table below.

	Science and Mathematics
SM1	A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies
SM2	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply a range of mathematical and statistical methods, tools and notations proficiently and critically in the analysis and solution of engineering problems
SM3	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline and the ability to evaluate them critically and to apply them effectively
SM4	Awareness of developing technologies related to own specialisation

SM5	A comprehensive knowledge and understanding of mathematical and computational models relevant to the engineering discipline, and an appreciation of their limitations
SM6	Understanding of concepts from a range of areas, including some outside engineering, and the ability to evaluate them critically and to apply them effectively in engineering projects
	Engineering Analysis
EA1	Understanding of engineering principles and the ability to apply them to undertake critical analysis of key engineering processes
EA2	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques
EA3	Ability to apply quantitative and computational methods, using alternative approaches and understanding their limitations, in order to solve engineering problems and to implement appropriate action
EA4	Understanding of, and the ability to apply, an integrated or systems approach to solving complex engineering problems
EA5	Ability to use fundamental knowledge to investigate new and emerging technologies
EA6	Ability to extract and evaluate pertinent data and to apply engineering analysis techniques in the solution of unfamiliar problems
EA7	Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaption of engineering analytical methods.
	Design
DD1	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics
DD2	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards
DD3	Work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies
DD4	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal
DD5	Plan and manage the design process, including cost drivers, and evaluate outcomes

DD6	Communicate their work to technical and non-technical audiences
DD7	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations
DD8	Demonstrate the ability to generate an innovative design for products, systems, components or processes to fulfil new needs
	Economic, legal, social, ethical and environmental context
EE1	Understanding of the need for a high level of professional and ethical conduct in engineering, a knowledge of professional codes of conduct and how ethical dilemmas can arise
EE2	Knowledge and understanding of the commercial, economic and social context of engineering processes
EE3	Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations and how they may be applied appropriately
EE4	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate
EE5	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues, and an awareness that these may differ internationally
EE6	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk
EE7	Understanding of the key drivers for business success, including innovation, calculated commercial risks and customer satisfaction
	Engineering Practice
EP1	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc)
EP2	Knowledge of characteristics of particular equipment, processes, or products, with extensive knowledge and understanding of a wide range of engineering materials and components;
EP3	Ability to apply relevant practical and laboratory skills
EP4	Understanding of the use of technical literature and other information sources
EP5	Knowledge of relevant legal and contractual issues

EP6	Understanding of appropriate codes of practice and industry standards
EP7	Awareness of quality issues and their application to continuous improvement
EP8	Ability to work with technical uncertainty
EP9	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments
EP10	Ability to apply engineering techniques taking account of a range of commercial and industrial constraints
EP11	Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader
	Additional General Skills
GS1	Apply their skills in problem solving, communication, working with others, information retrieval and the effective use of general IT facilities
GS2	Plan self-learning and improve performance, as the foundation for lifelong learning/CPD
GS3	Monitor and adjust a personal programme of work on an on-going basis
GS4	Exercise initiative and personal responsibility, which may be as a team member or leader