

TK1004

Diploma in Engineering Technology (Highways)



Te Kura Matatini o Taranaki

WITT

WESTERN INSTITUTE
OF TECHNOLOGY
AT TARANAKI**Course Descriptor****DET4.102****Engineering Mathematics 1**

Elective

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

Approved by
 Academic Standards Committee

Resolution No. 10/ASC.11/5

Learning hours:

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 directed 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 context.

Prerequisites:

There are no prerequisites.

Recommendations:

Success in this subject requires students to have a basic level of competence in mathematics at NCEA Level 2 standard. It is recommended that students do a refresher course/s to ensure they have current competence to achieve at this skill level.

Learning outcomes:

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

No	LEARNING OUTCOME
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:
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 & 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 & 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 & 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 TASK	WEIGHTING	LEARNING OUTCOMES
Assignments	30%	1, 2, 3, 4, 5
Tests	20%	1, 2, 3, 4, 5
Examinations	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	• Group work
• Web technologies	• Computer Simulation
• Videos	• Laboratories

Required texts:

None. Printed course notes are provided.

**Course Descriptor****WITT credit value:** 15**Level:** 4**Duration:** 20 Weeks**Internet based learning indicator:** 2 – Web SupportedApproved by
Academic Standards CommitteeResolution No. 10/ASC11/5**Learning hours:**

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 directed 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.

Prerequisites:

There are no prerequisites.

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Identify and describe the composition of minerals and rocks, and discuss soil & 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, steel, 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, steel, timber and new materials in Civil Engineering.

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%	1,4
Assignments/Tests	15%	1,2, 3,
	25%	4
Examination	20%	1, 2, 3,
	30%	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.

PROGRAMME CODE:

PROGRAMME TITLE:

TK1004

Diploma in Engineering Technology (Highways)



Te Kōwhiri Mātauranga o Taranaki

WITT

WESTERN INSTITUTE
OF TECHNOLOGY
AT TARANAKI**Course Descriptor**

COURSE CODE:

COURSE TITLE:

DET4.202**Land Surveying 1**

Elective

WITT credit value: 15**Level:** 4**Duration:** 20 Weeks**Internet based learning indicator:** 2 - Web SupportedApproved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

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 directed 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

Prerequisites:

There are no prerequisites.

Learning outcomes:

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

NO	LEARNING OUTCOME
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.

Content/main topics:

- Principles of land surveying, survey instruments and targets, safety in surveying
- Fundamental principles and techniques of levelling, traversing fundamentals, co-ordinate 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:

TK1004

Diploma in Engineering Technology (Highways)



Te Kōwhiri Mātauranga o Taranaki

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 OF TECHNOLOGY
 AT TARANAKI

Course Descriptor

COURSE CODE:

COURSE TITLE:

DET5.207

Geotechnical Engineering 1

Compulsory

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

Approved by
Academic Standards Committee

Resolution No. 10/ASC/5

Learning hours:

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 directed 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.

Prerequisites:

There are no prerequisites

Learning outcomes:

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

No	LEARNING OUTCOME
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.

Content/main topics:

- Soil composition,
- Soil laboratory tests: grading analysis, plasticity characteristics (LL, PL, PI, CPL, SL)
- 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.



Course Descriptor

DET6.101 Engineering Management (Civil)

Elective

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

Approved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

Directed contact 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 directed 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

Prerequisites:

There are no prerequisites.

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Demonstrate an understanding and apply the fundamentals of project planning and project management
2.	Prepare and evaluate and prepare cost estimates, tender documentation and contract documentation
3.	Administer and supervise contracts in accordance with the relevant Standards and/or Codes of Practice
4.	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 (eg. 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



Course Descriptor

DET5.203 Hydraulics (Civil)

Elective

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

Approved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

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 directed 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:

There are no prerequisites.

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Understand and 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.	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 flat, 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.

PROGRAMME CODE:

PROGRAMME TITLE:

TK1004

Diploma in Engineering Technology (Highways)



Te Kaitiaki Mātāhiaki o Taranaki

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 AT TARANAKI

Course Descriptor

COURSE CODE:

COURSE TITLE:

DET5.204 Highway Engineering 1

Compulsory

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

Approved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

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 directed 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 geometric design.

Prerequisites:

There are no prerequisites.

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Outline and describe road infrastructure administration agencies, road transportation funding mechanisms and principles of route location,
2.	Evaluate the properties and testing of road earthworks, pavement and wearing surface materials and demonstrate knowledge of road construction practice
3.	Demonstrate an understanding of the components, functions and design of surface drainage for roads
4.	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, role and responsibilities of roading agencies in NZ, funding sources and mechanisms
- Site establishment, road formation terminology, earthworks materials and construction practice, subgrade preparation, subgrade 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.



Course Descriptor

DET6.101 Engineering Management (Civil)

Elective

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

Approved by
Academic Board

Resolution No. 10/AB05/4

Learning hours:

Tutor contact hours	60
Self-directed hours	90
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

Prerequisites:

There are no prerequisites.

Learning outcomes:

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

NO	LEARNING OUTCOME
1.	Demonstrate an understanding and apply the fundamentals of project planning and project management
2.	Prepare and evaluate and prepare cost estimates, tender documentation and contract documentation
3.	Administer and supervise contracts in accordance with the relevant Standards and/or Codes of Practice
4.	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
- Requirements of discipline specific Conditions of Contract (eg. NZS3910), dispute resolution
- Professionalism and Ethics, consultation, Treaty of Waitangi.

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

TK1004

Diploma in Engineering Technology (Highways)



Te Kōwhiri Mātauranga o Taranaki

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 AT TARANAKI

Course Descriptor

DET6.202**Highway Engineering 2**

Compulsory

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

Approved by
 Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

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 directed 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.

Prerequisites:

DET5.204 Highway Engineering 1(Co-requisite)

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Evaluate the feasibility of roading projects
2.	Design the geometrical and structural components of a road
3.	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, surface water run-off rates, hydraulic design of surface draining conduits, sub-surface drainage design, culvert location and sizing, 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

**Course Descriptor****WITT credit value:** 15**Level:** 6**Duration:** 20 Weeks**Internet based learning indicator:** 2 - Web SupportedApproved by
Academic Standards CommitteeResolution No. 10/ASC 11/5**Learning hours:**

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 directed 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 traffic engineering concepts and fundamentals.

Prerequisites:

There are no prerequisites.

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Plan and evaluate a range of traffic surveys
2.	Understand and apply the principles of traffic flow theory and traffic management
3.	Demonstrate knowledge of intersection design fundamentals, and design at-grade intersections
4.	Evaluate and apply road safety analysis principles and procedures.
5.	Understand and appraise the design factors relating to traffic facilities for non-vehicle road users.

Content/main topics:

- Route location principles, traffic growth and traffic forecasts, traffic surveys
- Levels of service, road capacity, traffic flow characteristics and modelling, road hierarchy, access and movement functions, traffic impact assessment, Traffic calming, parking facilities
- Intersection design fundamentals and practice, at grade intersection design
- Accident prevention and reduction, accident investigation procedures and analyses, road safety audits
 - Types and characteristics of non-vehicle road users; methods to reduce passenger vehicle road usage; sustainable transport modes; alternatives to roading; advantages and disadvantages resulting from a decrease in vehicle usage.

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
Assignment/Projects	40%	1, 3, 4, 5
Tests	10%	1,2
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	• Group work
• Project investigations	

Required texts:

None. Printed course notes are provided



Course Descriptor

WITT credit value: 15

Level: 6

Duration: 20 Weeks

Internet based learning indicator: 2 – Web Supported

 Approved by
 Academic Standards Committee

 Resolution No. 10/ASC11/5
Learning hours:

Tutor contact hours 40

Self-directed hours 110

 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 integrate and synthesise knowledge in one or more project based learning experiences.

Prerequisites:

 DET5.207 Geotechnical Engineering 1
 DET5.204 Highway Engineering 1

Learning outcomes:

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

NO	LEARNING OUTCOME
1.	Develop a preliminary design, based on sound engineering practice, for a civil engineering construction project.
2.	Undertake well defined planning of construction work in a civil engineering environment.
3.	Evaluate compliance of the project to specification.
4.	Present findings to an audience in a professional manner.

Content/main topics:

- Research options for planning and construction to meet specifications of a selected civil engineering project.
- Identification and application of relevant standards basic design, commissioning methodology, detailed plan, safety requirements, environmental impact.
- A written structured report that includes executive summary, aim, background, preliminary design calculations, drawings and specification, discussion, references.
- Presentation of an overview of the project to peers and/or industry representatives.

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 and Presentations	100%	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	• Web technologies
• Formative assessments	• Visiting guest Lecturers
• Videos	• Project investigations
• Group work	• Presentations
• Tutorials	• Computer simulation

Required texts:

None. Printed course notes are provided



Course Descriptor

WITT credit value: 15

Level: 6

Duration: 20 weeks

Internet based learning indicator: 2 – Web Supported

Approved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

Class contact hours 55

Self-directed hours 95

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 study the materials and construction requirements of road pavements and wearing surfaces including material properties and requirements, construction technology and the design of chip seals and asphalt mixes.

Prerequisites:

DET5.204 Highway Engineering 1 (Co-requisite)

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Evaluate the properties and requirements of pavement materials
2.	Evaluate earthworks and subgrade preparation requirements
3.	Demonstrate skills and knowledge required to competently oversee pavement layer construction
4.	Apply compaction practice and soil improvement techniques in the construction of roadworks
5.	Evaluate wearing course properties and requirements
6.	Evaluate the properties and applications of a range of bituminous binders
7.	Carry out chipseal design
8.	Carry out asphalt mix design
9.	Evaluate the properties and applications of a range of pavement marking materials and techniques.

Content/main topics:

Aggregate properties: desirable characteristics, sampling and testing, clay index, sand equivalent, cleanness value, crushing resistance, weathering quality index, abrasion resistance, CBR, shear strength.

Aggregate production: quarries, processes, storage, legislation and by-laws, management plan approval.

Earthworks operations: earthworks planning and design, setting out, cut/fill/borrow waste, batter slopes, vegetation cover, subgrade preparation, subgrade evaluation, planning and implementation of construction phases, setting out, construction plant and equipment, quality control, soft areas, subgrade improvement options, specifications.

Base and sub-base construction: planning and implementation of construction phases, plant and equipment selection, construction processes, quality control, surface preparation, specifications.

Soil improvement: compaction technology: compaction testing standards, factors affecting compaction of soils, compaction behaviour of free-draining and non-free-draining soils, compaction equipment, in-situ compliance testing: nuclear density meter, indirect methods, lime stabilisation, cement stabilisation, modification vs. cementation, testing, construction procedure, quality control, safety, geo-synthetics.

Wearing surfaces: types (including unsealed, chipseal, asphaltic concrete, open graded porous asphalt, stone mastic asphalt, PMB, slurry seals), road noise, skid resistance, roughness, permeability, water spray, friction restoration techniques, selection criteria.

Bituminous materials: origin and manufacture, types (penetration grades, cutback bitumen, emulsions), binder properties, testing and quality control, additives (adhesion agents, fluxing agents, anti-foaming agents), aging, oxidation, specifications.

Chipseal design and construction: aggregate requirements, testing, skid resistance, treatment selection, binder selection, aggregate size selection, chip application rates, binder application rate, basecourse surface preparation, binder spray rate determination (cutbacks and emulsions), spray rate controls, chipping and rolling requirements, sweeping and painting, quality control, specifications.

Bitumen emulsion sealing practice: emulsion selection, aggregate selection, surface preparation, construction procedures and controls, quality control.

Asphaltic concrete design and construction: materials, mix composition, mix design, plant requirements, surface preparation, transportation, placing and compaction, quality control, asphalt plant processes, dust extraction and control, quality control, safe handling of bituminous materials, specifications.

Pavement Marking Practice: Marking materials and delineation alternatives: paint, thermoplastic, cold applied plastic, beads, RPM's. Marking material selection, quality control, retro-reflectivity, skid resistance, application rates and application technology. Specifications including MOTSAM and Transit New Zealand specification covering materials testing and approvals, application and quality control.

Basis of assessment:

All assessments in this course are achievement based.

Assessment requirements:

The **final** mark is a combination of a **coursework** mark and an **examination** mark.

Component	Assessment Task	Learning Outcomes	Weighting
Coursework Mark	Assignments	1, 2, 3, 4, 5, 6, 9	30%
	Design Projects	7, 8	20%
Examination Mark	1 x 2½-hour examination (LO 1-4: 25%) 1 x 2½-hour examination (LO 5-9: 25%)		50%
Final Mark	Coursework mark + examination mark		100%

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

Required texts:

None. Printed Course notes are provided



Course Descriptor

WITT credit value: 15

Level: 7

Duration: 20 weeks

Internet based learning indicator: 2 – Web Supported

Approved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

Class contact hours	55
Self-directed hours	95
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 study a range of advanced transportation engineering topics including the role and implementation of land transport programmes, project evaluation procedures, quality management systems and asset management practices and systems.

Prerequisites:

DET5.204 Highway Engineering 1 (Co-requisite)

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Evaluate the role and requirements of land transport programmes
2.	Carry out project evaluation procedures
3.	Explain and evaluate a quality management system
4.	Demonstrate knowledge of, and apply all aspects of, Lifecycle Asset Management
5.	Demonstrate knowledge and understanding of the roles of the various parties to contracts
6.	Describe Asset Management Systems and how they contribute to AM practice

Content/main topics:

- Land Transport Programmes: National Land Transport Programme, Regional Land Transport Programmes, including Maintenance Programmes, Improvement Works and Road Safety Programmes
- Economic Evaluation: Transportation economics, specific procedures, simplified procedures, full procedures, crash analysis, risk analysis guidelines, Project Feasibility Report (PFR), Scheme Assessment Report (SAR), planning and environmental impact assessment, cost estimation
- Quality Management: Concepts of quality, quality Systems – ISO 9000 and documentation
- Asset Management: Infrastructural asset management, asset management process, setting and measuring road levels of service, asset data collection, road condition assessment and performance measurement, valuing roading assets, replacement cost, depreciation, asset management plans, optimised decision making and risk management
- Maintenance Contracts: Types of contracts, contract administration procedures, contract roles, tendering processes, network management contracts, PSMCs, hybrid contracts. Impact of recent legislation, eg. Local Government Act 2002.
- Road Asset Maintenance Management Systems: eg. RAMM, inventory, data collection, information outputs, treatment selection, reporting, predictive deterioration modelling (eg. HDM4, dTIMS)

Basis of assessment:

All assessments in this course are achievement based.

Assessment requirements:

The **final** mark is a combination of a **coursework** mark and an **examination** mark.

ASSESSMENT TASK	LEARNING OUTCOME(S)	WEIGHTING
*Assignments, projects and/or class tests	1,2,3,4,5,6	50%
1 x 2.5 hour examination	1,2,3	25%
1 x 2.5 hour examination	4,5,6	25%
Final Mark		100%

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

Required texts: Coursework notes provided.

TK1004

Diploma in Engineering Technology (Highways)



Te Kōwhiri Mātauranga o Taranaki

WITT

WESTERN INSTITUTE
OF TECHNOLOGY
AT TARANAKI**Course Descriptor**

DET7.340

Geometric Design**WITT credit value:** 15**Level:** 7**Duration:** 20 Weeks**Internet based learning indicator:** 2 – Web SupportedApproved by
Academic Standards Committee

Resolution No. 10/ASC11/5

Learning hours:

Class contact hours 50

Self-directed hours 100

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 study road geometrics in detail and to apply knowledge and skills gained to the safe, functional and aesthetic design of road alignments in accordance with the requirements of current Codes of Practice.

Prerequisites:

DET6.202 Highway Engineering 2 (Co-requisite)

Learning outcomes:

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

NO	LEARNING OUTCOME
1.	Evaluate geometric design criteria
2.	Develop a horizontal alignment and prepare setting-out data for an alignment comprising plain circular curves
3.	Apply super-elevation to produce a safe and aesthetic horizontal alignment
4.	Develop a horizontal alignment and prepare setting-out data for an alignment incorporating transition curves
5.	Develop suitable designs for reverse, compound and similar curves
6.	Apply a range of horizontal alignment safety and aesthetic requirements
7.	Develop a vertical alignment that meets safety and aesthetic requirements
8.	Co-ordinate horizontal, vertical and auxiliary alignment requirements

Content/main topics:

- Horizontal alignment: Speed parameters, horizontal curve types and elements, plain circular curves, super-elevation, transition curves, unit chords, reverse curves, compound curves, lane widening, sight distance on horizontal curves.
- Vertical alignment: Elements, crest and sag curves, longitudinal grades, vertical curve properties, reduced levels through vertical curves, high and low points, asymmetrical curves, sight distance requirements, vertical curve length.
- Road cross-sections: Cross-sectional elements and dimensions, auxiliary lanes, coordination of horizontal and vertical alignment, alignment design using speed environment concepts.
- Roadside features: safety barriers, traffic signs, delineators.

Basis of assessment:

All assessments in this course are achievement based.

Assessment requirements:

The **final** mark is a combination of a **coursework** mark and an **examination** mark.

Component	Assessment Task	Learning Outcomes	Weighting
Coursework Mark	Assignments	1-7	15%
	Minor Project	4, 7	10%
	Major Project	8	25%
Examination Mark	1 x 3-hour examination		50%
Final Mark	Coursework mark + examination mark		100%

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

Required texts: Course notes are provided

TK1004

Diploma in Engineering Technology (Highways)



Te Kura Mātauranga o Taranaki

WITT
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 AT TARANAKI

Course Descriptor

DET7.360 Pavement Engineering II
WITT credit value: 15

Level: 7

Duration: 20 Weeks

Internet based learning indicator: 2 – Web Supported

 Approved by
 Academic Standards Committee

 Resolution No. 10/ASC11/5

Learning hours:

Class contact hours	50
Self-directed hours	100
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 present an in-depth treatment (advanced applications) of pavement design and pavement rehabilitation design, and to produce designs - both for new pavements and for rehabilitation projects - in accordance with the requirements of current Codes of Practice.

Prerequisites:

DET5.204 Highway Engineering I – Co requisite

Learning outcomes:

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

No	LEARNING OUTCOME
1.	Demonstrate knowledge of pavement design fundamentals
2.	Evaluate material requirements for pavement design
3.	Determine the design traffic loading for pavement design
4.	Design flexible pavements using mechanistic analysis
5.	Investigate and design pavement rehabilitation options

Content/main topics:

- Introduction to mechanistic analysis: Elastic concepts and parameters, pavement modelling, distress modes, performance criteria, mechanistic design procedure.
- Materials characterisation: Factors affecting strength, elastic characterisation and performance criteria for unbound granular materials, cemented materials, and asphaltic concrete.
- Sub-grade characterisation: Factors affecting strength (modulus), sub-grade investigation, sub-grade improvement techniques, elastic characterisation and performance criteria.
- Design traffic determination: Definition of design traffic, standard loads, load equivalency, design period, traffic growth, levels of traffic data, traffic counting methods, design traffic calculations.
- Pavement rehabilitation: Rehabilitation treatment methods, granular overlay design techniques, asphaltic concrete overlay design techniques, stabilisation treatment design, computer applications.

Basis of assessment:

All assessments in this course are achievement based.

Assessment requirements:

The **final** mark is a combination of a **coursework** mark and an **examination** mark.

Component	Assessment Task	Learning Outcomes		Weighting
Coursework Mark	Assignments	1, 2, 3, 5	20%	50%
	Project	4,	20%	
	Case Study	All	10%	
Examination Mark	1 x 3-hour examination			50%
Final Mark	Coursework mark + examination mark			100%

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