

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
Course Descriptor	



COURSE CODE:	COURSE TITLE:	
CET2.002	Core Skills (Civil & Highway)	Foundation Elective

WITT credit value: 15
Level: 2
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	75
Self-directed hours	75
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period.

Purpose:

To introduce common engineering terminology and technical literacy fundamentals, and to develop basic engineering measurement, computational and mathematical skills, at NCEA level 2, to enable the analysis and calculation based solution of simple engineering problems.

Pre-requisites:

There are no prerequisites.

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
5.	Use computational techniques and basic mathematics to solve a broad range of defined engineering problems
6.	Understand the usage of a broad range of engineering terminology and units of measurement, and carry out units conversions.
7.	Utilise computer- and web based resources in communication- and problem solving applications.

Content/main topics:

- General algebraic manipulations,
- Manipulation and transposition of quantities
- Exponents and indices
- Linear, quadratic and simultaneous equations
- Trigonometry concepts and applications; solve right angle triangles; solution of non right angle triangle problems, calculation of areas and volumes
- Radian measurements and applications
- Engineering units used in the Standard International (SI) system to measure time, length, area, volume, mass, force, velocity, acceleration, gravity, flow rate, pressure and stress
- Calculations involving the use of prefixes (eg. milli-, kilo-, etc.) in the SI system; conversion of units
- Definition and relationships: Mass, volume, weight, density, unit weight, specific gravity, force, pressure, pressure head
- Computer application tools: basic word-processing skills, basic spreadsheet skills, engineering applications.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TASK	WEIGHTING	LEARNING OUTCOMES
Projects/presentations	30%	3
Assignments/tests	40%	1,2
Examination	30%	1,2

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies:

Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Laboratories

Required texts:

None. Printed course notes are provided.

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
Course Descriptor	



COURSE CODE:	COURSE TITLE:	
CET3.001	Introduction to CAD	Foundation Elective

WITT credit value: 15
Level: 3
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	75
Self-directed hours	75
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period.

Purpose:

People credited with this course are able to:

- Prepare CAD environment; create drawing entities; edit entities and attributes; and produce and confirm output.
- Describe and apply sketching techniques in preparation for CAD drawing and produce drawings in CAD to a recognised standard.

Pre-requisites:

There are no prerequisites.

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
8.	Prepare CAD environment
9.	Create drawing entities
10.	Edit entities and attributes
11.	Produce and confirm output
12.	Produce drawings in CAD to a recognised standard

Content/Main topics:

- Sketching techniques and engineering communications
- Creating drawing contexts in a CAD environment
- Introduction to CAD base details, editing entities and attributes
- Producing drawings in CAD to meet standard requirements
- Checking outputs to confirm conformance to industry standards

**Basis of assessment:**

Assessments in this course are competency based.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Portfolio of drawings produced in CAD format	100%	1,2,3,4,5

**Refer Course Information Sheet for the individual weighting of drawing requirements*

Required texts:

There are no required texts.

Learning and Teaching Strategies:

Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Laboratories

Required texts:

None. Printed course notes are provided.

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
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COURSE CODE:	COURSE TITLE:	
CET3.002	Mathematics (Introduction)	Foundation Elective

WITT credit value: 15
Level: 3
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	75
Self-directed hours	75
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period.

Purpose:

People credited with this course are able to demonstrate knowledge and understanding of the following at NCEA level 2 level:

- Use basic algebraic functions, formulae and equations to solve problems.
- Choose and apply trigonometric methods to solve problems.
- Plot graphs to solve linear, simultaneous and quadratic functions
- Show an understanding of statistical concepts and use basic statistical methods
- Understand basic level calculus and use differentiation and integration to solve problems

Pre-requisites:

There are no prerequisites.

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
1.	Transpose, manipulate, expand, factorise and simply basic algebraic functions
2.	Solve linear, simultaneous and basic quadratic equations
3.	Show an understanding of the use of equations involving powers and indices
4.	Solve simple logarithmic and exponential equations
5.	Solve problems involving right angle triangles - areas, lengths, angles, etc
6.	Use sine, cosine and/or area rules to solve non-right angle triangle problems
7.	Solve basic trigonometric equations involving sine, cosine or tangent

8.	Solve problems involving radians and degrees, including unit conversions
9.	Use of graphs to solve linear, simultaneous and quadratic equations
10	Draw basic statistical graphs from supplied data to highlight areas of interest
11	Compute basic statistical quantities – mean, mode, standard deviation
12	Understand basic statistical concepts – measure of spread, cumulative frequency
13	Understand the use of basic calculus concepts and notation
14	Understand basic differentiation and integration rules – chain rule
15	Solve simple area problems using integration techniques
16	Use basic calculus to solve problems including maxima and minima models



Content/Main topics:

- General algebraic expansions and applications
- Manipulation and transposition of quantities
- Linear, quadratic and simultaneous equations
- Graphical methods - linear, quadratic and simultaneous equations
- Trigonometry concepts and applications
- Radial measurements and applications
- Statistical concepts and applications
- Calculus concepts and applications

Basis of assessment:

Assessments in this course are achievement based.

Assessment requirements:

COMPONENT	ASSESSMENT TASK	LEARNING OUTCOME(S)	WEIGHTING
Coursework Mark	Assignments and tests*	All	50%
Examination Mark	1 x 3 hour examination	All	50%
Final Mark	Coursework plus examination		100%

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies:

Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Laboratories

Required texts:

None. Printed course notes are provided.

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
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COURSE CODE:	COURSE TITLE:	
CET4.111	Engineering Fundamentals	Elective

WITT credit value: 15
Level: 4
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To introduce the basic fundamentals of a range of engineering disciplines.

Pre-requisite:

CET2.002 Mathematics (Introduction)

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
13.	Demonstrate an understanding of, and apply, the fundamentals of statics, dynamics
14.	Evaluate direct stress and strain, and derive elastic properties from tensile test results.
15.	Demonstrate an understanding of the engineering properties of fluids and apply the fundamentals of hydrostatics.
16.	Demonstrate an understanding of electrical voltage, current and resistance and explain the difference between AC and DC.
17.	Demonstrate awareness of the New Zealand Electricity system and describe some of its safety features.
18.	Demonstrate an understanding of heat energy and transfer; temperature and humidity of air.



Content/main topics:

- SI units, Units conversion; Scalars, Vectors, Force, Components of a force; Analysis of concurrent force systems; Moment of a force, Conditions of static equilibrium, beam support reactions; First moment of area, Centroid, Centre of gravity; Velocity, Acceleration, Linear motion; Newton's laws of motion; Friction on level surfaces; Work and Power; Potential- and Kinetic energy, Conservation of energy
- Tensile-, Compressive- and Shear stress and strain; Tensile test, Elastic Modulus
- Fluid properties: Density, Specific gravity, Specific Weight, Viscosity; Pressure, head, gauge pressure, absolute pressure, manometers
- Electron flow, voltage, current, resistance, batteries, generators, Ohm's law, use of multimeter, AC and DC applied to resistive circuits
- Overview of the power distribution system, MEN system, protection and safety
- Radiant, conductive and convective heat energy. Thermal mass and thermal conductivity. Latent heat of vaporization and freezing. Simple temperature sensors and sources of errors in measurement

Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Tests	20%	1,2,3,
Practicals/Assignments	30%	Any 3 of 1,2,3,4,6
Examination	50%	1,2,3,4,5,6

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Project investigations
• Tutorials	• Visiting guest lecturers
• Formative assessments	• Videos
• Web technologies	• Laboratories
• Computer simulation	• Group work

Required texts:

None. Printed course notes are provided

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
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COURSE CODE:	COURSE TITLE:	
CET4.112	Mathematics 1	Elective

WITT credit value: 15
Level: 4
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To develop mathematical skills, concepts and understandings in order to perform calculations and solve problems within engineering contexts.

Pre-requisite:

CET2.002 Mathematics (Introduction)

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
19.	Manipulate and solve algebraic expressions and equations.
20.	Solve, manipulate and apply mathematical functions, including application of graphs where appropriate.
21.	Apply the rules and principles of trigonometry using both degree and radian measure.
22.	Demonstrate knowledge of differentiation and integration techniques and apply them to solve engineering problems.
23.	Demonstrate knowledge and application of one of the following:
	5.1 Complex numbers, logic expressions and numbers
	OR
	5.2 Basic statistical concepts and techniques.

Content/main topics:

- Rules for simplifying, factorising, exponents and fractions; Simple manipulation of surds; Linear equations
- Basic functions: linear-, quadratic-, exponential-, logarithmic functions; Solve quadratic, exponential and log equations; Solve simultaneous equations; Graphs: linear-, polynomial-, exponential-, logarithmic-, simple rational functions; Amplitude, frequency, period, phase displacement and time displacement of a graph
- Trigonometric identities and formulae; Degree and radian measure; Solve trigonometric equations; Graph trigonometric functions; Calculation of areas and volumes
- Differentiation and integration rules and concepts; Applications of differentiation: tangent to a curve, minima and maxima, optimisation techniques, rate of change of time dependent variables, growth and decay rates; Applications of integration: Area under a curve, mean value, RMS (non-trigonometric only), first and second moments of area, Simpson's rule.
- Complex numbers: rectangular and polar conversion, quadratic equations with complex roots, Logic expressions and numbers: Conversions between and operations on binary, hexadecimal, decimal and binary coded decimal numbers; Boolean algebraic expressions.
- Mean, median, range, standard deviation, Scatter diagrams, Regression analysis, Correlations.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Assignments	30%	1,2,3,4,5
Tests	20%	1,2,3,4,5
Examination	50%	1,2,3,4,5

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

Typically a blend of the following:

• Lectures	• Computer simulation
• Tutorials	• Laboratories
• Formative assessments	• Videos
• Web technologies	• Group work

Required texts:

None. Printed course notes are provided

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
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COURSE CODE:	COURSE TITLE:	
CET4.113	Technical Literacy	Compulsory

WITT credit value: 15
Level: 4
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	75
Self-directed hours	75
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To develop technical research skills along with oral, written, graphical and interpersonal communication skills.

Pre-requisite:

Nil

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
24.	Utilise information obtained from physical or web based resources in technical problem solving and presentations.
25.	Prepare and deliver an oral presentation on a technical subject.
26.	Communicate ideas and technical findings in a written format.
27.	Create and use pictorial sketches and pictorial/orthographic drawings to current drawing standards as a communication technique to present ideas and data.
28.	Demonstrate interpersonal communication skills to develop project outcomes.

Indicative Content:

- Technical and business communication to standards and codes including referencing systems, physical and web based resources.
- Interpersonal communication.
- Computer application tools, e.g. word-processing, spread sheeting, presentation graphics
- Pictorial sketching and basic engineering drawing techniques, orthographic projection, dimensioning principles, principles of drawing office practice and drawing management.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Written Assessment	30%	1,3,5
Oral Presentation	20%	1,2,5
Examination	50%	4

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

To pass this course, the student must achieve a total minimum mark of 50% including a minimum of 50% for learning outcome 4.

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Project investigations
• Tutorials	• Visiting guest Lecturers
• Formative assessments	• Videos
• Web technologies	• Laboratories
• Computer simulation	• Group work

Required texts:

None. Printed course notes are provided



Course Descriptor

COURSE CODE:	COURSE TITLE:	
CET4.211	Materials (Civil)	Elective

WITT credit value: 15
Level: 4
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To introduce the fundamentals of geological and geomorphological processes and the properties and application of a range of civil engineering materials.

Pre-requisites:

Nil

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
29.	Identify and describe the composition of minerals and rocks, and discuss soil & rock formation processes
30.	Demonstrate knowledge and understanding of physical and structural geology and interpret geological maps
31.	Describe the causes and effects of earthquakes
32.	Describe and evaluate the properties and applications of concrete, metals, timber and new materials in Civil Engineering.



Content/main topics:

- Common rock forming minerals, Formation and properties of rocks
- Mechanical & chemical weathering, erosion, deposition, land slides
- Structural geology, geological maps
- Earthquake terminology, magnitude, plate tectonics, effects of earthquakes, case studies
- Concrete, cement, aggregates, concrete manufacture, properties, testing, admixtures, hot and cold weather concreting, mix design, masonry
- Metals: engineering properties of steel (tensile strength, modulus, hardness, ductility), reinforcing steel
Applications of other metals (aluminium, alloys)
Corrosion: causes, effects, protection against
Joining methods, welding, bolting
- Timber: strength, durability, conversion, moisture states, seasoning, defects, grading, classification, preservation, wood based products, jointing
- Geosynthetics, plastics

Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TASK	WEIGHTING	LEARNING OUTCOMES
Practicals	10%	1
Assignments/ Tests	15% 25%	1, 2, 3 4
Examination	20% 30%	1, 2, 3 4

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies:

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Laboratories

Required texts:

None. Printed course notes are provided.



Course Descriptor

COURSE CODE:	COURSE TITLE:	
CET4.212	Land Surveying 1	Elective

WITT credit value: 15
Level: 4
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To understand and apply the theoretical and practical concepts of Land Surveying

Pre-requisite:

CET2.002

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
33.	Understand basic principles of land surveying and use survey instruments.
34.	Understand and apply fundamental principles and techniques of levelling, traversing and co-ordinate calculations, and errors distribution
35.	Use equipment and apply techniques for field and distance measurements.



Content/main topics:

- Principles of land surveying, survey instruments and targets, safety in surveying
- Fundamental principles and techniques of levelling, traversing, fundamental, coordinate calculations, errors.
- Field- and distance measurements, Global Navigation Satellite Systems in land surveying

Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Assignments/Practicals	40%	1, 2, 3
Tests	10%	1, 2, 3
Examination	50%	1, 2, 3

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Practicals

Required texts:

None. Printed course notes are provided

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
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COURSE CODE:	COURSE TITLE:	
CET5.202	Civil and Structural Drawing	Elective

WITT credit value: 15
Level: 5
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To develop skills required to produce civil engineering and structural drawings.

Pre-requisites:

CET4113 Technical Literacy

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
54.	Produce civil engineering drawings to recognised standards.
55.	Produce Structural concrete, steel, and timber drawings to recognised standards.
56.	Produce drawings using computer aided draughting (CAD) techniques.

Content/main topics:

- Principles of drawing office practice and drawing management
- Topographical survey plans
- Civil engineering construction drawings for roads and water/waste reticulation, long and cross sections; volume calculations
- Subdivision development layout drawings
- Structural concrete, steel and timber drawings

**Basis of assessment:**

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Portfolio of Drawings of which at least 50% must be produced in CAD format	100%	1,2,3

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Computer simulation
• Formative assessments	• Videos
• Visiting guest lecturers	• Drawing and CAD Laboratory
• Web technologies	

Required texts:

None. Printed course notes are provided



Course Descriptor

COURSE CODE:	COURSE TITLE:	
CET5.203	Hydraulics (Civil)	Elective

WITT credit value: 15
Level: 5
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Tutor contact hours	80
Self-directed hours	70
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To introduce the principles of fluid mechanics and apply them in civil engineering hydraulic applications.

Prerequisites:

CET4.112 Mathematics 1 or equivalent.

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
57.	Understand and apply the principles of fluid statics and dynamics
58.	Analyse pipelines and pipe networks
59.	Analyse uniform and non-uniform open channel flow
60.	Determine the operating characteristics of pumps in a range of pipeline systems
61.	Demonstrate understanding of the operation and application of a range of equipment used for the measurement of fluid flow in open and closed conduits

Content/main topics:

- Pressure & head, manometers; hydraulic lift (jack); resultant thrust on inclined and curved surfaces; buoyancy, types of flow (uniform, non-uniform, steady, unsteady), Reynold's number, principle of continuity; fluid energy (Bernoulli), momentum principle, thrust on bends and reducers.
- Major and minor losses, Single pipe analyses, pipes in parallel and series, pipe network analysis, computer applications
- Manning's formula, best channel sections, circular conduits, specific energy, critical depth, sub and super critical flow, Froude number, flow profiles.
- Pump types and applications, turbine types and applications, operating characteristics of centrifugal pumps, pump system optimisation, series vs parallel pumps, variable speed pumps, NPSH.
- Sharp and broad crested weirs, flumes, flow orifices, flow nozzles, flow meters and gauges (magnetic flow meters, etc)



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Assignments/Projects	35%	1,2,3,4,5
Tests	15%	1,2,3,4
Examination	50%	1,2,3,4,5

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Laboratories

Required texts:

None. Printed course notes are provided.



Course Descriptor

COURSE CODE:	COURSE TITLE:	
CET5.204	Highway Engineering 1	Compulsory

WITT credit value: 15
Level: 5
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To introduce the fundamentals of road materials, road construction practices and road maintenance techniques, as well as the principles of drainage design.

Pre-requisite:

CET2.002

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
62.	Outline and describe road infrastructure administration agencies, road transportation funding mechanisms and principles of route location.
63.	Evaluate the properties and testing of road earthworks, pavement and wearing surface materials and demonstrate knowledge of road construction practice
64.	Demonstrate an understanding of the components, functions and design of surface and sub-surface drainage for roads
65.	Evaluate road maintenance solutions/techniques and develop a simple road maintenance strategy.

Content/main topics:

- Overview of road infrastructure in NZ, State highways vs local roads, the responsibilities of roading agencies in NZ, funding sources and mechanisms, principles of route location
- Site establishment, road formation terminology, earthworks materials and construction practice, sub grade preparation, sub grade improvement, pavement types and components, pavement materials and construction practice, Wearing surface types, wearing surface materials and construction practice
- Surface run-off determination, surface and sub-surface drainage components and installation, culverts, environmental impact of storm water run-off from roads and construction sites
- Modes of surface and pavement distress, failure modes, road condition monitoring, maintenance methods and strategies, life cycle, rehabilitation options, temporary traffic management requirements, safety.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below. The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TASK	WEIGHTINGS	LEARNING OUTCOMES
Assignment/Projects	40%	1,2,3,4
Tests	10%	1,2,3,4
Examination	50%	1,2,3,4

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Laboratories
• Videos	

Required texts:

None. Printed course notes are provided.

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
Course Descriptor	



COURSE CODE:	COURSE TITLE:	
CET5.207	Geotechnical Engineering 1	Elective

WITT credit value: 15
Level: 5
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To introduce the fundamentals of geological and geomorphological processes and the properties and application of a range of civil engineering materials.

Prerequisite:

CET2.002

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
66.	Describe soil composition and calculate soil phase ratios
67.	Determine basic engineering properties of soils
68.	Classify soils in the field and from laboratory results
69.	Describe and evaluate methods to improve the engineering properties of soils
70.	Plan geotechnical site investigations and interpret the results.

Content/main topics:

- Soil composition,
- Soil tests: grading analysis, plasticity characteristics (LL, PL, PI, CPL, SL), compaction
- Soil classification – unified classification system
- Soil compaction and stabilisation, Shear strength of soils, California Bearing Ratio (CBR), Permeability characteristics of soils
- Subsoil investigations, soil description; soil sampling; in-situ testing; safety.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Assignment / Projects	25%	1, 3, 5
Laboratory Reports	15%	2, 4
Tests	10%	1, 2, 3, 4, 5
Examination	50%	1, 2, 3, 4, 5

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting Guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Laboratories/Practicals
• Group work	

Required texts:

None. Printed course notes are provided.

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
Course Descriptor	



COURSE CODE:	COURSE TITLE:	
CET6.101	Engineering Management	Elective

WITT credit value: 15
Level: 6
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To develop the knowledge and skills required to administer and manage projects effectively in a specific discipline of engineering

Pre-requisite:

Nil

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
71.	Demonstrate an understanding and apply the fundamentals of project planning and project management
72.	Prepare and evaluate cost estimates, tender documentation and contract documentation
73.	Administer and supervise contracts in accordance with the relevant Standards and/or Codes of Practice
74.	Critically evaluate professional practice principles and their application to an engineering environment.

Content/main topics:

- Project Management functions, scheduling techniques, Critical path analysis, PERT charts, Gantt charts, uncertainty and Risk management
- Contract law and Documentation, schedules of Quantities, costing and Tendering; time cost/quality balance; contract types; engineering company structures.
- Requirements of discipline specific Conditions of Contract (NZS3910), dispute resolution
- Professionalism and Ethics, consultation, Treaty of Waitangi, Sustainability, RMA.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TASK	WEIGHTING	LEARNING OUTCOMES
Projects/Assignments	50%	1, 2, 3, 4
Examination	50%	1, 2, 3, 4

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Group work
• Laboratories	• Projects investigations

Required texts:

None. Printed course notes are provided

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
Course Descriptor	



COURSE CODE:	COURSE TITLE:	
CET6.202	Highway Engineering 2	Elective

WITT credit value: 15
Level: 6
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To develop knowledge of road design, roading project evaluations and maintenance management.

Pre-requisite:

CET5.204 Highway Engineering 1

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
75.	Evaluate the feasibility of roading projects
76.	Design the geometrical and structural components of a road
77.	Demonstrate understanding and knowledge of asset management and road maintenance management fundamentals

Content/main topics:

- Benefit cost ratio, projects costs, project benefits, time value of money, project evaluations
- Characteristics and applications of a range of wearing surfaces, design of sprayed seal surfaces, flexible pavement design using standard design charts, introduction to mechanistic analysis, road geometrics, horizontal alignment, transition curves, vertical alignment, ancillary services (safety rails, pavement marking, signage, street lighting)
- Asset management fundamentals, road performance data acquisition and analysis, life cycle costing, maintenance management strategies



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Assignment/Projects	40%	1,2,3
Tests	10%	1,2,3
Examination	50%	1,2,3

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Tutorials
• Formative assessments	• Visiting guest Lecturers
• Web technologies	• Computer Simulation
• Videos	• Project investigations

Required texts:

None. Printed course notes are provided

PROGRAMME CODE:	PROGRAMME TITLE:
TK1003	Certificate in Engineering Technology
Course Descriptor	



COURSE CODE:	COURSE TITLE:	
CET6.205	Water & Wastewater Systems	Elective

WITT credit value: 15
Level: 6
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To evaluate the requirements of, and design water, waste water and storm water reticulation systems.

Pre-requisites:

CET4.212 Core Engineering Skills (Water)
 CET4.213 Water and Wastewater (Introduction)

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
78.	Analyse water supply and demand requirements, and design a small water reticulation system.
79.	Evaluate hydrological parameters and design an urban storm water management system.
80.	Determine waste water quantities and design a waste water reticulation system.
81.	Appraise the requirements of water and waste water pumping installations and optimise design.
82.	Understand integrated water management approaches

Content/main topics:

- Water supply sources; Water demand; Water reticulation system components; Water reticulation analysis; Reticulation installation and maintenance, reservoirs.
- Hydrological cycle; Surface run-off determination; Infiltration; Storm water reticulation components and design; Storm water buffering, Storm water disposal, Impact of storm water run-off.
- Waste water sources and quantities; Waste water collection and reticulation system components, design and maintenance.
- More efficient use of water, water metering, recycled water
- Pump station layout and components; Variable capacity requirements; Sump capacity Series, parallel and variable pump operation; Pump system (sump, pump and rising main) optimisation.



Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Assignments/ Projects	40%	1,2,3,4, 5
Tests	10%	1,2,3,4
Examination	50%	1,2,3,4, 5

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Computer simulation
• Tutorials	• Videos
• Formative assessments	• Project investigations
• Visiting guest lecturers	• Field trips
• Web technologies	

Required texts:

None. Printed course notes are provided



Course Descriptor

COURSE CODE:	COURSE TITLE:	
CET6.206	Water and Waste Management	Elective

WITT credit value: 15
Level: 6
Duration: 20 Weeks
Internet based learning indicator: 2 – Web Supported

Learning hours:

Indicative directed hours	90
Self-directed hours	60
Total learning hours	150

Rationale for allocation of hours:

This course is offered in a **block course** format. This is a part-time study model making it accessible to persons who can not attend a full-time study programme. The study cycle comprises of one or more block courses (accounting for the class contact hours) and self-directed study. Course work assignments and projects are completed during the self-directed study period and the final examination is conducted at the end of term.

Purpose:

To develop knowledge and understanding of drinking water quality control parameters and treatment methods, and of current and emerging treatment technologies for liquid and solid wastes.

Pre-requisite:

CET4.213 Water and Wastewater (Introduction)

Learning outcomes:

On successful completion of this course the student will be able to:

No	LEARNING OUTCOME
83.	Evaluate and apply drinking water standards and quality parameters.
84.	Understand and appraise the principles and practice of water treatment.
85.	Evaluate and apply waste water quality parameters.
86.	Demonstrate knowledge of wastewater and solid waste treatment and disposal methods.
87.	Critically evaluate environmental impact and Maori cultural values in relation to water supply and waste management.

Content/main topics:

- Drinking water characteristics; quality parameters, Drinking water standards; public health and safety.
- Water treatment components and processes.
- Waste water sources, waste water characteristics, quality parameters.
- Centralised waste water treatment system components and processes, decentralised waste water treatment systems, septic tanks, recirculation sand filters, oxidation ponds, advance pond systems, wetlands, evapo-transpiration beds, spray irrigation, etc.
- Nature, quantities and methods of solid waste disposal.
- Environmental impact studies, Cultural attitudes and perspectives on water and waste water management.

Basis of assessment:

All assessments in this course are achievement based. The Final Overall Mark will be the sum of the Coursework Mark and the Examination Mark as detailed below.

The Coursework Mark is the weighted sum of the test, assignment, project, etc, marks. Course Information sheets (issued at the start of each course) will detail the individual weightings and coverage of each assessment task and end of term examination.

Assessment requirements:

ASSESSMENT TYPE	WEIGHTING	LEARNING OUTCOMES
Project and Presentations	40%	2,4,5
Tests	10%	1,3
Examination	50%	1,2,3,4

**Refer Course Information Sheet for the individual weighting of assignments, projects and tests*

Learning and Teaching Strategies

As appropriate to the discipline and to the practice and resources of the delivering Institution. Typically a blend of the following:

• Lectures	• Computer simulation
• Tutorials	• Videos
• Formative assessments	• Project investigations
• Visiting guest lecturers	• Field trips
• Web technologies	

Required texts:

None. Printed course notes are provided