

NZDE Civil Engineering Courses

Course Code	Course Name	Learning Outcomes
Compulsory		
DE4101	Engineering Fundamentals	<ol style="list-style-type: none"> 1. Demonstrate an understanding of, and apply, the fundamentals of statics, dynamics and mechanical energy concepts. 2. Evaluate direct stress and strain, and derive elastic properties from tensile test results. 3. Demonstrate an understanding of the engineering properties of fluids and apply the fundamentals of hydrostatics. 4. Demonstrate an understanding of electrical voltage, current and resistance and explain the difference between AC and DC. 5. Demonstrate awareness of the New Zealand Electricity system and describe some of its safety features. 6. Demonstrate an understanding of heat energy and transfer; temperature and humidity of air
DE4102	Engineering Mathematics	<ol style="list-style-type: none"> 1. Manipulate and solve algebraic expressions and equations. 2. Solve, manipulate, and apply mathematical functions, including application of graphs where appropriate. 3. Apply the rules and principles of trigonometry using both degree and radian measure. 4. Demonstrate knowledge of differentiation and integration techniques and apply them to solve engineering problems. 5. Demonstrate knowledge and application of one of the following: <ol style="list-style-type: none"> 5.1 Complex numbers, logic expressions and numbers OR 5.2 Basic statistical concepts and techniques
DE4103	Technical Literacy	<ol style="list-style-type: none"> 1. Utilise information obtained from physical or web based resources in technical problem solving and presentations. 2. Prepare and deliver an oral presentation on a technical subject. 3. Communicate ideas and technical findings in a written format. 4. Create and use pictorial sketches and pictorial/orthographic drawings to current drawing standards as a communication technique to present ideas and data. 5. Demonstrate interpersonal communication skills to develop project Outcomes.

DE4201	Materials (civil)	<ol style="list-style-type: none"> 1. Identify and describe the composition of minerals and rocks, and discuss soil and rock formation processes 2. Demonstrate knowledge and understanding of physical and structural geology and interpret geological maps 3. Describe the causes and effects of earthquakes 4. Describe and evaluate the properties and applications of concrete, metals, timber and new materials in Civil Engineering.
DE4202	Land Surveying 1	<ol style="list-style-type: none"> 1. Understand basic principles of land surveying and use survey instruments. 2. Understand and apply fundamental principles and techniques of levelling, traversing and co-ordinate calculations, and errors distribution 3. Use equipment and apply techniques for field and distance measurements.
DE5207	Geotechnical Engineering 1	<ol style="list-style-type: none"> 1. Describe soil composition and calculate soil phase ratios 2. Determine basic engineering properties of soils 3. Classify soils in the field and from laboratory results 4. Describe and evaluate methods to improve the engineering properties of soils 5. Plan geotechnical site investigations and interpret the results.
DE5202	Civil & Structural Drawing	<ol style="list-style-type: none"> 1. Produce civil engineering drawings to recognised standards. 2. Produce Structural concrete, steel, and timber drawings to recognised standards. 3. Produce drawings using computer aided draughting (CAD) techniques.
DE5201	Structures 1	<ol style="list-style-type: none"> 1. Calculate stresses caused by axial forces, shear forces and bending moments 2. Analyse simple structural elements and - structures 3. Evaluate the range of common structural loadings and their effect on structures
DE5204	Highway Engineering 1	<ol style="list-style-type: none"> 1. Outline and describe road infrastructure administration agencies and principles of route location. 2. Evaluate the properties and testing of road earthworks, pavement and wearing surface materials, discuss road construction practice and pavement distress. 3. Evaluate the components, functions and design of surface and sub-surface drainage for roads.

		4. Describe basic horizontal and vertical alignment of a road.
DE5203	Hydraulics (Civil)	<ol style="list-style-type: none"> 1. Apply the principles of fluid statics and dynamics. 2. Analyse pipelines and pipe networks. 3. Analyse uniform and non-uniform open channel flow. 4. Determine the operating characteristics of pumps in a range of pipeline systems. 5. Evaluate the operation and application of a range of equipment used for the measurement of fluid flow in open and closed conduits.
DE6102	Engineering Project	<ol style="list-style-type: none"> 1. Develop preliminary design(s), based on a given specification, for an engineering project relevant to their strand (Civil, Mechanical, Electrical, Electronics, Fire). 2. Develop a plan or design parameters considering functionality, safety, environmental, cultural and ethical issues 3. Undertake well-defined planning and produce as project output 4. Produce supporting documentation relevant to project output 5. Evaluate compliance of the project output against specification 6. Present findings to an audience in a professional manner
DE6101	Engineering Management	<ol style="list-style-type: none"> 1. Identify the parties involved in an engineering project and evaluate the roles and responsibilities that each has. 2. Apply the fundamentals of project management to a well-defined engineering project. 3. Appraise the procurement process, evaluate contract documentation and prepare cost estimates for a well-defined engineering project. 4. Demonstrate how to administer and supervise projects, contracts and engineering works in accordance with the relevant standards and/or codes of practice. 5. Critically evaluate professional practice principles and their application to an engineering environment.
Electives (select 4)		
DE5205	Engineering Surveying	<ol style="list-style-type: none"> 1. Execute survey computations and assess errors, accuracy and probability of survey data. 2. Demonstrate understanding of survey specialisation and methods.

		<p>3. Undertake a range of site and engineering surveying tasks.</p> <p>4. Appraise safety requirements in surveying.</p>
DE5206	Structures 2	<p>1. Analyse a range of statically determinate and indeterminate structures and structural elements.</p> <p>2. Appraise and evaluate the effects of a range of loads (actions) on structures.</p> <p>3. Design a range of simple structural elements.</p>
DE6201	Geotechnical Engineering 2	<p>1. Examine the occurrence and flow of water through soils and discuss the impact soil water has in engineering practice.</p> <p>2. Determine and evaluate the shear strength parameters of soils.</p> <p>3. Determine the earth pressure on, and analyse the stability of, earth retaining structures.</p> <p>4. Analyse the stability of earth slopes.</p> <p>5. Determine the bearing capacity of shallow and deep foundations.</p> <p>6. Understand the process of consolidation and estimate consolidation settlement.</p> <p>7. Describe the causes of liquefaction and how these can be controlled to reduce the chances of liquefaction</p>
DE6202	Highway Engineering 2	<p>1. Evaluate the road transportation funding mechanisms and the feasibility of roading projects</p> <p>2. Design the geometrical and structural components of a road.</p> <p>3. Evaluate Road maintenance solutions/techniques and develop a simple road maintenance strategy</p> <p>4. Evaluate asset management and road maintenance management fundamentals.</p>
DE6203	Traffic Engineering	<p>1. Evaluate the role of human capabilities and vehicle characteristics in relation to road usage.</p> <p>2. Apply the principles of traffic flow theory.</p> <p>3. Appraise and evaluate traffic management techniques and plan and evaluate a range of traffic surveys.</p> <p>4. Appraise the design of at grade intersections for selected situations.</p> <p>5. Appraise the principles and techniques of road safety analysis in practical contexts.</p> <p>6. Appraise the design factors relating to traffic facilities for non-motor vehicle road users and public transport.</p>
DE6204	Structures 3	<p>1. Analyse a range of statically indeterminate structures.</p>

		<p>2. Appraise and evaluate the effects of a range of loads (actions) on structures.</p> <p>3. Design a range of structural elements.</p>
DE6205	Water & Wastewater Systems	<p>1. Analyse water supply and demand requirements, and design a small water reticulation system.</p> <p>2. Evaluate hydrological parameters and design an urban storm water management system.</p> <p>3. Determine waste water quantities and design a waste water reticulation system.</p> <p>4. Appraise the requirements of water and waste water pumping installations and optimise design.</p> <p>5. Evaluate integrated water management approaches.</p>
DE6206	Water & Wastewater Management	<p>1. Evaluate and apply drinking water standards and quality parameters.</p> <p>2. Understand and appraise the principles and practice of water treatment.</p> <p>3. Evaluate and apply waste water quality parameters.</p> <p>4. Evaluate wastewater- and solid waste treatment and disposal methods.</p> <p>5. Critically evaluate environmental impact and Maori cultural values in relation to water supply and waste management.</p>
DE6207	Land Surveying 2	<p>1. Undertake advanced setting out and levelling tasks.</p> <p>2. Demonstrate knowledge of the cadastral survey system and land subdivision process in NZ, and application of GNSS in surveying</p> <p>3. Demonstrate knowledge of survey computations</p> <p>4. Demonstrate knowledge of professional practice aspects, including responsibilities of the surveyor.</p>
DE6208	Civil Eng & Construction Practices	<p>1. Appraise the plant and methods used in the full range of civil engineering construction activities.</p> <p>2. Develop and implement safety plans for the full range of civil engineering construction activities.</p> <p>3. Develop and implement quality control plans for the full range of civil engineering construction activities.</p> <p>4. Develop and implement environmental protection plans for the full range of civil engineering construction activities.</p>