

TRINITY INTERNATIONAL UNIVERSITY

presents the

GENERAL AND AVAILABLE DEGREE PROSPECTUS

for the

B Sc (Hons) in Hydrological Science

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 Hydrological Science	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
© Copyright protected**

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:

Degree	Cost
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 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.

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.

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.
-
-

8. DEGREE COURSES

B Sc (Hons) IN HYDROLOGICAL SCIENCE

Compulsory Courses

BUS/COM1	Business Communication (i) Administration (ii) Management
FS/CBR2	Applied Science (i) Physics I (ii) Physics II
FSR/CBR3	Chemistry (general chemistry)
CBR5A	Mathematics I (i) College Algebra (ii) Differential Calculus (iii) Integral Calculus I (iv) Integral Calculus II
HST/AGR001	Mathematical Statistics
HST/ARG003	Soil Science
HST01	Environmental Geology
HST/CIT05	Fluid Mechanics
HST/AGR004	Agricultural Technology
HST02	Hydrology Practice
HST/CIT14	Water Supply
HST03	Stream and River Hydrology
HST/AGR002	Environmental Science
HST04	Waste Water Management
HST05	Public Health Engineering
HST06	Industrial Water Management

Optional Courses: Select any six courses from -

HST07	Industrial Conservation
HST08	Water Resource Assessment
HST/AGR042	Ecology and Natural Resources Policy
HST09	Conservation of Natural Resources
HST10	Marine Ecology Conservation
HST11	Conservation of Water Resources
HST/AGR039	Conservation of Forests
HST12	Environmental and Water Management
HST13/AGR044	Agricultural and Environmental Case Studies
HST14	Marine Geo-Physics

9. DEGREE SYLLABUS

9.1 GENERAL INFORMATION

Developed by Professor Dr J Potgieter
Copyright protected ©

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 HYDROLOGICAL SCIENCE

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.

HST/AGR001 – Mathematical Statistics

Introduction to business statistics, Graphical representation of statistical results, Measures of central location, Measures of dispersion, Basic probability concepts, Probability distributions, Sampling and sampling distributions, Confidence intervals, Hypothesis testing – means and

proportions, Hypothesis testing – the Chi-square static, Index numbers, Simple linear regression and correlation, Interest and annuities, References.

HST/ARG003 – Soil Science

Soil as natural resource, Soil texture, Particle size distribution, Bulk density and soil porosity, Soil water content, Water movement in soil, Environmental influence on soil formation, Properties of colloids in the soil environment, Types of soil acidity, Liming acid soils, Soil degradation by salinity and sodality, Soil testing, Available phosphorus in soils, Soil organic matter and chemical sorption, Microbial decomposition of organic materials in soil, Soil survey reports.

HST01 – Environmental Geology

An overview of our planetary environment; Rocks and minerals; Internal processes; Earthquakes; Volcanoes; Surface processes; Coastal zones and processes; Mass movements; Geology and climate: glaciers, deserts and global climate trends; Water resources; Soils as a resource; Mineral and rock resources; Energy resources – fossil fuels; Energy resources – alternative sources; Waste disposal; Water pollution; Air pollution; Environmental law; Land-use planning and engineering; Geologic time; Geologic process rates; Introduction to topographic and geologic maps and satellite imagery; Mineral and rock identification; References.

HST/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.

HST/AGR004 – Agricultural Technology

The importance of power and technology, Opportunities in agricultural power and technology, Safety in agricultural power and technology, Tools, instruments and fasteners, Equipment maintenance facilities and storage, Applying science principles and practices with agricultural equipment, Tractors, Crop production equipment, Production equipment, Turf and landscape equipment, Specialty equipment, Irrigation equipment, Selecting and using electric motors, Internal combustion engine systems and functions, Maintaining gasoline engines and systems, Rebuilding small air-cooled gasoline engines, Maintaining diesel engines, Engine efficiency, Power trains - using hydraulic systems, using pneumatic systems, using robotics, Electronic systems, Precision technology, Variable rate technology, Yield monitors and controllers, Remote sensing, References.

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.

HST03 – Stream and River Hydrology

Hydrology principles; Hydrologic analysis; frequency analysis; Flood routing; Hydrologic simulation models; Urban hydrology; Floodplain hydraulics; Ground water hydrology; Design issues in hydrology; GIS applications in hydrology; Radar rainfall applications in hydrology; Floodplain management issues in hydrology; References.

HST/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.

HST04 – Wastewater Management

Introduction; Filtration and equipment; Chemical additives that enhance filtration; Selecting the right filter media; Principles of pressure and cake-filtration; Cartridge and other filters; Sand filter principles; Sedimentation technologies; Flotation, clarification and membrane separation technologies; Ion exchange and carbon adsorption; Water sterilization technologies; Treating sludge; References.

HST06 – Industrial Water Management

Introduction; Water quality; Water treatment processes; Basic design considerations; Pre-design report, screening and aeration; Water conveyance, flow measurement and planning; Coagulation, flocculation and precipitation; Sedimentation; Filtration; Color, taste and odor control; Disinfection and fluoridation; Water stability, clearwell, high-service and distribution systems; Residuals processing and disposal; Plant siting, layout, yard piping and hydraulic profile; Process control; References

Optional Courses: Select any six courses from -

HST07 – Industrial Conservation

Introduction; Overview of the industrial ecology intellectual framework; Sustainable development; Industrial ecology; Industrial ecology infrastructure; Applications to practice: sector initiatives, techniques and tools, research and development; Complex systems; Economic issues; Legal issues; Government structure and industrial ecology policy formulation; The private firm; Case studies: structured design for environment, is the private firm compatible with a sustainable world?, policy case study – the Netherlands, enhanced national security case study – the United States.

HST08 - Water Resources Assessment

Principles of flow in hydro-systems; Flow processes and hydrostatic forces; Hydraulic processes; Pressurized pipe flow; Hydraulic processes – open channel flow; Ground water flow; Surface runoff; Reservoir and stream flow routing; Probability; Risk and uncertainty analysis for hydraulic and hydraulic design; Water withdrawals and uses; Water distribution; Water for hydroelectric generation; Flood control; Storm-water control; Street and highway drainage and culverts; Design of spillways and energy dissipation for flood control storage and conveyance systems; References.

HST/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.

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.

HST10 - Marine Ecological Conservation

The coastal environment, Coastal management: players and jurisdictions; Marine and coastal hazards; Coastal pollution; Ocean dumping; Offshore oil development and transport; Open space preservation and management; Towards integrated coastal and marine sanctuary management.

HST11 - Conservation of Water Resources

Introduction; Water management; Water supply and development; Water use and wastewater generation; Conveying and distributing water; Wastewater and stormwater 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.

HST/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.

HST12 - Environmental Water Management

The nature and organization of water; Energy flow, equilibrium and change; The earth's surface; The atmosphere; Bio-element cycling, the biological environment; The cellular basics of life; Population dynamics; Biological communities; Eco-systems; Terrestrial and aquatic biomes; Land utilization: a focus on agriculture and forestry; The major extractive industries; Energy production, pollution and waste management; Water pollution; Waste management; Case studies: focus on oil pollution – the Exxon Valdez, Chernobyl, Bhopal; References.

HST13/AGR044 - Agricultural and Environmental Case Studies

Introduction; Arctic wilderness and wildlife; Tropical forests and bio-diversity; Industrial revolution and pollution; Estuaries; Seagrass meadows and saltwater ecosystems; Air-pollution, history, trends and legislation; Population principles and demography; Green revolution agriculture; Sustainable agriculture; Petroleum resources – fossil fuels; Nuclear power; Sustainable energy; Global change; Ozone depletion; Managing hazardous wastes.

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.