

**TRINITY INTERNATIONAL UNIVERSITY**

**presents the**

**GENERAL AND AVAILABLE DEGREE PROSPECTUS**

**for the**

**B Sc (Hons) in Soil Science Technology**

## INDEX

1. General Information	Page 3
2. Degree Supervisors	Page 3
3. Enrollment Information and Course Fees	Page 4
5. Course Structure	Page 5
6. Student Documentation	Page 6
8. Degree Courses for the B Sc (Hons) in Soil Science Technology	Page 7
9. Degree Syllabus	Page 8
9.1 General Information	Page 8
9.2 Specific Degree Syllabus	Page 10

## 1. GENERAL INFORMATION

### ABOUT THE DEGREE PROGRAMS

**Specially prepared by**

**Professor Dr J Potgieter  
Course Director  
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These undergraduate and postgraduate degree courses have been specially prepared for distance learning purposes and are intended to fill the special needs for the university. Students will be entitled to receive credit for life-work experience based on the norms and standards set by CAEL and previously completed studies at recognized academic institutions under the University's accreditation for prior learning program.

Undergraduate degree programs are designed for students who wish to pursue a scientific related program in either the scientific or managerial science fields of endeavor.

These programs are designed and have been compiled from sources and materials NOT RELATED to any existing degree programs offered anywhere. The textbooks selected and syllabuses are based according to the latest materials, developments, technologies and systems applicable in the field of endeavor.

All courses are textbook related and suitable assignments and examinations are set for each course to be completed by students. Where applicable, fieldwork and practical work will be prescribed. Theses and assignments must follow the usual format and structure requirements set by each faculty.

## 2. DEGREE SUPERVISORS

**Under the guidance of Prof Dr J Potgieter PhD (Eng), PhD (Aviation Science), D Lit, D Sc (hc), PhD (Bus Admin), D Eng (Industrial Eng) the following programs are supervised:**

B Sc (Hons) Industrial Engineering (Electrical and Mechanical Majors)  
 B Sc (Hons) Agricultural Science  
 B Sc (Hons) Agricultural Engineering  
 B Sc (Hons) Agricultural Management  
 B Sc (Hons) Hydrological Science  
 B Sc (Hons) Mechatronics Engineering  
 B Sc Forensic Science  
 M Sc Forensic Science

**Under the guidance of Prof S M Keong PhD(Eng), PhD (Eng Mgt), D Sc (Concrete), M Sc (Civil Eng), M Sc (Geot Eng), C Eng, MICE, MIEE, MCIOB, FBEng, FSE, C Math the following programs are supervised:**

B Sc (Hons) Structural Engineering  
 B Sc (Hons) Concrete Technology  
 B Sc (Hons) Soil Science Technology

**Under the guidance of Professor Dr S Grima B Com, B Com (Hons), M Sc (Fin Man), M Sc (Accountancy), PhD (Finance), FIPFM, FDTMS, FIAB, AFA the following program is supervised:**

M Sc Financial Management

### 3. ENROLLMENT INFORMATION AND COURSE FEES

Here are the fees for the available degrees:

<b>Degree</b>	<b>Cost</b>
Associate Degree (as separate degree or part of Bachelors Degree):	\$1800-00 USD
Bachelors Degree (excluding associate degree)	\$1800-00 USD
Bachelors Degree (including Associate Degree)	\$3600-00 USD
Masters Degree	\$2600-00 USD
PhD (in any approved field of research)	\$3600-00 USD

Textbooks are NOT included and are separately quoted. Costs depend on the nature of the program, exemption granted as well as courier/transportation and importation/tax fees applicable to the student's country of residence.

#### **PAYMENT METHODS**

We accept: Personal checks, bank drafts, electronic transfer and credit card payments. Payment by means of installments must be arranged.

#### **ENROLLMENT DETAILS AND ADDRESS**

Internet enrollments are possible on our website at: [www.trinityinternationalcu.com](http://www.trinityinternationalcu.com) by following the instructions. Applicable fees are payable by means of a personal check, draft, direct transfer or credit card payments. We accept installments and any approved arrangements for payment of fees.

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## 5. COURSE STRUCTURE

The programs have been structured to ensure they are suitable to any organization or person anywhere in the world. Students will be able to commence with their studies any time of the year. The programs are structured to allow a) students without a high school diploma or b) mature students to study up to the highest degree level. Students without the usual entrance level qualification, but with acceptable basic knowledge are welcome to apply and will be able to study their intended program from first principles. Bridging courses will be prescribed to ensure that the student has the required level of knowledge. Many introductory courses have enough scope and are of such nature, which allows students to advance up to degree level and prepare students for more advanced level work.

### OVERVIEW

#### Objective

The programs are designed for students who wish to study their field of interest most suitable to them. The course programs are suitable for students anywhere in the world and will be complimented with fieldwork, practical requirements and coursework as well as assignments most suitable to the needs of each student. Where applicable, courses will be adapted for special needs on topics, study areas and research areas not included as listed in the various programs. These programs are suitable for distance education or campus learning centers approved by the Course Director. The purpose is also to enable students to acquire the knowledge and theoretical understanding with skills to equip them to advance from basic principles to the higher level in their fields of study. We further strive to provide the mature candidate whom has gained acceptable training, education and experience, an acceptable method to advance to the higher degree levels in his/her career. Our third aim is to ensure that candidates develop their professional careers and gain acceptance through membership or certification or by joining international or local professional institutions.

#### ENTRY METHOD (as indicated on the [Admissions Page](#))

- A suitable school level certificate (to advance through studies to senior school certificate level), or
- A senior school leaving certificate/diploma for degree candidates
- Mature students with suitable training and experience

#### EXEMPTIONS (as indicated on the [Admissions Page](#))

Students with completed courses, certificates, diplomas or degrees will be considered for exemption. Partial exemption may be granted where applicable. Additional coursework will be prescribed, to complete the outstanding coursework in question in order to gain full credit for each course where applicable.

#### DURATION

No time limit is set but as a guide the usual durations are:

Associate degrees - from one to two years

Bachelor's degree programs - from two to four years

Master's degree programs - from one to two years

Doctorates - from two to three years, depending on the amount of work involved.

## **LEARNING METHODS**

- Coursework requirements assignments
- Textbook related studies, notes and articles,
- Fieldwork, research, practical work assignments
- Learning sources such as libraries, Internet and dedicated learning sources

## **METHOD OF ASSESSMENT**

Assignments, projects, independent projects, examinations and independent theses or projects and dissertations as applicable to assess student professionalism.

## **TEXTBOOKS**

Textbooks are prescribed for each course. Where applicable additional learning sources available on the Internet will be utilized. The Course Director will assist students with the arrangement and ordering of textbooks. An estimate will be given to students giving the cost for the textbooks related to his/her studies. Students are responsible for additional study aids, notepads and any other equipment required to study efficiently. A complete reading list will be given for each degree programs upon successful admission to your program of choice.

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## **6. STUDENT DOCUMENTATION**

All students at all degree levels will receive the following:

- Information about the required textbooks.
  - Study instructions and assignments.
  - Coursework and fieldwork as required.
  - Syllabus details for each course.
  - Student handbook – basic study requirements and information
  - Student guidelines on how to prepare assignments, theses, proposals and dissertations.
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## 8. DEGREE COURSES

### B Sc (Hons) IN SOIL SCIENCE TECHNOLOGY

#### Compulsory Courses

BUS/COM1	Business Communication (i) Administration (ii) Management
FS/CBR2	Applied Science (i) Physics I (ii) Physics II
FC/CBR3	Chemistry
CBR5A	Mathematics I (i) College Algebra (ii) Differential Calculus (iii) Integral Calculus I (iv) Integral Calculus II
SST/AGR001	Mathematical Statistics
SST/ARG003	Soil Science
SST01	Physical Geology
SST/CIT05	Fluid Mechanics
SST02	Mineralogy
SST/HST02	Hydrology Practice
SST/CIT04	Computers in Geology (i) Basic Programming Principles (ii) Programming in C, C++
SST03	Applied Geo-Physics
SST04	Geological Mapping
SST/AGR002	Environmental Science

#### Optional Courses Section 1: Select any three courses from –

SST/CIT13	Engineering Geology
SST05	Foundation Mechanics
SST06	Earth Quakes
SST/MIT02	Metallurgical Science
SST/MIT03	Mineral Processing

#### Optional Courses Section 2: Select any four courses from –

SST/MIT09	Resources Assessment and Planning
SST/MIT08	Strategic Management
SST/AGR042	Ecology and Natural Resources Policy
SST/HST09	Conservation of Natural Resource
SST/HST11	Conservation of Water Resources
SST/HST14	Marine Geo-Physics
SST/AGR039	Conservation of Forests

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## 9. DEGREE SYLLABUS

### 9.1 GENERAL INFORMATION

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#### GENERAL NOTES AND INFORMATION APPLICABLE TO EACH COURSE

##### Pre-requisites

Will be stated if required, but as a guide the structure of the courses and the sequence determine the basic requirements in each case. Usually, mathematics, physics and chemistry are the major tools and form the basic in each case for each program. This is followed by courses required in each case to fulfil the needs for successful completion during the entire study process.

**Number of Credits:** 3

##### Hours Assigned:

2 hours/week x 14 weeks or the equivalent via distance learning = 28 hours

##### Laboratory/practical:

2 hours/week x 7 weeks or its equivalent via distance learning = 14 hours

Total = 42 hours

##### Contents:

Each course contents are listed below and the general notes and information is applicable to each program.

##### Objectives A: The subject syllabus provide students with -

- 1 The basic skills for analyzing and improving working methods, procedures and systems in the context of the workstation and a department taking into account ergonomic considerations so that they are able to carry out a production management project in a company for the purpose of management and productivity improvement.
- 2 Skills in the use of compilation of work measurement data and to have a basic understanding of the techniques and importance of qualifying work in manufacturing and service industries hence to be able to measure the work content
- 3 A working knowledge of the techniques of facilities layout and their interaction with the material handling system (where relevant), to enable them to evaluate an existing production system and recommend improvements and/or to plan a new system.

##### Objectives B: The subject aims to -

- 1 Provide students with an understanding of the basic principles and techniques involved in management of people and engineering in the production of goods and services.
- 2 Enable students to appreciate the importance of quality management.
- 3 Ensure students are aware of the effects on engineering organizations of the factors in the environment within which they operate.

**Objectives C: Provide students with -**

- 1 The ability to perform research, use the knowledge obtained from each course of the program and to compile and sort the information obtained.
- 2 To be able to use the knowledge obtained to write the research project and to use proper methods, language and techniques to complete the task. Be able to use computer packages and software for the preparation of research projects and reports.

**Teaching and Learning Approach:**

A mixture of lectures, tutorial exercises and case studies will be used to deliver the various topics in the subject. Some will be covered in a problem-based format where this enhances the learning objectives. Others will be covered through directed study in order to enhance the student's ability of what to learn. Some case studies, largely based on consultancy experience, will be used to integrate these topics and thus demonstrate to students how the various techniques are inter-related and how they apply in real situations.

**Assessment:**

Coursework - 40%  
Examination - 60%

**Textbooks and References:**

Listed separately for convenience and reference.

## 9.2 SPECIFIC DEGREE SYLLABUS

### B Sc (Hons) IN SOIL SCIENCE TECHNOLOGY

#### Compulsory Courses

##### **BUS/COM1 - Business Communication**

Research methods, Libraries and Internet, Referencing, Criteria and plagiarism, Essays and articles, Letters at work, Business proposals and business plans, Reports, Academic proposals and theses, Presentation skills for individuals and groups, Illustrations – graphics and power point.

##### **FS/CBR2 – Applied Science**

**Part I – Physics I:** Introduction and mathematical concepts, Kinetics in one dimension, Kinetics in two dimensions, Forces and Newton's laws of motion, Work and energy, Impulse and momentum, Rotational dynamics, Rotational kinetics, Simple and harmonic motion and elasticity, Fluids, Temperature and heat, The transfer of heat, The ideal gas law and kinetic theory, Thermodynamics, Waves and sound, the principle of linear superposition and interference phenomena

**Part II – Physics II:** Electric force and electric fields, Electric potential energy, Electric circuits, Magnetic forces and magnetic fields, Electromagnetic induction, Alternating current circuits, Electromagnetic waves, The reflection of light, Mirrors, The refraction of light, Lenses and optical instruments, Interference and the wave nature of light, Special relativity, Particles and waves, The nature of the atom, Nuclear physics and radioactivity, Ionizing radiation, Nuclear energy and elementary principles.

##### **FSR/CBR3 - Chemistry (general chemistry)**

Basic principles; Atomic structure and chemical bonding; reactions in aqueous medium; Precipitation and complex formation and redox; Gases; Thermo-chemistry; Engineering applications of chemical equilibrium and kinetics in corrosion; Combustion; Welding and water treatment; Inorganic and organic polymers.

##### **CBR5A - Mathematics I**

Composed as:

College Algebra I  
Differential Calculus I  
Differential Calculus II  
Integral Calculus I  
Integral Calculus II

Complex numbers, Hyperbolic functions, Determinants, Vectors, Differentiation, Differentiation applications, Partial differentiation, Curves and curve fitting, Series, Integration, Integration applications, Approximate integration, Polar coordinates, Multiple integrals, First order differential equations, Second order differential equations, Operator D methods, Statistics.

##### **SST/AGR001 - Mathematical Statistics**

Introduction; Graphical representation of statistical results; Measures of central location; Measures of dispersion; Basic probability concepts; Probability distribution; Sampling and sampling distributions; Confidence intervals; Hypothesis testing: Means and proportions, the

Chi-square statistic; Index numbers; Simple linear regression and correlation; Time series analysis; Financial calculations: Interest and annuities; Tables and references.

### **SST/ARG003 - Soil Science**

Soil in engineering, Formation of soil and soil deposits, Subsurface exploration, Physical and index properties of soils, Permeability of soils, Capacity, Seepage, Stresses in soils, Compressibility: settlement, Shear of slopes, Stability of slopes, Lateral earth pressure, Site improvement, Bearing capacity – shallow foundations, References.

### **SST01 - Physical Geology**

Solar energy to earth and the seasons; Earth's modern atmosphere; Atmosphere and surface energy balances; Global temperatures; Atmospheric and oceanic circulations; Water and atmospheric moisture; Weather; Water resources; Global climate systems; The dynamic planet; Tectonic, earthquakes and volcanism; Weathering, Karst Landscapes and mass movement; River systems and landscapes; Eolian processes and arid landscapes; The oceans, coastal processes and landforms; Glacial and periglacial processes and landforms; The geography of soils; Ecosystem essentials; Terrestrial biomes; Earth and the human denominator.

### **SST/CIT05 - Fluid Mechanics**

Introduction, Properties of fluids, Fluid static's, Basics of fluid flow, Energy in steady flow, Momentum and force in fluid flow, Similitude and dimension analysis, Steady incompressible flow in pressure conduits, Forces on immersed bodies, Steady flow in open channels, Fluid-flow measurement, Unsteady-flow of compressible fluids, Ideal flow mathematics, Hydraulic machinery – pumps, Hydraulic machinery – turbines, References.

### **SST02 - Mineralogy**

Introduction; Physical properties of materials; Elements of crystal chemistry; Mineral reactions stability and behavior; Crystallographic concepts; Selected point groups and space groups; Analytical methods in mineral science; Crystal chemistry and systematic descriptions of native elements; Sulfides and sulfosalts; Crystal chemistry and synthetic description of oxides; Hydro-oxides and halides; Crystal chemistry and synthetic description of carbonates, nitrates, borates, sulfates, chromates, tungstates, molybdates, phosphates, arsenates and vanadates; Crystal chemistry of rock-forming silicates; Systematic description of rock-forming silicates; Gem minerals; Determinative tables and references.

### **SST/HST02 - Hydrology Practice**

Introduction; Hydrologic measurements and data sources; Statistical methods in hydrology; Precipitation; Interception and depression storage; Evaporation and transpiration; Infiltration; Surface water hydrology; Hydrographs; Groundwater hydrology; Urban hydrology; Hydrologic simulation and streamflow synthesis; Hydrology in design; References.

### **SST/CIT14 - Computers in Geology**

Problems and problem solving; General concepts and tools; Arithmetic and logical operators; Developing an algorithm to solve a problem; Modularization; Functions and procedures; Arrays; File processing; Reports and control breaks; Processing the date; Introduction to object-oriented programming.

Introduction, Fundamental data types, Objects decisions, Functions, Iteration, Testing and debugging, Classes, Vectors and arrays, Pointers, Streams, Inheritance, Object oriented design, Recursion, Algorithms, An introduction to data structures, Advanced C++ language, Coding guidelines, C++ language summary, Java.

**SST03 - Applied Geo-Physics**

Gravity methods; Magnetic method; Radioactivity surveys; Electric current methods; General considerations; Direct current methods; Induced polarization; Electromagnetic methods; VLF methods; Seismic methods; General considerations; Seismic reflection; Seismic refraction; References.

**SST04 - Geological Mapping**

Fundamentals and nature of geological maps; Three dimensional aspects; Measurements in three-dimensions; Geological-cross sections; Visual assessment of outcrop patterns; Uniformities; Folds; Faults; Igneous and metamorphic rocks; Geological history from maps; Maps in environmental geology; The heritage of geological maps; The production of geological maps; References.

**SST/AGR002 - Environmental Science**

Environmental sciences and sustainable development; The global environmental debate; Environmental policies and policy processes; Environmental economics in environmental management; Population; Vulnerability and criticality; The global warming debate; Coastal management; River processes and management; GIS in environmental science; Groundwater pollution and protection; Marine and estuarine pollution; Urban air pollution and health; Environmental risk management; Energy politics; Preventing disease; Managing global commons.

**Optional Courses Section 1: Select any three courses from –****SST/CIT13 - Engineering Geology**

Origin and development of the earth, Minerals, Igneous rocks, Sedimentary rocks, Metamorphic rocks, Engineering properties of rocks, Elements of soil mechanics, Rock weathering and soils, Stratigraphy and geologic time, Structural geology, Running water, The work of glaciers, Physiographic provinces and engineering aspects, Landslides, subsidence and slope stability, Ground water geology, Coastal processes and landform features, Earthquakes and geo-physics, Sub-surface investigation and site selections, Arid environments and wind, Engineering geology and environmental geology, References and information.

**SST05 - Foundation Mechanics**

Introduction; Basic concepts of dynamics and vibrations; Dynamics of discrete systems; Multi-degree of freedom systems; Numerical methods for free vibration analysis; Numerical methods for forced vibration analysis; Vibrations of continuous systems and elastic media; Dynamics of soils and foundations; Finite element method to foundation dynamics; Frame foundations and structures; Vibration isolation and control; Tests for the evaluation of design parameters; General guidelines for design and construction of machine foundations; References.

**SST06 - Earthquakes**

Introduction to geo-technical earthquake engineering; Seismology and earthquakes; Strong ground motion; Seismic hazard analysis; Wave propagation; Dynamic soil properties; Ground response analysis; Local site effects and design ground motions; Liquefaction; Seismic slope stability; Seismic design of retaining walls; Soil improvement for remediation of seismic hazards; References.

**SST/MIT02 - Metallurgical Science**

Structure and bonding of atoms; Atomic arrangements in materials; Structural phases; Their formation and transitions; Defects in solids; Characterization of materials; Physical properties of materials; Mechanical behavior of materials; Strengthening and toughening; Modern alloy developments; Ceramics and glasses; Plastics and composites; Corrosion and surface engineering; Bio-materials; Materials for sports; References.

**SST/MIT03 - Mineral Processing**

Introduction; Ore handling; Metallurgical accounting; Control and simulation; Particle size analysis; Comminution; Crushers; Grinding mills; Industrial screening; Classifying; Gravity concentration; Dense medium separation (DMS); Froth flotation; Magnetic and high tension separation; Ore sorting; De-watering; Tailings disposal; References.

**Optional Courses Section 2: Select any four courses from –****SST/MIT09 - Resources Assessment and Planning**

Introduction and the origins of resources – minerals the foundation of society, the origins of earth resources; History and environmental impact of resource usage – earth's resources through history, environmental impacts of resource exploitation and use; Energy – energy from fossil fuels, energy for the future; Metals – abundant metals, the geo-chemically scarce metals; Fertilizer, chemical, construction and industrial resources – fertilizer and chemical minerals, building materials and other industrial minerals; Water and soil for life support – water resources, soil as a resource, future resources; References.

**SST/MIT08 - Strategic Management**

Analysis of the competitive situation; Strategic management; The environmental and external stakeholders; Organizational resources and competitive advantage; Strategy formulation; Strategic direction; Strategy formulation at the business-unit level; Strategies for entrepreneurship and innovation; Corporate-level strategy and restructuring; Strategy implementation and control; Strategy implementation: design and control; Global strategic management and the future.

**SST/AGR042 - Ecology and Natural Resources Policy**

Natural resources – an overview; Management considerations; Basic ecology; Planning; Policy and administration; Atmospheric resources and climate; Water resources; Soil: the basic land resource; Ecosystems; Forests and forestry; Range-land and food production; Farmland and food production; Outdoor recreation; Urban land-use management; Wildlife conservation and management; Fishery conservation and management; Bio-diversity and endangered species management; Mineral resources; Non-renewable energy resources; Renewable energy; The sustainable path to a secure future; Natural resources and international development; Economics and economic systems; Sustainable development; Technology and the future.

**SST/HST09 - Conservation of Natural Resources**

Natural resource conservation and management: past, present and future; Economics and ethics and critical thinking: tools for creating a sustainable future; Lessons from ecology; the human population challenge; World hunger: solving the problem sustainability; The nature of soils; Soil conservation and sustainable agriculture; Pesticides: protecting our crops, our health and our environment; Aquatic environments; Managing resources sustainability waters; Water pollution; Fisheries conservation; Rangeland management; Forest management; Plant and animal extinction; Wildlife management; Sustainable waste management; Air pollution; Air pollution: global problems; Minerals, mining and a sustainable society; Non-renewable

energy resources: issues and options; Creating a sustainable system of energy: efficiency and renewable energy.

### **SST/HST11 - Conservation of Water Resources**

Introduction; Water management; Water supply and development; Water use and wastewater generation; Conveying and distributing water; Wastewater and storm-water systems; Water quality; Water quality models; Systems for treating wastewater and water; Physical treatment processes; Chemical treatment processes; Biological treatment processes; Processing of sludges; Advanced wastewater treatment processes and water reuse.

### **SST/HST14 - Marine Geo-Physics**

Introduction; Locating offshore observations; Seabed imaging by sonar and lidar; Seismic exploration at sea – a theoretical background; Seismic data acquisition at sea; The marine gravity field; The earth's magnetic field at sea; Heat flow; Investigations of the sea floor using electrical methods; Seabed exploration using radiometric methods; Geo-physical observations in offshore boreholes; Deep-sea geo-physics and the changing geometry of the oceans; Studies of the oceanic lithosphere – the sedimentary cover; Studies of the oceanic lithosphere – the coastal basement and upper mantle; Investigations of divergent and transform continental margins; Studies of subduction zones.

### **SST/AGR039 - Conservation of Forests**

What is wildlife, diversity and forest? Species composition; Age structure; Spatial heterogeneity; Edges; Islands and fragments; Shores; Dying, dead and down trees; Vertical structure; Intensive silviculture; Special species; Management of plants; Organizational responsibilities; References.